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Lessons From Studying the International Economics of Intellectual Property Rights

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I. INTRODUCTION

When the Uruguay Round negotiations began in 1986, the subject of intellectual property rights ("IPRs") was completely unfamiliar to international trade economists. Presumably the area was ignored because global trade policy concerns had not moved into questions of domestic business regulation. Even today, readers will search in vain for serious treatments of the trade implications of exclusive rights to intellectual property ("IP") in international economics textbooks.

Despite this general inattention, a small but growing literature has emerged in which trade economists have framed specific questions and applied theory and statistical analysis to them. This literature has advanced the understanding of the role of IPRs in the international economy from the realm of speculation to the boundary of hard analysis based on facts and evidence. It has demonstrated that it is possible to use data to assess hypotheses about the economics of global intellectual property protection. Prior to the construction of the evidence that is the subject of this Article, strong claims based on largely unexamined assumptions were made on both sides of the debate. Thus, for example, American trade authorities could push global negotiations on higher standards of protection by claiming that they would result in a long-term flowering of innovation and international technology transfer. Opponents could oppose such standards on the basis of fears that stronger IPRs would destroy channels of inexpensive access to technologies, medicines, and information products. Evidence suggests that there is some truth in both claims, but far more exaggeration.

In this Article, I provide an overview of what international economists have learned from studying IPRs in the global context. While progress has been made, many of the results remain subject to statistical and analytical uncertainty and wide areas of research remain insufficiently explored. There is much about the functioning of IPRs that we do not understand very well, particularly in the context of promoting economic development.

My approach is to list a series of conclusions from the literature. In each case I note whether the conclusions are robust or re-

main tentative. The critical feature underlying confidence assessment is whether the hypotheses are supported with systematic econometric evidence. Inevitably, the inferences drawn reflect largely my interpretations of this work. Since much of the work reviewed is my own, the discussion herein cannot be considered completely impartial.[1]

II. QUESTIONS ASKED AND PARTIALLY ANSWERED

Each of the issues covered in this Section could support a series of extensive articles. My intent here is to distill the main lessons and indicate where further research is needed. I state the issues as hypotheses and then provide explanatory discussion.

A. There Are Good Reasons to Study the International Economics of IPRs

A fundamental question is whether international economists can add value to the analysis of IPRs. Economic approaches to patents, copyrights, trademarks, and related devices typically adopt a closed-economy approach without distinguishing among interests of different countries. For example, standard patent analysis seeks to identify optimal patent scope, requiring a complex calculation among the interests of innovators, consumers, and second comers. Actual patent regimes may then be assessed relative to optimal structures, though such comparisons are fraught with conceptual and practical difficulties.

1. One Size Does Not Fit All

In principle, this approach could be extended to the global economy with a simple relabeling of interests. Thus, we may identify four "country types" with divergent interests in global protection. First, *IP exporters* are net producers and sellers of intellectual property, with a consequent interest in strong international rights. Second, *high-income IP importers* are net purchasers of intellectual property but their industries require access to sophisticated technological inputs and their consumers prefer high-quality, differentiated products. Thus, they generally favor strong protection but are more amenable to limits on that protection. Third, *IP followers*

1. The material I review is discussed in far more detail and nuance in my book, KEITH E. MASKUS, INTELLECTUAL PROPERTY RIGHTS IN THE GLOBAL ECONOMY (2000).

are industrializing economies that need access to modern technologies but prefer that such access be inexpensive and readily diffused among their industries. Such countries have mixed interests between protective standards to encourage incoming investment and technology flows and weak standards to promote imitation and learning. Finally, *low-income IP importers* produce little IP domestically and rely on foreign suppliers for new products and technologies. Their interests lie in having weak IPRs.

Thus, it is possible to envision a global social planner that would optimally select a set of international IPRs standards that would achieve balance among these interests, with compensation paid from countries that gain income to those that lose income. However, IPRs are the province of national governments, not a global planner. Accordingly, national policies do not attempt to maximize global consumer surplus, but rather reflect the predominance of interests within each country. Thus, for example, it is possible for stronger patents in industrializing countries to have beneficial long-term effects in terms of enhanced technology transfer and domestic innovation, but harmful short-term effects in terms of higher-cost imitation and additional rent transfers to foreign IP owners. Any country with myopic policymakers would oppose such protection. This outcome seems likely in that the short-term losers could be domestic enterprises with strong lobbying power.

Put differently, the existence of different national standards is a basic reason for studying IPRs as an international economic issue. Like standard trade barriers, IPRs may be selected to discriminate against foreign interests. Moreover, IPRs may protect the inefficient rents of favored economic actors.

However, there are three important differences between trade restrictions and IPRs that diminish the force of this analogy. First, tariffs and quotas operate as taxes on trade, thereby interfering with economic efficiency and creating wasteful rents. Powerful evidence exists that all countries gain from reducing their trade barriers. In contrast, IPRs are not taxes with clear damage to efficiency. Rather they are business regulations that either support or hinder the competitive functioning of markets. Therefore, it is impossible to establish a uniform standard of optimality that would apply in each country. Put more starkly, what does "free trade" mean in the IPRs context? It cannot be based on fully harmonized standards in all nations. Instead, each country should select standards that promote efficient growth while minimizing distortionary influences on the allocation of international trade and investment.

This prescription is not easy to translate into practical statements about global IPRs policy.

A second difference is that while there are strong similarities among tariffs and quotas in how they affect trade, the term "intellectual property rights" covers an enormous range of policies that could have quite disparate impacts on economic activity. Patents, copyrights, trademarks, geographical indications, trade secrets, protection for chip designs, and plant breeders' rights differ in their objectives, scope, and operation. It is misleading to claim that any country has clear interests in strong or weak IPRs, for its interests likely vary by functional area.

Finally, while trade restrictions may be aimed at overcoming market failures or achieving particular non-economic goals, they are inefficient mechanisms for doing so and should be avoided. Trade barriers fulfill such goals at high cost and, because they are indirect policies, they may be ineffective or counterproductive. In contrast, IPRs are more intimately related to issues of social regulation. In the first instance, they are aimed directly at addressing failures in markets for information and innovation. In so doing, they could either harm or help prospects for attaining social objectives, such as ensuring reasonable access to information technologies, medicines, and seed varieties. It is impossible to issue blanket statements about the inadvisability of employing IPRs for such purposes.

2. Economies Differ in Important Ways

A second general reason why international economists can say useful things about IPRs is that closed-economy models need not pay attention to variations in collateral regulation. For example, analyses of American or European Union patent policy correctly presume that competition law is adequate to prevent inappropriate use of market power established in patent grants. However, competition policies are weak in the vast majority of developing economies, and simply translating patent models into those economic contexts is at best misleading. Thus, a licensing practice that might be a manageable competition problem in the American market could be a substantial difficulty for authorities in poor countries.

This observation pertains to a wider class of economic policies, including restrictions on trade and investment, promotion of human capital acquisition, development of capital markets, construction of technology infrastructure, and other forms of industrial

policy. In brief, economies vary widely in their underlying policy regimes that make IPRs more or less effective. Unfortunately, analysis of how these factors interact with IPRs at varying levels of economic development is scarce and discursive rather than systematic and empirical.

3. Globalization and Technical Change Lie at the Root of the Problem

We are in a period of rapidly expanding international economic activity, particularly regarding implicit or explicit trade in technology and goods protected by intellectual property rights. Moreover, protection of intellectual property through patent applications and trademark registrations is rising rapidly, particularly in major developing economies.[2] Thus, the international demand for IPRs is growing dramatically. In today's global economy, the creation of knowledge and its adaptation to product designs and production techniques are essential for commercial success. Firms wish to exploit their technical advantages on an international scale and to limit misappropriation from potential rivals. These tasks are made easier by the adoption of stronger and more uniform IPRs in different countries.

For their part, governments and enterprises in many industrializing and developing countries increasingly recognize that a closer connection to international sources of technology is important for encouraging their own development. Governments agree to strengthen IPRs in the hope of attracting investment and advanced technologies. Indeed, domestic firms may lobby for stronger protection in order to facilitate their linkages with multinational enterprises. Thus, globalization of technology trade is itself the key factor in explaining systemic change in intellectual property rights.

Two other factors are critical as well. One is that the costs of copying and imitating products from important sectors of technology are falling, making infringement easier and more prevalent. A final strain on the classical IPRs system is that many of the newer technologies do not fit comfortably within standard conceptions of industrial property and artistic property. Computer microcircuits, software programs, biotechnological inventions, and electronic transmissions all strain the limits of classical patent or copyright laws. Thus, even within developed countries the area of intellectual property law remains in considerable flux.

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2. *See* MASKUS, *supra* note 1, at 66-73 (providing data on patent applications, trademark applications, and applications for plant variety registrations in several countries).

These elements explain the substantial rise in demand on the part of intellectual property owners for stronger and more harmonized global standards of protection. In turn, they underlie the massive efforts mounted by the United States and the European Union to reform the global IPRs system, culminating in the negotiation of the Agreement on Trade-Related Aspects of Intellectual Property Rights ("TRIPS") in the World Trade Organization ("WTO"). There also has been an accommodating rise in the global supply of IPRs. Whether the increases in demand and supply are in rough balance remains to be seen. However, as I argue later, many countries are not in a position to enforce tighter standards. Thus, trade economists could pay attention to mechanisms for encouraging appropriate compliance with TRIPS and other obligations in IPRs.

B. Intellectual Property Rights Are Hard to Measure

The most fundamental task supporting empirical analysis is to measure the strength of IPRs on a consistent international basis. This is an especially difficult undertaking, and any numerical measures that claim to capture IPRs accurately are subject to sharp criticism. IPRs may be compared to underlying characteristics governing economic structure, such as factor endowments, infrastructure, and the judicial system. Unlike tariffs, IPRs are not readily measurable, nor do they have obvious impacts on prices. Complicating the picture is that identical laws may have different effects in countries that vary in market structures and preferences.

It is impossible to account fully for the magnitude and strength of IPRs on a comparative basis across countries. Instead, economists develop qualitative rankings, based on laws, of IPRs as measures of inputs into economic and social production.

For example, some analysts count the number of World Intellectual Property Organization ("WIPO") conventions of which nations are members as a measure of commitment to minimal global standards. However, because these conventions cannot be enforced, membership reflects a "best-efforts" commitment without much meaning. Thus, economists have found little correlation between membership and international economic activity.[3]

Others have attempted to capture the strength of IPRs and their enforcement more comprehensively through detailed consid-

3. *See* Michael J. Ferrantino, *The Effect of Intellectual Property Rights on International Trade and Investment*, 129 WELTWIRTSCHAFTLICHES ARCHIV 301, 319-23 (1993).

eration of each nation's laws.[4] The first cross-country index was developed by Rapp and Rozek ("RR").[5] They read legal texts regarding each country's patent laws and assessed their conformity with the minimum standards proposed by the U.S. Chamber of Commerce.[6] Their approach considered only the existence of features of patent law, such as working requirements and product patents for pharmaceuticals, and did not consider enforcement. Their scale ranged from zero, signifying the absence of a patent law, to five, indicating full conformity with the minimum standards. Thus, the index was subjective and attempted to capture differences in many complex legal issues.

This approach was extended significantly by Ginarte and Park ("GP").[7] They rated the patent laws of most countries every five years from 1960 to 1990, based on five components: duration of protection, extent of coverage, membership in international patent agreements, provisions for loss of protection, and enforcement measures.[8] Each component was further broken down into characteristics determining its effective strength.[9] These sub-components were aggregated into national scores, with a minimum possible score of 0.0 and a maximum of 5.0.[10] The GP index is a more comprehensive reflection of variations in patent laws than is RR. One interesting feature of the former is that it showed little change in legislated patents in the 1980s but significant and widespread strengthening between 1990 and 1995.

The GP and RR indexes offer useful information about legal commitments to protecting patents over a broad set of nations. However, the difficulties of capturing the effective strength of a complex range of policies in a single index must be kept in mind. Further, no studies have assessed the international strength of copyrights, trademarks, or plant breeders' rights.

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4. For early attempts, see the papers collected in INTELLECTUAL PROPERTY RIGHTS: GLOBAL CONSENSUS, GLOBAL CONFLICT? (Michael R. Gadbaw & Timothy J. Richards eds., 1988).

5. *See* Richard T. Rapp & Richard P. Rozek, *Benefits and Costs of Intellectual Property Protection in Developing Countries*, J. WORLD TRADE, Oct. 1990, at 75, 78-81.

6. *See id.* (citing UNITED STATES CHAMBER OF COMMERCE, GUIDELINES FOR STANDARDS FOR THE PROTECTION AND ENFORCEMENT OF PATENTS (1987)).

7. *See generally* Juan Carlos Ginarte & Walter G. Park, *Determinants of Patent Rights: A Cross-National Study*, 26 RES. POL'Y 283 (1997).

8. *See id.* at 284. These data have now been updated to 1995 and were provided to the author by Walter Park.

9. *See id.*

10. *See id.*

C. Intellectual Property Rights Are Endogenous

Unsurprisingly, there is a positive correlation between patent rights and real GNP per capita. This claim was first analyzed by Maskus and Penubarti using a version of the RR index.[11] In fact, it seems that patent rights become weaker as incomes rise from low levels, strengthen at middle-income levels, and accelerate at highest income levels. Thus, there is a quadratic relationship between IPRs and GNP per capita. I have updated this analysis using the GP index for 1990 and a sample of 72 countries.[12] To the basic specification I added the number of the scientists and engineers employed as a percentage of the labor force, measures of aggregate market size, openness to trade and investment, and the secondary school enrollment ratio as determinants of patent rights. Controls were added for whether countries were former British or French colonies, which has a material effect on their patent laws. Independent variables were lagged five years. This specification resulted in the following equation:

$$\begin{aligned} PATENT = {} & \mathbf{10.8} - \mathbf{2.58}\log(INCOME) + \mathbf{0.17}[\log(INCOME)]^2 - \\ & 0.01SCHOOL + \mathbf{0.06}OPEN - 0.01\log(GDP) + \mathbf{0.08}S\&E \\ & + \mathbf{0.23}UKCOL + \mathbf{0.33}FCOL; \\ R^2 = {} & 0.37. \end{aligned}$$

Significant coefficients are in boldface. Note that, controlling for other influences, the inverted-U relationship between patent strength and real per-capita income remains intact. Using these results, the income at which expected patent protection becomes weakest is approximately $2,000 per capita in 1985 international dollars. Moreover, the expected patent index is the same for economies with per-capita GNP of $500 and $7750, indicating that there is a large range of income variation before protection becomes stronger than at its low-income levels.

The variable measuring trade openness had a significant impact on the patent index.[13] The school enrollment ratio was insignificant, perhaps because secondary enrollment figures mask substantial differences in human capital formation. The intensity of scientists and engineers in the labor force had a strongly positive

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11. *See* Keith E. Maskus & Mohan Penubarti, *How Trade Related Are Intellectual Property Rights?*, 39 J. INT'L ECON. 227, 235-37, 240 (1995).

12. *See* MASKUS, *supra* note 1, at 102-09.

13. *See* Ginarte & Park, *supra* note 7, at 296 (detecting a positive effect in their regressions).

impact on patent strength. Thus, as economies engage in more inventive activity the demand for intellectual property protection grows.

The finding that patent protection falls as incomes rise to moderate levels before rising again suggests that economies in the early stages of industrialization have the strongest interests in weak IPRs. As their manufacturing sectors deepen they find stronger patents helpful in ensuring orderly technology transfer and protecting their own innovation. For example, for many middle-income economies, including Brazil and Mexico, actual protection lagged behind that predicted by the regression equation. In this regard, the significant upgrading of IPRs observed in the 1990s in Brazil and Mexico likely resulted in part from stronger domestic interests in tighter protection.

D. TRIPS Will Shift Income Among Countries

An interesting question is whether TRIPS will have an important short-run impact on the international distribution of patent rents. A recent attempt at studying this question was made by McCalman.[14] He looked at bilateral patent statistics across 29 countries in 1988 and analyzed the implicit values of those patent rights. It is possible to infer the value of patent rights in each country by relating the decision to patent to local conditions. The GP index is useful for such analysis for it decomposes patent laws into components reflecting their specific characteristics. This permitted a close attempt at capturing the patent changes required by TRIPS in each country. For example, Canada has strengthened its enforcement mechanisms and has raised the private value of patents by removing working requirements. Similarly, many developing countries must upgrade enforcement, remove working requirements, provide for reversal of burden of proof, and lengthen patent duration. Because such components may be identified in the GP index, their impact on patent value could be estimated econometrically.

McCalman applied these estimates to bilateral patent data to compute the anticipated rise in patent value. By making imitation more costly, stronger patents would permit higher license fees for inventors, generating higher net rent transfers abroad to the

14. *See generally* Phillip McCalman, Reaping What You Sow: An Empirical Analysis of International Patent Harmonization (June 1999) (working paper, University of Wisconsin-Madison).

extent that licensors are foreign. In turn, the higher license fees on existing patents would cut the willingness of local firms to license, generating additional losses. It is important to understand the nature of this exercise, which was to ask what the additional net present value of patents would have been in 1988, had each country in the data sample provided patent rights in compliance with TRIPS. Because innovation and patenting rates were held constant, it was inherently a static exercise in shifting rents. I have updated McCalman's figures to millions of 1995 dollars through the use of national GDP deflators and exchange rates.

The computations demonstrate that the overwhelming share of rents transferred by stronger global patent rights would accrue to the United States. TRIPS required the United States to strengthen its patent regime only marginally, implying a small outward rent transfer on existing patents. However, American firms owned huge portfolios of patents abroad. The additional strength of patent laws in host countries would have transferred an additional $5.85 billion in rents, for a net gain to the United States of $5.76 billion. Other developed countries that would receive net inward transfers include Germany ($1.23 billion) France ($831 million), Italy ($277 million), Sweden ($217 million), and Switzerland ($36 million). The United Kingdom would experience a sizeable gross inward rent flow of around $588 million, but a larger outflow of $1.22 billion. The United Kingdom was required by TRIPS to provide for preliminary injunctions, establish reversal of burden of proof in certain process patent cases, and make willful patent infringement subject to criminal action.[15] The Japanese case was similar, with a net rent loss of $589 million. Among developed economies, Canada would realize the largest net loss from net changes in patent values, at $1.04 billion. Canadian patent changes would increase sharply the value of patents held there. However, foreign patents held by Canadian firms are overwhelmingly located in the United States and their value would not increase by much.

Among developing countries, the gross outward transfer would rise with the size of economies and the extent of patent reform. Because its citizens own so few patents, India would receive negligibly higher inward transfers, but the value of foreign-owned patents would rise by $430 million. The result for Korea was similar, with a net outward transfer of $454 million. However, this re-

15. These calculations reflect McCalman's interpretation of how well the GP index captured both existing patent laws and those required by TRIPS. Such interpretations are subject to error.

sult is outdated because Korean firms have been granted far more patents abroad since 1988. Thus, applied to 2000 patent portfolios the gross inward transfer would be much larger. Brazil would experience the largest net outward transfer among all countries in the sample, at $1.7 billion.[16]

These rent transfers are economically significant. Thus, for example, the rent-transfer gain on patents of $5.9 billion would complement U.S. short-run gains from standard trade liberalization in the Uruguay Round by 42%.[17] Canada's short-run gains would be cut by 94 percent, from $1.106 billion to $66 million, and Brazil's by 76 percent, from $2.239 billion to $532 million. Accounting for the patent-valuation aspect of TRIPS, Mexico would actually experience a net welfare loss in the short run. McCalman went on to compute the deadweight losses in each country from forcing technology purchasers to pay higher prices. Net static welfare impacts would be the sum of the rent transfers and deadweight patent losses. Only the United States accrued large welfare gains, though France, Germany, and Italy registered small net benefits. Across all countries, the welfare losses induced by stronger patents amounted to as much as 20% of the global efficiency gains from trade liberalization.

E. IPRs Stimulate International Economic Activity

The preceding discussion suggests that for technology importing nations to benefit from stronger IPRs there must be dynamic gains that could emerge over time. Such gains could come from enhanced flows of international trade, investment, and technology transfer, which would augment growth prospects. The empirical literature is reasonably optimistic on this score.

1. Patents and International Trade

Intellectual property rights were taken up in the Uruguay Round on the grounds that weak and variable standards distort international trade. In theory, limited protection could raise or reduce trade, depending on demand characteristics, market structure, the ability of countries to prevent infringement, and other factors. It is also possible that highly protective IPRs could deter legitimate trade or facilitate collusive behavior that would limit competition

16. For further calculations, see MASKUS, *supra* note 1, at 184.

17. These trade-liberalization gains were taken from Glenn A. Harrison et al., *Quantifying the Uruguay Round*, *in* THE URUGUAY ROUND AND THE DEVELOPING COUNTRIES 217 (Will Martin & L. Alan Winters eds., 1996).

through trade.[18] The basic tradeoff when countries adopt stronger patents is between greater market power for rights-owning firms, permitting higher profits on lower trade volumes, and greater market demand for those firms as local imitators are made less competitive, inducing higher trade flows. Thus, no certain prediction may be made about the impacts of variable patent rights on trade volumes. A clear picture can emerge only from empirical analysis.

In a pair of studies, Maskus and Penubarti estimated the impact of patent rights on 1984 bilateral trade in manufacturing sectors.[19] The data set incorporated 22 exporting countries and 71 importing nations covering all levels of economic development. Explanatory variables included importer per-capita GNP, tariffs in the importer, and a version of the RR index. The patent index was interacted with dummy variables for small and large developing countries in order to capture the effects of market size and technological capacity.

The authors found that within the group of large developing economies the strength of national patent laws exerted a statistically significant and positive effect on bilateral imports in many product categories. Thus, in these countries the market-expansion effect dominated. Put differently, weak patents in large developing economies are barriers to manufacturing exports from the OECD countries. The impacts were positive but weaker in the group of small developing countries, suggesting that net market-expansion effects largely operated in these nations as well. Interestingly, the pharmaceuticals sector registered positive impacts of patents on import volumes.

To assess the economic significance of these results, I computed the increases in international trade flows that the model would predict from changes in national patent rights.[20] The coefficients were applied to crude estimates of the rise in patent indexes implied by implementation of the TRIPS Agreement. The scenarios entailed marked increases in the indexes of developing countries but did not impose full harmonization with laws in developed countries. The implied trade effects were long run in nature and would emerge only after TRIPS standards are phased in and markets adjust to the new policy regimes. Taking all manufacturing goods to-

18. *See* Keith E. Maskus & Mohan Penubarti, *Patents and International Trade: An Empirical Study*, *in* QUIET PIONEERING: ROBERT M. STERN AND HIS INTERNATIONAL ECONOMIC LEGACY 95, 95-97 (Keith E. Maskus et al. eds., 1997).

19. *See id.*; Maskus & Penubarti, *supra* note 11, at 233-37, 244.

20. *See* MASKUS, *supra* note 1, at 115.

gether, in the small developing economies as a group perhaps $2.7 billion in additional annual imports would be created. This came to 6.2% of total merchandise imports of this group in 1984. Manufacturing imports by the large developing countries would expand by between $14.7 billion and $24.2 billion per year. These sums range from 5.4% to 8.9% of 1984 merchandise imports of these nations, suggesting that stronger patent rights would cause marked increases in import demand. Finally, the small policy changes envisioned in the developed economies would induce an additional $7.9 billion in imports, or perhaps 0.6% of merchandise imports.

Smith recently updated these studies by analyzing manufacturing exports of U.S. states to 96 countries in 1992.[21] Smith attempted to identify market-power and market-expansion effects in countries distinguished by their abilities to imitate products. Her econometric results found that market-expansion effect dominated among the industrial countries, attesting to the effectiveness of their IPRs in deterring imitation. This was especially the case in patent-sensitive industries, such as chemicals and instruments. The market-expansion impact was pronounced in U.S. trade with middle-income economies displaying weak patent rights and strong imitation threats. Thus, countries such as Brazil and Malaysia should observe rising trade volumes as protection increases. Finally, the market-power effect dominated among the group of nations, primarily the least developed countries, with weak imitation and strong patent regimes.

These studies support two important conclusions. First, weak patent rights are significant barriers to manufacturing trade, particularly in IPRs-sensitive goods. However, this situation holds primarily within the group of industrializing economies that pose credible imitation threats. It is no surprise that these countries have been the main focus of complaints about weak intellectual property rights. As these countries strengthen their regimes, they should attract rising import volumes of high-technology goods, which may have a beneficial growth impact. Second, poor countries without much ability to imitate products are not a competitive threat. Thus, their weak patent regimes do not concern technology developers. As they adopt stronger patents their economies could be exposed to monopoly impacts with negative effects on their terms of trade.

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21. *See* Pamela J. Smith, *Are Weak Patent Rights a Barrier to U.S. Exports?*, 48 J. INT'L ECON. 151, 158-59 (1999).

2. Patents and Foreign Direct Investment

Economic theory suggests that the relationships between IPRs and Foreign Direct Investment ("FDI") are subtle and complex.[22] Identifying these relationships requires empirical analysis. Despite their potential significance, few studies have included IPRs as a potential determinant of FDI. Two early studies could not find any relationship between simple measures of IP protection and the international distribution of FDI by U.S. multinational enterprises.[23] Nor could a more recent paper find significant effects of patent rights on FDI in a gravity framework.[24] Thus, there are doubts about the ability of econometric studies to find such impacts.

Two recent studies find positive evidence, however. In the first, survey results were used to develop an index of perceived weakness of IPRs in destination countries on the part of U.S. firms.[25] In the econometric model, the authors found that weak patents had a significantly negative impact on the location of American FDI.[26] In the second, I argued that estimation should account for the joint decisions made by MNEs.[27] In particular, multinational firms may choose to export, increase investment, or transfer technology directly in response to stronger patent rights.[28] I estimated a simultaneous set of equations to capture these joint impacts, controlling for other relevant influences, for a set of 46 destination countries, using annual data from 1989-1992.[29]

To summarize results, the level of patent strength in developing countries was positively associated with both exports to af-

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22. *See* Keith E. Maskus, *The Role of Intellectual Property Rights in Encouraging Foreign Direct Investment and Technology Transfer*, 9 DUKE J. COMP. & INT'L L. 109, 128 (1998).

23. *See* Edwin Mansfield, *Unauthorized Use of Intellectual Property: Effects on Investment, Technology Transfer, and Innovation*, *in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY 107, 112-14 (Mitchell B. Wallerstein et al. eds., 1993); Keith E. Maskus & Denise Eby Konan, *Trade-Related Intellectual Property Rights: Issues and Exploratory Results*, *in* ANALYTICAL AND NEGOTIATING ISSUES IN THE GLOBAL TRADING SYSTEM 401, 406 (Alan V. Deardorff & Robert M. Stern eds., 1994)

24. *See* Carlos A. Primo Braga & Carsten Fink, *International Transactions in Intellectual Property and Developing Countries*, 19 INT'L J. TECH. MGMT. 35, 38-42 (2000).

25. *See* Jeong-Yeon Lee & Edwin Mansfield, *Intellectual Property Protection and U.S. Foreign Direct Investment*, 78 REV. ECON. & STAT. 181, 181-83 & tbls.1-3 (1996).

26. *See id.* at 185-86 & tbl.4; *see also* Braga & Fink, *supra* note 24, at 46 (discussing shortcomings of the Lee and Mansfield approach including a biased selection of countries and an inability to control for other influences on investor perceptions).

27. *See generally* Keith E. Maskus, *The International Regulation of Intellectual Property*, 134 WELWIRTSCHAFTLICHES ARCHIV 186 (1998).

28. *See id.* at 196-202.

29. *See id.* at 198-99.

filiates and affiliate sales.[30] The coefficient on the patent index was negative and significant in the assets equation for developed economies, but the impact in developing countries was significantly positive.[31] Thus, a one-unit increase in the patent index of the average developing economy would raise the asset stock of U.S. multinational affiliates by about 16%, or $1.9 billion.[32] The evidence therefore suggests that U.S.-headquartered MNEs are sensitive to improvements in IPRs in developing countries in making foreign location decisions.[33] However, these investments may come at the expense of reduced presence in developed economies, where a substitution effect between FDI and licensing becomes dominant once patent protection exceeds a particular level.[34]

3. Patents and Licensing

Economic theory suggests that technology and product licensing also would be influenced ambiguously by stronger patent laws. Stronger IPRs would reduce the risk of local imitation, thereby raising rents to foreign licensors and causing licensing volumes to fall. However, tighter protection would lower the costs of achieving licensing contracts, raising incentives to license.[35] Again, the issue is empirical.

One recent study considered the real volumes of license fees for industrial processes, paid by unaffiliated foreign firms to U.S. firms, in 26 countries for the years 1985, 1990, and 1995.[36] These volumes were regressed on the GP patent index in addition to several control variables. The authors found that unaffiliated royalties and license fees were positively and significantly affected by patent rights, but only once the patent index exceeded a critical value of 2.07 on a five-point scale. To the extent that license fees reflect the value of underlying technology, this finding supports the notion that technology transfer would rise with stronger patent rights in

30. *See id.*
31. *See id.*
32. *See id.*
33. *See id.*
34. *See id.*
35. For discussion and details, see Guifang Yang & Keith E. Maskus, *Intellectual Property Rights, Licensing, and Innovation in an Endogenous Product-Cycle Model*, J. INT'L ECON. (forthcoming 2000).
36. *See* Guifang Yang & Keith E. Maskus, *Intellectual Property Rights and Licensing: An Econometric Investigation*, 136 WELTWIRTSCHAFLICHES ARCHIV (forthcoming 2000).

those countries that have enacted at least modest technology protection.

F. The Statistical Correlation Between IPRs and Economic Growth is Positive Under Some Circumstances

One may question claims that the strength of intellectual protection is positively correlated with economic growth. After all, many countries have developed economically in the presence of weak IPRs, including Korea, Taiwan, Japan, and, arguably, the United States. Other countries have suffered stagnation in the presence of weak IPRs, including Brazil, Argentina, and India. Clearly there are many factors involved.

However, the economic evidence reviewed above provides scope for IP protection to enhance growth indirectly by promoting trade, FDI, and licensing. Each of these flows is a source of technology transfer. Imports of capital goods from technologically advanced nations have been shown to raise productivity in developing countries.[37] Foreign direct investment has a similar impact, although the effect strengthens as countries expand their levels of education above some threshold level.[38] Licensing directly transfers technology and know-how. Finally, patent applications may be read in order to develop competing products. Evidence exists that patenting activity among developed countries is strongly correlated with knowledge spillovers across borders.[39]

While these processes are complex, two conclusions are supported by evidence. First, IPRs encourage growth more readily in economies that are open to international trade and investment. In addition to the direct positive impacts, competition from abroad encourages domestic firms to invest in technology and product quality. Moreover, firms in open economies are more likely to undertake the costs of technology transfer and adaptation when those investments are supported by IPRs. A recent study discovered that the impact of stronger patents in open economies was to raise growth rates by 0.66% on average in comparison with closed economies.[40] Thus,

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37. *See* David T. Coe et al., *North-South R&D Spillovers*, 45 ECON. J. 134, 136, 147 (1997).

38. *See* E. Borensztein et al., *How Does Foreign Direct Investment Affect Economic Growth?*, 45 J. INT'L ECON. 115, 134 (1998).

39. *See generally* Jonathon Eaton & Samuel J. Kortum, *Trade in Ideas: Patenting and Productivity in the OECD*, 40 J. INT'L ECON. 251 (1996).

40. *See* David M. Gould & William C. Gruben, *The Role of Intellectual Property Rights in Economic Growth*, 48 J. DEV. ECON. 323, 341 (1996).

market liberalization combined with stronger IPRs tends to increase growth.[41]

Second, other relevant economic characteristics influence the effectiveness of IPRs. One study found no direct correlation between patent strength and growth, but there was a strong and positive impact of patents on physical investment and on R&D spending, which in turn raised growth performance.[42] Another paper demonstrated that FDI raises growth performance in economies with sufficient stocks of human capital and skilled labor.[43] These features are important for promoting local adaptation and learning new technologies.

Thus, IPRs, openness, investment, and human capital accumulation seem to work jointly in raising productivity and economic growth. Unfortunately, these impacts have taken little root in the least developed countries. They appear to become more complex and cumulative as countries grow richer. Thus, the role of IPRs in growth is intertwined with the details of complicated development processes.

G. Intellectual Property Rights Help Deepen Markets

One core reason for a sustained lack of economic development in poor countries is that institutions fail to support the development of extended markets.[44] Weak IPRs may play a central role in this failure. Inadequate IPRs can stifle technical change even at low levels of economic development. Most innovation in developing countries involves small adaptations of existing technologies. These investments benefit from local patent or utility model protection. For example, utility models have been shown to improve productivity in farm-implement markets in Brazil and the Philippines.[45]

A recent study analyzed how the Japanese patent system affected Japanese technical progress since the second world war.[46] The system was designed to encourage incremental innovation and

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41. *See id.* at 345-46.

42. *See* Walter G. Park & Carlos Ginarte, *Intellectual Property Rights & Economic Growth*, 15 CONTEMP. ECON. POL'Y, July 1997, at 51, 60.

43. *See* Borensztein et al., *supra* note 38, at 123-25.

44. *See* Joseph E. Stiglitz, *Markets, Market Failures, and Development*, 79 AM. ECON. REV. 197, 201-02 (1989).

45. *See* Robert E. Evenson & Larry E. Westphal, *Technological Change and Technology Strategy*, *in* 3A HANDBOOK OF DEVELOPMENT ECONOMICS 2209, 2257, 2261, 2271, 2278 (Jere Behrman & T.N. Srinivasan eds., 1995).

46. *See* Keith E. Maskus & Christine McDaniel, *Impacts of Japanese Patent System on Productivity and Growth*, 11 JAPAN & WORLD ECON. 557, 568-72 (1999).

diffusion of knowledge into the economy through early disclosure of patent applications, utility models, and narrow claim requirements. The authors found that this system promoted large numbers of utility model applications for incremental inventions, which were based in part on laid-open prior applications for invention patents. In turn, utility models had a strongly positive impact on real productivity growth over the period. They concluded that utility models and patent applications were an important source of technical change and information diffusion in Japan.

Innovation through new product development and establishment of new firms may be discouraged by weak trademark protection in developing nations. A recent survey of trademark use in Lebanon provided evidence on this point.[47] Firms in the apparel and food products industries wished to design clothing aimed at Middle Eastern markets. Attempts to do so were frustrated by trademark infringement by other firms in Lebanon and neighboring countries. Similar problems exist in China and retard the interprovincial marketing of products, as evidenced in another case study.[48] Thus, new business activity may be restrained by trademark infringement targeted at domestic enterprises.

Entertainment and publishing firms in many developing countries tend to be small and often incapable of expanding their operations beyond minimal levels. In part, this problem is caused by extensive local piracy in the face of weakly enforced copyrights. However, a further structural difficulty is that inadequate copyrights cannot support the complex contracts that allocate rights in modern creative industries. For example, in China, the software industry has grown in the area of business applications, but has faced obstacles in developing fundamental program platforms. Thus, domestic commercial interests in stronger copyrights have emerged and are promoting enforcement. In contrast, India has long had a system of effective copyright protection, which is thought by many observers to have been important in developing and protecting its successful film and software industries.

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47. *See* Keith E. Maskus, *Strengthening Intellectual Property Rights in Lebanon, in* CATCHING UP WITH THE COMPETITION: TRADE OPPORTUNITIES AND CHALLENGES FOR ARAB COUNTRIES 251, 253-54 (Bernard Hoekman & Jamel E. Zarrouk eds., 2000).

48. *See* Keith E. Maskus et al., Intellectual Property Rights and Economic Development in China (September 16, 1998) (paper presented at the Southwest China Regional Conference on Intellectual Property Rights and Economic Development, on file with author).

H. Stronger IPRs Need to be Accompanied by Supportive Policies

Tighter IPRs by themselves cannot improve development prospects without appropriate collateral institutions. Intellectual property protection generates market power that could have deleterious short-term impacts on information users, even as it promises long-term benefits through innovation and technology acquisition. However, countries should complement their new regimes with policies that raise the likelihood of achieving long-term gains.[49] While the range of such policies is broad, four categories are particularly important.

First, as discussed earlier, IPRs enhance growth more readily in open economies. Thus, market liberalization and the removal of distribution monopolies should encourage dynamic gains from IPRs. Second, because adequate supplies of human capital promote innovation and technology adoption, it is important to invest in education. Third, IPRs are economically useful only where innovations may be brought freely to the marketplace. Thus, countries should reduce impediments to the commercialization of new knowledge within their national innovation systems.

Finally, it is conceivable that countries could be harmed by anticompetitive abuse of IPRs, requiring them to be vigilant in the application of appropriate competition policies. Competition regulation is a new and difficult issue for most developing countries. Thus, as IPRs systems are strengthened they should be accompanied by the development of modern competition-maintenance regimes aimed at curbing abusive licensing practices, monopoly pricing, and unwarranted market segmentation. This complex area requires considerable thought in its implementation.[50]

III. CONCLUDING REMARKS

The claim in this Article is that economists have made substantial progress in understanding the complex tradeoffs that exist in the interplay between intellectual property rights and international economics. Adding an international dimension to the study of IPRs makes the analysis more complex because of the great diver-

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49. *See* MASKUS, *supra note* 1, at 200-16.

50. *See generally id.*; Nancy T. Gallini & Michael J. Trebilcock, *Intellectual Property Rights and Competition Policy, in* COMPETITION POLICY AND INTELLECTUAL PROPERTY RIGHTS IN THE KNOWLEDGE-BASED ECONOMY 17, 18-27 (Robert Anderson & Nancy T. Gallini eds., 1998); Keith E. Maskus & Mohamed Lahouel, *Competition Policy and Intellectual Property Rights in Developing Countries: Interests in Unilateral Initiatives and a WTO Agreement*, 23 WORLD ECON. 595, 601-07 (2000).

sity of interests in protection among nations. However, it also opens up new avenues for investigating the economic implications of stronger global IPRs established by TRIPS.

The complexity of intellectual property protection supports both optimistic and pessimistic claims about how countries will be affected. None of these claims may be decisively rejected by theoretical or empirical analysis. However, the work reviewed here has, to an important degree, pushed back the veil of ignorance. In brief, it suggests that the short-run impacts of TRIPS will be essentially redistributive between countries, with the bulk of gains accruing to the United States and other technology developers. Over the longer term, however, there are mechanisms that could enhance technical change and growth in the technology importing countries. To achieve those gains, developing nations should complement their stronger regimes with appropriate collateral policy reforms. While these conclusions seem warranted by the evidence marshaled to date, it is evident that much work remains to be done.