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DO AS I SAY, NOT AS I DID

Dru Brenner-Beck†

I. INTRODUCTION

Necessity may be the mother of invention, but it is not often recognized that economic growth is invention's child. In the past decade, a custody battle has erupted between certain nations of the developed and less developed worlds, as the two camps struggle for control of technology. This battle can be seen most clearly in the escalating debate concerning the international protection of intellectual property rights.¹ This paper contends that it is in the interest of a less developed country ("LDC")² to adopt stringent intellectual property measures only after reaching a threshold level of economic development. This threshold level is marked by several prerequisites. First, the LDC's per capita gross national product ("GNP") must be at a level significantly above the subsistence level typical in LDCs. Second, the LDC's engineers and scientists must have attained a sufficient degree of technical sophistication to profit from the incentives offered by a rigorous system of intellectual property protection. Finally, the LDC's economy must internally generate sufficient investment capital to support sustained growth.

Many of these necessary preconditions can be fostered by the very "pirate" activities First World nations decry. Indeed, "piracy" may be a necessary element of a nation's economic development. Further, even after an LDC becomes sufficiently developed to profitably protect intellectual property, such protection alone may not be the final answer. Other control mechanisms, such as compulsory

† J.D., Boston University School of Law. This paper received the Boston Patent Law Association Award in 1991. The author would like to thank Professor Robin Merges of Boston University School of Law for his guidance and support.

1. In this paper the term "intellectual property" will include patents, copyrights, trademarks, and trade secrets, as well as *sui generis* protection for semiconductor mask works. In many cases, data on patents will be used as a general indicator of all intellectual property protection since that data is more readily available. The terms "piracy", "counterfeiting", and "imitation" will be used interchangeably to indicate infringement of First World intellectual property rights.

2. Although terms such as "developing nation" and "Third World nation" are often used to describe these countries, this paper will primarily use the term "less developed country" for the sake of consistency.

licensing provisions and domestic working requirements, may be appropriate and necessary to encourage the type of innovative/productive activity that supports its development goals.

The relationship between international intellectual property protection and world economic growth is both complex and emotionally charged. Accusations of "piracy" and "thievery" are matched by countercharges of exploitation and attempted economic domination. This Article will first describe the world environment in which this contentious debate is conducted and the perspectives of both developed nations and LDCs. Next, this Article will review the existing economic models that have attempted to highlight the factors an LDC should consider in deciding whether to implement a system of intellectual property protection.

Against the backdrop of these models, this Article will then discuss the prerequisite "threshold" of economic development that an LDC must attain to benefit from rigorous intellectual property protection. The next section will highlight recent intellectual property law changes and their effects in LDCs, focusing primarily on Singapore. Finally, this Article will explore policy initiatives available to developed nations that could encourage increased intellectual property protection by LDCs.

II. THE ENVIRONMENT IN WHICH THE DEBATE IS CONDUCTED

Intellectual property rights are independently defined and granted by all nations. Thus, protection of these rights is territorial.³ Each nation must choose the composition and extent of the protection it will provide and structure its laws to accomplish its political and economic objectives. Historically, this choice has reflected a country's evaluation of the costs and benefits of a particular level of protection, and the effect on the country's economic objectives. The choice of an ideal level of protection, ranging from free access to intellectual property at one extreme to complete protection at the other,⁴ will change as the country develops and its economic needs change. This change is largely due to the accompanying change in the calculation of costs and benefits at different stages of development.

The escalating debate over intellectual property protection has been conducted against the backdrop of the current system of multi-

3. Mark S. Massel, *The International Patent System*, 7 J. ECON. ISSUES 645, 647 (1973).

4. Richard P. Rozek, *Protection of Intellectual Property Rights: Research and Development Decisions and Economic Growth*, in INTELLECTUAL PROPERTY RIGHTS IN SCIENCE, TECHNOLOGY, AND ECONOMIC PERFORMANCE 31, 40 (F. Rushing & C. Ganz Brown eds., 1990) [hereinafter IP RIGHTS IN SCIENCE].

lateral international treaties on intellectual property that do not establish minimum standards of protection which member states must provide.⁵ Instead, the central concept in the current system is "national treatment." Under the national treatment approach, each signatory nation may implement its own regime of national laws to protect (or not protect) intellectual property, so long as foreign nationals enjoy the same rights as citizens of that country.⁶ Exacerbating the situation, from the developed nations' perspectives, is the feeling that the enforcement of even the existing international standards is inadequate.⁷

The current battle over international intellectual property protection has arisen as the world has increasingly become economically interdependent. Different nations' conceptions of suitable levels of protection have clashed head-on. Many developed countries are pressuring LDCs to adopt more stringent levels of protection, arguing that such levels will foster economic progress in the LDCs. The most common complaint against the LDCs center on many LDCs' exclusion of entire areas from patent protection, their requirement that the patented products be produced ("worked") in the LDC, or that the patent holder grant licenses to domestic producers in exchange for patent protection.⁸

A. TECHNOLOGY'S CENTRAL ROLE IN THE DEBATE

The level of technological sophistication in developed nation and LDC economies differs markedly; this variance lies at the heart of the debate over the proper level of intellectual property protection. Developed nations and LDCs recognize technological change

5. For patents: the Paris Convention for the Protection of Industrial Property, and the Patent Cooperation Treaty; for copyright: the Berne Convention for the Protection of Literary and Artistic Works, and the Universal Copyright Convention; for trademarks: the Paris Convention, the Madrid Agreement Concerning the International Registration of Marks, and the Nairobi Treaty on the Protection of the Olympic Symbol. For a detailed description of the provisions of the above treaties, as well as a summary of the current World Intellectual Property Organization's ("WIPO") proposed changes to the system, see GATT OR WIPO? NEW WAYS IN THE INTERNATIONAL PROTECTION OF INTELLECTUAL PROPERTY (F. Beier & G. Schricker eds., 1988) [hereinafter GATT OR WIPO?].

6. See generally *id.*

7. See Gary M. Hoffman et al., *Commercial Piracy of Intellectual Property*, 5 COMPUTER LAW 7 (1988).

8. See Frederick M. Abbott, *Protecting First World Assets in the Third World: Intellectual Property Negotiations in the GATT Multilateral Framework*, 22 VAND. J. TRANSNAT'L L. 689, 706-07 (1989); Keith E. Maskus, *Intellectual Property*, in COMPLETING THE URUGUAY ROUND 169 (J. Schott ed., 1990). See generally U.S. INTERNATIONAL TRADE COMMISSION, FOREIGN PROTECTION OF INTELLECTUAL PROPERTY AND THE EFFECT ON U.S. INDUSTRY AND TRADE (1988) [hereinafter 1988 USITC REPORT].

as an engine of economic growth.⁹ Forty percent of the growth in per capita GNP in the United States from 1929 to 1957 has been attributed to technological change.¹⁰ The developed nations and LDCs disagree, however, on the question of how to best acquire the technology needed to fuel rapid growth.

Developed countries typically devote one to three percent of their annual GNP to the production of new technology.¹¹ These nations believe that vigorous protection of intellectual property rights is the only way to ensure the continued production of new technologies necessary for increased overall world growth.

LDCs are marked by their technological inferiority. They see access to technology as a necessity if they are to bridge the growing economic gap between developed and developing countries, and improve their populations' welfare. The LDCs' attitudes toward intellectual property rights reflect a distrust of a system they see as assisting the developed countries' monopolization of technology, and the perpetuation of the LDCs' dependent status.¹² Some LDCs have gone so far as to characterize technology as the common heritage of mankind which ought to be freely available to all.¹³

LDCs criticize developed country demands for "adequate" protection as self-serving and hypocritical. Intellectual property systems in the developed world emerged only after centuries of incremental changes in policies designed to aid economic advancement.¹⁴ For example, the United States, today one of the foremost advocates of increased worldwide intellectual property protection, did not recognize the works of foreign authors until 1891.¹⁵ The

9. Richard T. Rapp & Richard P. Rozek, *Benefits and Costs of Intellectual Property Protection in Developing Countries*, 24 J. WORLD TRADE 75 (1990).

10. Edwin Mansfield, *Intellectual Property, Technology and Economic Growth*, in IP RIGHTS IN SCIENCE, *supra* note 4, at 17, 19.

11. See Ashoka Mody, *New International Environment for Intellectual Property Rights*, in IP RIGHTS IN SCIENCE, *supra* note 4, at 203, 207.

12. Mansfield, *supra* note 10, at 27.

13. See ROBERT P. BENKO, PROTECTING INTELLECTUAL PROPERTY RIGHTS: ISSUES AND CONTROVERSIES 28 (1987); James W. Peters, *Toward Negotiating a Remedy to Copyright Piracy in Singapore*, 7 NW. J. INT'L L. & BUS. 561, 603 n.201 (1986).

14. See CHRISTINE MACLEOD, INVENTING THE INDUSTRIAL REVOLUTION 12-13 (1988) (The primary goal of the British patent policy in the 1500s was "the introduction of entire industries or manufacturing techniques from abroad. The rights of the first inventor were understood to derive from those of the first importer of the invention."); Charles Twinomukunzi, *The International Patent System—a Third World Perspective*, 22 INDIAN J. INT'L L. 31, 42 (1982) (the importation of foreign inventions was a recognized function of the first American patent law).

15. See Raphael Kaplinsky, *Industrial and Intellectual Property Rights in the Uruguay Round and Beyond*, 25 J. DEV. STUD. 373, 376 (1988); Robert W. Kastenmeier & David Beier, *International Trade and Intellectual Property: Promise, Risks, and Reality*, 22 VAND. J. TRANSNAT'L L. 285, 301 n.50 (1989); Nick B. Williams, *Thai Producers Grapple with Growing Piracy, Protection Issue Simmers as Moral, Economic Dilemma*, L.A. TIMES, Mar. 14, 1988, § 4, at 2.

U.S. was among the largest "pirates" of English works, earning the title of "the buccaneers of books" in 1884.¹⁶ Lax enforcement of patent protection in the U.S. led Eli Whitney to forego patenting his later inventions after losses resulting from infringement of his cotton gin.¹⁷

B. CHANGES IN THE ENVIRONMENT

World changes in the 1980s have brought the intellectual property protection issue to the forefront of world debate. As the international trade system became more interdependent,¹⁸ the importance of intellectual property to the developed countries' economies became more pronounced.

First, international trade expanded. U.S. trade in goods and services, for example, today comprises twenty-two percent of total GNP.¹⁹ The increased significance of international trade occurred at the same time as a shift in the developed nations' comparative advantage to products with a high technology content.²⁰ Twenty-three to twenty-five percent of all U.S. exports in 1988 had a high intellectual property content.²¹ Simultaneously, research and development ("R&D") costs have risen significantly, increasing the stake of the developing countries in protecting the technology they develop.²² Due to the increasing importance of intellectual property to the economies of the developed nations, their demands for increased protection have become even more vocal.

At the same time, advances in "high-tech" copying technologies as well as the advance in global communications have made "piracy" easier and more efficient.²³ This has increased both the scope of "piracy" and the resulting loss to the originator country. A 1988 USITC Report estimated total U.S. business losses to piracy in 1986 at \$23.8 billion,²⁴ or almost fifteen percent of the U.S. trade

16. Kastenmeier & Beier, *supra* note 15, at 302 n.50.

17. HELENA STALSON, *INTELLECTUAL PROPERTY RIGHTS AND U.S. COMPETITIVENESS IN TRADE* 33 n.14 (1987).

18. Gerald J. Mossinghoff, *The Importance of Intellectual Property Protection in International Trade*, 7 B.C. INT'L & COMP. L. REV. 235 (1984).

19. *See* Mody, *supra* note 11, at 235.

20. *See id.* at 206.

21. Kastenmeier & Beier, *supra* note 15, at 286; *General Developments: Also in the News*, 8 Int'l Trade Rep. (BNA) 134 (Jan. 23, 1991).

22. *See* Mossinghoff, *supra* note 18, at 238-239.

23. *See* David Beier, *Remarks of David Beier*, 22 VAND. J. TRANSNAT'L L. 333 (1989); Hoffman et al., *supra* note 7, at 8; Kaplinski, *supra* note 15, at 279; Mody, *supra* note 11, at 211. *See generally* GARY M. HOFFMAN, *THE ANNENBERG WASHINGTON PROGRAM, CURBING INTERNATIONAL PIRACY OF INTELLECTUAL PROPERTY: POLICY OPTIONS FOR A MAJOR EXPORTING COUNTRY* (1989) [hereinafter *THE ANNENBERG REPORT*] (examples of these new technologies are computer graphics, desktop publishing capabilities, fiber-optic cable communications, and worldwide fax capabilities).

24. 1988 USITC REPORT, *supra* note 8, at viii.

deficit.²⁵ The study identified three major components of the total loss: lost U.S. sales caused by the importation of infringing goods (\$1.8 billion), U.S. export losses (\$6.2 billion), and losses in royalty or license fees (\$3.1 billion).²⁶ A 1982 USITC study placed U.S. employment losses attributable to foreign "piracy" at over 131,000 jobs.²⁷ Although the methodology used in the 1988 USITC study may have overestimated the magnitude of the losses,²⁸ or may have ignored the losses from domestic infringing activity,²⁹ the damage to U.S. industry from international piracy remains substantial. The Congressional Economic Leadership Institute estimates that losses from piracy may run as high as sixty percent of the U.S. trade deficit,³⁰ and may account for over five percent of total world trade.³¹

Piracy's effect on business enterprises is demonstrated by the lost sales which these businesses suffer. Estimated losses of potential sales from the piracy of motion pictures, videos, and sound recordings alone were \$117 million in 1988.³² U.S. copyright holders estimate that pirate activities in twelve countries alone cost them over \$1.3 billion dollars a year in lost sales.³³ Brazil, China, India, Indonesia, Malaysia, Mexico, Nigeria, the Philippines, the Republic of Korea, Singapore, Taiwan, and Thailand have been identified as being responsible for the bulk of the losses to U.S. industry.³⁴

The extent of the loss, combined with the increased importance

25. Edwin A. Finn, Jr., *That's the \$60 Billion Question*, FORBES, Nov. 17, 1986 at 40.

26. 1988 USITC REPORT, *supra* note 8, at viii-ix (the remaining amounts arose from subsidiary categories such as estimated infringing product sales (\$9.5 billion), lost profits due to infringing product sales (\$754.9 million), and \$271 million in identification and enforcement costs).

27. See THE ANNENBERG REPORT, *supra* note 23, at 9; Hoffman et al., *supra* note 7, at 7.

28. The USITC methodology consisted of sending questionnaires to companies in affected industries and asking them to estimate their losses due to piracy. These companies' self-interest in quantifying their losses may have resulted in some overestimation. See generally 1988 USITC REPORT, *supra* note 8.

29. See STALSON, *supra* note 17, at 28 (1986 estimate that 20% of the world's fake goods were being made in the U.S).

30. *General Developments: Also in the News*, *supra* note 21.

31. *Media & Marketing: Pirates Bag a Deadly Haul*, DAILY TELEGRAPH (London), Sept. 5, 1990, at 27.

32. Hills, *Citing Significant Progress, Declines to Name Countries Under Special 301 Provision*, 7 Int'l Trade Rep. (BNA) 616 (May 2, 1990).

33. *U.S. Patent Holders Charge Piracy*, FACTS ON FILE WORLD NEWS DIGEST, May 12, 1989, at 335 F2, available in LEXIS, Nexis Library, ARCHIV File; *Copyright Holders Name Top 12 Pirate Nations*, The Reuters Library Report, Apr. 19, 1989, available in LEXIS, Nexis Library, REUTER File (the nations are China, Saudi Arabia, South Korea, India, the Philippines, Taiwan, Indonesia, Brazil, Egypt, Thailand, Nigeria, and Malaysia).

34. See 1988 USITC REPORT, *supra* note 8, at 3-1; GENERAL ACCT. OFF. INTERNATIONAL TRADE: STRENGTHENING WORLDWIDE PROTECTION OF INTELLECTUAL PROPERTY RIGHTS: REPORT TO SELECTED CONGRESSIONAL SUBCOMMITTEES 12-13 (1987) [hereinafter GAO REPORT].

of intellectual property products in the U.S. and other developed economies, has resulted in the mobilization of business communities in the developed nations. Numerous industry groups have been formed³⁵ and have successfully lobbied their governments to take a more active role in protecting intellectual property on a global scale. The U.S. Congress has responded to this lobbying by passing various acts that characterize "inadequate" intellectual property protection as unfair competition.³⁶ In 1984 the U.S. Congress passed an amendment to the U.S. Trade and Tariff Act.³⁷ This amendment specifically directs the President to take into account the extent to which a foreign nation protects intellectual property in deciding whether section 301 trade sanctions restricting that foreign nation's exports would be applied,³⁸ or whether Generalized System of Preferences ("GSP")³⁹ benefits would be extended.⁴⁰ The Caribbean Basin Economic Recovery Act⁴¹ also requires the adequacy of intellectual property protection to be taken into account when determining special tariff treatment.⁴² The Omnibus Trade and Competitiveness Act of 1988⁴³ reinforced these other measures by requiring the U.S. Trade Representative ("USTR") to produce an annual list of intellectual property priority countries who deny "effective and adequate intellectual property protection."⁴⁴ The Act then requires the USTR to initiate investigation into these problem countries and implement section 301 sanctions, if appropriate.⁴⁵

The U.S. has also been pursuing multilateral solutions by pressuring for the strengthening of existing international treaties, such

35. Such groups include the Intellectual Property Committee, the Business Software Alliance, the Computer and Business Equipment Manufacturers Association, and the Pharmaceutical Manufacturers Association. See, e.g., Finn, *supra* note 25.

36. This is not a new phenomenon—in the 1870s the Dutch were castigated for not playing by the rules of the game when they abolished their patent law in 1869 and used foreign patents without paying royalties. Their reintroduction of the patent system was a result of international pressure. See Twinomukunzi, *supra* note 14, at 44-45.

37. Trade and Tariff Act, Pub. L. No. 98-573, 98 Stat. 2948 (1984).

38. See R. Michael Gadbaw, *Intellectual Property and International Trade: Merger or Marriage of Convenience*, 22 VAND. J. TRANSNAT'L L. 223, 229 (1989); Kaplinski, *supra* note 15, at 389.

39. GSP treatment allows developing nations to export goods to the U.S. without many of the duties imposed on the goods of developed nations. See Brian M. Berliner, Note, *Making Intellectual Property Pirates Walk the Plank: Using 'Special 301' to Protect the United States' Rights*, 12 LOY. L.A. INT'L & COMP. L.J. 725, 737 (1990).

40. See Susan K. Sell, *Intellectual Property as a Trade Issue: From the Paris Convention to GATT*, 13 LEGAL STUD. F. 407, 419 (1989).

41. Caribbean Basin Economic Recovery Act, Pub. L. No. 98-67, 97 Stat. 369 (1983).

42. See Gadbaw, *supra* note 38, at 229.

43. Omnibus Trade and Competitiveness Act of 1988, Pub. L. No. 100-418, 102 Stat. 1107.

44. Judith H. Bello & Alan F. Holmer, *The Heart of the 1988 Trade Act: A Legislative History of the Amendments to Section 301*, 25 STAN. J. INT'L L. 1, 41 (1988).

45. See *id.* at 4-17.

as the Paris Convention.⁴⁶ Recently, the United States succeeded in having intellectual property protection included as a negotiating item in the Uruguay Round of the General Agreement on Tariffs and Trade ("GATT") talks.⁴⁷

In addition to these multilateral efforts, the U.S. has conducted a series of bilateral talks with the Republic of Korea, Hong Kong, Taiwan, Singapore, Malaysia, Thailand, and Indonesia. These talks, utilizing a carrot and stick approach, have resulted in dramatic changes in the domestic intellectual property laws of those countries.⁴⁸ Throughout these negotiations the U.S. has attempted to convince these LDCs that increased protection is in their best interests, while simultaneously pressuring them by using continued access to U.S. markets as a bargaining chip.

III. DEVELOPED COUNTRIES' POSITION: PROTECTION BENEFITS LDCS

Developed countries argue that intellectual property protection benefits LDCs. First, these nations claim that LDC protection of intellectual property is essential to the successful operation of a system that promotes global innovation,⁴⁹ and thus benefits all. Second, developed nations claim that LDC protection of intellectual property rights directly benefits LDC development by: 1) promoting the transfer of technology from the developed nations to LDCs; 2) encouraging direct foreign investment ("DFI") in the LDC; 3) stimulating First World R&D into problems specific to LDCs; and 4) strengthening the incentive for domestic innovation and creativity.

A. PROTECTION PROMOTES GLOBAL INNOVATION

The basic rationale supporting government support of intellectual property rights is that of "add[ing] the fuel of interest to the fire of genius."⁵⁰ The economic nature of intellectual property,⁵¹ similar to that of public goods, necessitates government protection to

46. See STALSON, *supra* note 17.

47. See generally Gadbow, *supra* note 38.

48. See Benko, *supra* note 13, at 13; Ebba Dohlman, *International Piracy and Intellectual Property*, OECD OBSERVER, Oct.-Nov. 1988, at 33, 36; *U.S. Continuing Efforts to Negotiate Bilateral Agreements to Curb Piracy*, 37 Pat. Trademark & Copyright J. (BNA) 11 (Nov. 3, 1988); Harvey J. Winter, *The Role of the United States Government in Improving International Intellectual Property Protection*, 2 J.L. & TECH. 325, 330-31 (1987).

49. Gunda Schumann, *Economic Development and Intellectual Property Protection in Southeast Asia*, in IP RIGHTS IN SCIENCE, *supra* note 4, at 159, 161.

50. RESPECTFULLY QUOTED 288 (Suzy Platt ed., 1989) (quoting Abraham Lincoln).

51. Both intellectual property and public goods are characterized by jointness in consumption—consumption of the good by one user does not diminish the amount of the good available to others—and difficulty in exclusion—excluding those who have not

assure the optimum level of innovation.⁵² The social rate of return from an investment in technology, or the payoff to society, is generally higher than the private rate of return, or the return to the investing firm.⁵³ The major reason for this difference is that the presence of imitators makes it difficult for the original innovator to enjoy the returns from the invention.⁵⁴ Most governments encourage innovation by granting a limited monopoly of the new technology⁵⁵ to the inventor through their intellectual property laws.⁵⁶ This monopoly attempts to even out the social and private rates of return, and to reduce the adverse effects of imitation on invention.

At a simplified level, producers of technology have two choices: they can invest in costly R&D to produce new technologies, or they can make marginal improvements to existing technologies.⁵⁷ This choice will depend on a comparison of the return on investment from each alternative. In the absence of intellectual property protection, the presence of imitators or "free riders"⁵⁸ will cause producers to refrain from making the relatively higher cost and higher risk investments in R&D to produce new technologies. Where "free riders" exist, investors cannot recoup the cost of their investment in R&D or realize their expected profit.⁵⁹ Both the innovation rate and the amount of investment in R&D directly relate to the level of intellectual property protection provided.⁶⁰

The importance of intellectual property protection in promoting innovation and investment is illustrated by the effects of the U.S. Drug Price Competition and Patent Term Restoration Act of 1984.⁶¹ Among other things, this Act extended the patent term to

paid for the good is difficult, if not impossible. See generally STANLEY M. BESEN, *NEW TECHNOLOGIES AND INTELLECTUAL PROPERTY: AN ECONOMIC ANALYSIS* (1987).

52. See Mansfield, *supra* note 10.

53. *Id.* at 20-22 (social rates of return from 56-99%).

54. *Id.* at 24-26 (60% to 80% of the patented innovations in the study were successfully imitated within 4 years of introduction).

55. In the case of copyright, governments may grant a limited monopoly of a new creation.

56. The Soviet block uses a dual system of patents and inventor's certificates. Most foreigners choose to use patents similar to those used in Western practice. Most Soviet natives, however, use inventor's certificates. These give exclusive rights to the state, with nominal royalties going to the inventor. See STALSON, *supra* note 17, at 31.

57. Rozek, *supra* note 4, at 36-37.

58. Free riders are subsequent producers who can produce the innovation at a low marginal cost since they do not have to bear the original cost of its development. Their competition deprives the inventor of the ability to recoup his investment.

59. See Mansfield, *supra* note 10, at 21-22 (It is estimated that the lag between invention and imitation was from six to twelve months for products and from six to eighteen months for processes).

60. See Richard P. Rozek, *Protection of Intellectual Property Rights: Research and Development Decisions and Economic Growth*, 5 CONTEMP. POL'Y ISSUES 54, 58 (1987).

61. Drug Price Competition and Patent Term Restoration Act of 1984, Pub. L. No. 98-417, 98 Stat. 1585 (codified in scattered sections of 15, 21, 35 & 42 U.S.C.).

take into account the regulatory review time of some pharmaceutical products. As a result, investment in pharmaceutical R&D increased dramatically, growing to twice the amount invested in 1980 within two years.⁶² In the U.S., patent protection was estimated to be essential for the development or introduction of thirty percent of inventions in the chemical industry, and up to sixty-five percent of the inventions in the pharmaceutical industry between 1981 and 1983.⁶³

The optimum amount of intellectual property protection occurs when the benefits from increased innovation offset the distortion caused by the monopoly grant.⁶⁴ According to the developed nations, the presence of free riders or imitators in the international arena has had a detrimental effect on the world incentive to innovate,⁶⁵ similar to the effect caused by domestic imitators. Sales of patented pharmaceuticals in Korea in 1984 made by "legitimate" producers amounted to \$29 million, while "pirated" copies of these same products accounted for sales of over \$70 million. Sales of new pharmaceuticals in Argentina, Brazil, Korea, Mexico, and Taiwan amounted to \$162 million, while pirate sales equaled \$192 million.⁶⁶ The effect of international piracy of this magnitude on the R&D decisions of developed nations' firms is clear, particularly when the largest projected growth in pharmaceuticals sales is expected to be in LDCs.⁶⁷

B. PROTECTION ENCOURAGES LDC DEVELOPMENT

Developed nations also argue that strong intellectual property protection will encourage: 1) the international transfer of technology, 2) increased direct foreign investment ("DFI") in LDCs, 3) increased R&D by developed countries in problems unique to the Third World, and 4) increased domestic innovation.

Developed nations argue that companies that create new technologies will not transfer those technologies to countries that do not

62. See Rapp & Rozek, *supra* note 9, at 38; Rozek, *supra* note 60, at 59-60.

63. See Mansfield, *supra* note 10, at 25.

64. William R. Johnson, *The Economics of Copying*, 1 J. POL. ECON. 158, 171 (1985).

65. Schumann, *supra* note 49, at 161 ("Rising R&D costs require large-scale production and an open international market to recoup these costs.").

66. Rozek, *supra* note 4, at 39.

67. See Le-Nhung McLeland & J. Herbert O'Toole, *Patent Systems in Less Developed Countries: The Cases of India and the Andean Pact Countries*, 2 J.L. & TECH. 229, 246 (1987) ("India, for example, has a world market share of less than two percent, despite a population three times that of the United States, which has a market share of eighteen percent."); Gerald J. Mossinghoff, *Research-Based Pharmaceutical Companies: The Need for Improved Patent Protection Worldwide*, 2 J.L. & TECH. 307 (stating that protection is seen as necessary for innovation and that U.S. pharmaceutical company R&D investment was \$4.6 billion in 1986, more than 15% of the annual sales of those companies).

protect intellectual property. These companies will not risk losing either their proprietary information or future export markets. In a 1987 survey, seventy-five percent of the companies which were interviewed saw inadequate protection of intellectual property rights as a strong disincentive to license technology to developing countries.⁶⁸ Indeed, it is unlikely that companies whose products or processes have a high intellectual property content would be eager to either transfer their technology or invest directly in an LDC absent a stringent legal framework to protect their investment.⁶⁹ Conversely, with adequate protection many companies would be more willing to locate production facilities in LDCs to take advantage of low labor costs or other incentives offered by LDC governments.

Furthermore, notwithstanding the benefits of direct technology transfer, LDCs obtain advantages by importing high technology products into their economy. High-tech products would provide immediate benefits to the populations of LDCs. The importation of these products requires the development of a local infrastructure and a resulting rise in local employment. Finally, importation educates the LDC on state-of-the-art existing technology and can enhance indigenous innovation.⁷⁰

Developed countries also argue that without adequate intellectual property protection in the LDCs, multinational companies ("MNCs") have no incentive to invest the resources necessary to develop new technologies appropriate to the LDCs' climates and resource endowments. Because of the lack of patent protection in South American nations, for example, one major international pharmaceutical company refuses to develop drugs for illnesses common to those countries.⁷¹

Developed nations also claim that only intellectual property protection can promote research into new uses of existing protected products to solve problems unique to the LDCs. For example Merck, a large pharmaceutical company, developed the drug Mec-

68. Schumann, *supra* note 49, at 173.

69. See James Canute, *U.S. Favors Bilateral Pacts to Protect Its Know-How*, FIN. TIMES, Jan. 6, 1988, at 4; see also Ruth A. Pagell, *International Information Copyright Issues: A Personal View*, 13 Database Information Access Co., June 1990, available in LEXIS, Nexis Library, ARCHIV File (stating that some database suppliers, such as Dialog, will not sell to countries known to violate copyright practices); David Churbuck, *U.S. Software Firms Struggling to Stem Illegal Foreign Sales, Software Piracy*, PC WEEK, Nov. 11, 1986, at 213 (stating that many U.S. software companies apply copy protection on a country by country basis); *Europeans Edgy About Investing in S. Korea*, EC Delegate Says, Reuter Library Report, May 23, 1990, available in LEXIS, Nexis Library, REUTER File (EC businesses cautious about investing in South Korea because of a lack of adequate protection for intellectual property rights).

70. See Mossinghoff, *supra* note 18, at 245-46.

71. See Calvin Sims, *Wounded by Patent Piracy . . . Vexed by Tape Technology: U.S. Laws Offer Less Protection than Those of Major Trading Partners*, N.Y. TIMES, May 13, 1987, at D1.

tizan, which has successfully treated worm parasites in livestock. Merck scientists later discovered that the drug was effective against the worm which causes river blindness in humans. River blindness affects approximately 18 million people annually in the Third World.⁷² Without the patent rights to the drug Merck would not have had either the resources or the incentive to conduct the extensive research and clinical trials which led to the discovery that the drug could be used to treat one of the most crippling illnesses affecting humans in the Third World.⁷³

The developed countries also argue that the lack of laws protecting intellectual property has a debilitating effect on indigenous invention and creativity within the LDC. The lack of intellectual property protection not only removes the incentive for domestic inventors to innovate, but can actually lead to the emigration of the highly trained and educated segment of an LDC's population.⁷⁴ This "brain-drain" causes (1) a direct loss as skilled and educated LDC personnel emigrate, and (2) a secondary loss, as existing DFI and technology transfer become less efficient in actually transferring vitally needed knowledge and resources to the LDC because of the absence of these personnel.⁷⁵

Developed countries contend that "pirate" activities foster a continuing dependent "copy-cat" mentality in the LDCs, destroying those nations' ability to sustain domestic innovation and escape their "lesser developed" status. The "pirating" of foreign literary, cultural, and academic works, sold at low prices, can destroy the market for domestically produced works that embody the local culture. In effect, the local culture can be overwhelmed by imports of cheap copies of foreign movies, books, videos, and music.⁷⁶ The lack of intellectual property protection can also result in extensive "piracy" of domestic works which destroys the domestic innovator's incentive to produce, share his invention, and thereby build the domestic infrastructure necessary to develop.⁷⁷

72. Rapp & Rozek, *supra* note 9, at 88 (stating that river blindness occurs mostly in Africa, Latin America, and the Middle East).

73. *Id.* at 88-89.

74. See Bob Johnstone, *Diverting the Brain Drain*, FAR. E. ECON. REV., Jan. 28, 1988, at 70 (stating that in Taiwan, of the 20% of college graduates who go abroad to get higher degrees, only 20% return); Jonathan Moore, *Taiwan's New Breed*, FAR. E. ECON. REV., Jul. 12, 1988, at 55 (stating that in 1987 of the 7100 graduate students who went abroad to study it is estimated that only thirty percent returned to Taiwan on completion of their studies).

75. See ROBERT SHERWOOD, *INTELLECTUAL PROPERTY AND ECONOMIC DEVELOPMENT* 174 (1990); McLeland & O'Toole, *supra* note 67, at 238.

76. See Peters, *supra* note 13, at 564.

77. See Pagell, *supra* note 69, at 5.

C. ADDITIONAL NEGATIVE EFFECTS OF PIRACY

The negative effects of piracy have gone far beyond mere monetary loss, and have directly affected the lives and health of consumers. Fake aircraft, helicopter, and vehicle parts have been responsible for numerous accidents and at least one death.⁷⁸ Counterfeit drugs, such as birth control pills that are only placebos and penicillin lacking one essential ingredient, pose obvious health risks to the populations of both the developed nations and the LDCs. For example, use of a defective copy of a fungicide resulted in the loss of fifteen percent of Kenya's coffee crop in 1979.⁷⁹ The recent Teenage Mutant Ninja Turtle craze has resulted in the increased counterfeiting of children's clothing bearing that design. Most of this clothing does not meet developed nations' child safety standards and poses significant fire hazards to young children.⁸⁰ These dangers are more significant in LDCs, which lack the extensive government agencies necessary to adequately oversee consumer health and safety.

Unrestricted copying of trademark-protected products can lower the overall quality and diversity of goods available in the market.⁸¹ When unrestricted counterfeiting makes it difficult for consumers to differentiate among products and determine the quality of the goods, the price they are willing to pay drops. As the price drops, high-quality producers are driven out of the market, which reinforces the downward spiral in quality. Thus, encouragement of pirate activities designed to aid the consumer by providing lower-cost copies can actually have an adverse impact on the consumer's welfare.

Finally, the developed countries argue that lack of effective intellectual property protection in the LDCs retards the mobilization of venture capital in those economies, limits the opportunities available to domestic entrepreneurs, and limits growth by retarding the willingness to share trade secrets.⁸² The basis of this argument is that investors, entrepreneurs, and inventors are disinclined to develop and promote new products, or share new information, in an environment which does not guarantee them an adequate return for their efforts.

78. See GAO REPORT, *supra* note 34, at 15; *CBI Launches New Drive Against Counterfeiters*, Origin News Services Limited, Aug. 23, 1990, available in LEXIS, Nexis Library, WIRES File; *Media & Marketing: Pirates Bag a Deadly Haul*, *supra* note 31.

79. See GAO REPORT, *supra* note 34, at 15; John S. McClenahan, *They'll Steal You Blind*; "Pirates," *Counterfeiter Prey on U.S. Firms*, PENTON/IPC INDUSTRY WEEK, May 27, 1985, at 78.

80. *Media & Marketing: Pirates Bag a Deadly Haul*, *supra* note 31.

81. George A. Akerlof, *The Market for Lemons: Qualitative Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488 (1970).

82. See SHERWOOD, *supra* note 75.

IV. LDCS' POSITION: PROTECTION FAILS TO CONFER PROMISED BENEFITS

LDCs are highly skeptical of the developed nations' claims that stronger intellectual property protection will directly benefit their economic development. Indeed, many see the current system as imposing high costs on the LDCs, while conferring few benefits. First, the LDCs argue that intellectual property protection in the developing nations has little, if any, effect on the R&D decisions of the large MNCs.⁸³ Thus, their policies have little effect on the overall world supply of inventions. The LDCs also contest the purported positive effect of strong intellectual property protection on either DFI or the effective transfer of technology to their economies.

A. PRIMARILY FOREIGNERS BENEFIT FROM PATENT PROTECTION IN THE LDCS

LDCs patent systems are characterized by both an overwhelming foreign domination of patent ownership and a low degree of patent use.⁸⁴ From 1957 to 1961 eighty-nine to ninety-six percent of patents awarded in LDCs went to foreigners.⁸⁵ Foreigners held ninety percent of LDC patents in 1983,⁸⁶ and seventy-three percent in 1988.⁸⁷ In contrast, sixty-four percent of patents awarded by developed nations in 1988 went to foreigners, with the vast majority of that number going to other developed nations.

Less than ten percent of the technology patented in LDCs is in use, as compared to thirty to fifty percent of worldwide patents in use.⁸⁸ In Latin America only one to ten percent of patents are used.⁸⁹ Furthermore, the actual transfer of technology fostered by the patent system is low. In 1983, patents filed in LDCs constituted

83. See Helge E. Grundmann, *Foreign Patent Monopolies in Developing Countries: An Empirical Analysis*, 12 J. DEV. STUD. 186, 195 (1976); Constantine Vaitsos, *Patents Revisited, Their Function in Developing Countries*, 9 J. DEV. STUD. 71, 75 (1972). But see Canute, *supra* note 69, at 4 (stating that certain industries are particularly dependent on patent protection—pharmaceutical company Warner Lambert, for example, which earns forty-eight percent of its \$3.1 billion revenues from outside the U.S.); Williams, *supra* note 15 (quoting a spokesman for ATT-Thailand as saying, "We have to make a return on our investment. If profits are cut by competition from pirate producers, it's going to affect our own budgets for research and development and other areas down the line").

84. See Douglas F. Greer, *The Case Against Patent Systems in LDCs*, 8 J. INT'L L. & ECON. 223 (1973); Vaitsos, *supra* note 83.

85. Vaitsos, *supra* note 83, at 73.

86. Thomas C. Creel & Drew M. Wintringham, *Patent Systems and Their Role in the Technological Advance of Developing Nations*, 10 RUTGERS COMPUTER & TECH. L.J. 255 (1984).

87. WIPO, *INDUSTRIAL PROPERTY STATISTICS* (1988) (my calculations, leaving out Eastern European countries, the USSR, and South Africa).

88. Creel & Wintringham, *supra* note 86, at 273.

89. Twinomukunzi, *supra* note 14, at 54.

only ten percent of the world patent supply.⁹⁰ Thus, the majority of patents in the LDCs are granted to foreigners, few are actually worked in the LDC, and a low percentage of the world's patent stock ever reaches the LDC.

LDC inventors also have little stake in the world patent system.⁹¹ Inventions by LDCs' nationals accounted for only one percent of the world patent stock in 1983.⁹² In 1988 that percentage had climbed to only 1.8 percent.⁹³ The LDCs argue that the ostensible benefits of intellectual property protection, particularly in the patent realm, do not necessarily translate into increased development of domestic industry—their foremost development goal.⁹⁴

B. PROTECTION DOES NOT PROMOTE DFI OR TECHNOLOGY TRANSFER

The actual motivations and actions of MNCs regarding patenting in LDCs strongly refute the argument that intellectual property protection will induce them to invest and transfer technology to the LDCs. MNCs obtain many patents with no intention of domestic production in the LDC.⁹⁵ In addition, MNCs' motivations to patent can be actively detrimental to the development goals of the LDC involved. MNCs take out the majority of patents in LDCs to protect their export markets—in that LDC and elsewhere—by blocking competitive production.⁹⁶ LDCs also charge that patents have been used to block competition from improved goods and to restrict price competition.⁹⁷ Therefore, even with stringent intellectual property protections in place, the manner in which MNCs' patent their products in the LDC may prevent the desired increases in DFI and technology transfer from ever occurring.

LDCs also argue that there are factors other than the level of intellectual property protection which are far more significant to MNCs when they decide to invest in a country or transfer technology. These factors are: 1) the likelihood of expropriation, 2) political stability, 3) exchange rate regulations and currency stability, 4)

90. Creel & Wintringham, *supra* note 86, at 274 n. 156 (forty-nine percent of these are owned by the U.S., Japan, the U.K., France, Canada, and the Federal Republic of Germany).

91. See Hanns Ullrich, *GATT: Industrial Property Protection, Fair Trade and Development, in GATT OR WIPO?*, *supra* note 5, at 127, 152 n.74 (developing countries account for 6% of the global R&D expenditures and 11% of R&D personnel, while industrialized countries account for 94% and 89%, respectively).

92. Creel & Wintringham, *supra* note 86, at 274.

93. WIPO, *supra* note 87.

94. Twinomukunzi, *supra* note 14, at 53-55.

95. Grundmann, *supra* note 83, at 191-92.

96. *See id.*; Massel, *supra* note 3, at 656.

97. *See* Massel, *supra* note 3, at 645, 654. *But see* Williams, *supra* note 15 (price factor would only involve 20-30 drugs per year).

labor training and cost, 5) political and labor unrest, and 6) the size of the domestic market.⁹⁸ In addition, for most LDCs the lack of domestic capital, the lack of readiness to invest and take risks, and the absence of entrepreneurial initiative severely limit the effectiveness of any technology transfer which does take place in inducing technical progress.⁹⁹

C. PROTECTION DOES NOT BENEFIT LDC INVENTORS

In LDCs, domestic invention is often limited to the capability to make incremental changes to existing technology, or to adapt existing technologies to the unique conditions of the Third World.¹⁰⁰ Few of these incremental changes would meet the developed world patent standards of novelty or nonobviousness. Consequently, patent protection does not provide any real benefit to the domestic inventor in the LDC. Additionally, the effect of "adequate" patent protection on domestic LDC innovation can actually be negative. Patents can act to block both the imitation and adaptation of western technology, as well as the accompanying buildup of the local R&D infrastructure achieved through the learning-by-doing process.¹⁰¹

D. LDCs ARE SKEPTICAL THAT PATENT PROTECTION WILL SOLVE PROBLEMS

The LDCs do not see patent protection as necessary for continued technology transfer, DFI, or continued domestic innovation. After the 1961 abolition of patent protection for pharmaceuticals in Turkey, for example, the amount of direct foreign investment in Turkey's pharmaceutical sector actually increased. Further, Turkey saw no appreciable decrease on technology transfer through licensing.¹⁰² India experienced a drop in domestic patent applications following a drastic change in its patent laws in 1970.¹⁰³ This change was specifically designed to protect domestic pharmaceutical companies from the MNCs by eliminating the MNCs' blocking of product patents and allowing only process patents for

98. DAN HAENDEL, *FOREIGN INVESTMENTS AND THE MANAGEMENT OF POLITICAL RISK* 152 (1979).

99. Barbara Hansen, *Economic Aspects of Technology Transfer to Developing Countries*, 11 INT'L REV. INDUS. PROP. & COPYRIGHT L. 430, 432 (1980).

100. See Vaitos, *supra* note 83, at 83; Williams, *supra* note 15.

101. See Massel, *supra* note 3, at 654; Vaitos, *supra* note 83, at 83; Williams, *supra* note 15.

102. See Ariman S. Kirim, *Reconsidering Patents and Economic Development: A Case Study of the Turkish Pharmaceutical Industry*, 13 WORLD DEV. 219, 226-27 (1985).

103. See Anil B. Deolalikar & Lars-Hendrik Roller, *Patenting by Manufacturing Firms in India: Its Production and Impact*, 37 J. INDUS. ECON. 303, 305 (1989); *India's Wrong Prescription*, FAR E. ECON. REV., Dec. 17, 1987, at 128.

pharmaceuticals. Even with additional government protections against MNCs, Indian firms continued to do poorly. However, once the Indian government liberalized these protections, while leaving the basic patent structure unchanged, domestic firms experienced increased competition from MNCs. Further, there is some evidence that domestic patenting has rebounded from its initial fall following the 1970 patent law change.¹⁰⁴ Thus, the LDCs assert, India's decrease in patent protection resulted in increased competition and increased domestic innovation.

The transfer of technology, so desperately needed by LDCs, is not necessarily embodied only in patents. Recent studies have indicated that transfer of associated know-how is more important to successful assimilation of new technologies in LDCs than the information included in a patent.¹⁰⁵ In addition much of the technology embodied in state-of-the-art First World patents is inappropriate for the distribution of labor and capital (the "factor endowment") and the industrial infrastructures of most LDCs. Worse, many patent licensing agreements contain such restrictive conditions that much of the benefits expected of the technology transfer are eliminated.¹⁰⁶ With no guarantee of DFI, technology transfer, or increased domestic invention, much of the quid pro quo supposedly accruing to a LDC in exchange for stringent intellectual property rights does not actually occur.¹⁰⁷

E. "PIRACY" MAY BENEFIT THE LDCs

In contrast, LDCs directly benefit, at least in the short run, from imitation or "piracy." These free rider benefits arise from: 1) the increase of domestic consumers' welfare from the availability of lower price "copies," 2) the improvement of the nation's infrastructure and human capital, 3) the elimination of the drain on the nation's foreign exchange from royalty/license payments or repatriation of profits by MNCs, 4) the development of a domestic entrepreneur ability, and 5) the ability to exploit new export markets for the imitated products. Official tolerance of imitation of imports in the Japanese economy during its early stages of growth seems to have benefitted the economy with no long-term adverse effects.¹⁰⁸

104. Deolalikar & Roller, *supra* note 103, at 305.

105. See Massel, *supra* note 3, at 653.

106. See *id.* at 655; see also Vaitos, *supra* note 83, at 83-84; Greer, *supra* note 84, at 246-50.

107. Many LDCs try to tip the balance by using working requirements and compulsory licenses to ensure that there is a quid pro quo for the LDC in granting the intellectual property right.

108. Carter Mackley, Note, *The Role of the Patent System in Technology Transfer:*

F. HOW THE LDCs PREFER TO STRUCTURE THEIR SYSTEMS

LDCs typically structure their existing intellectual property systems in a manner which maximizes the benefits to their economy while minimizing the problems seen in the existing international system. These problems include the nonuse of patents and higher prices for protected goods.¹⁰⁹ LDCs use mechanisms such as compulsory licenses, patent working requirements, and the exclusion of entire subject matter areas from patent protection to mitigate the costs and attempt to co-opt some of the benefits of intellectual property protection.¹¹⁰ Developed nations categorize these same provisions as "inadequate" protection.

For example, many LDCs exclude, or severely limit, pharmaceutical and chemical patent protection because of the social welfare benefits perceived in having pharmaceuticals and agricultural chemicals available to LDC populations at the lowest possible prices.¹¹¹ In the late 1950s, prices for pharmaceuticals were 50% to 255% higher in patent-protected countries than in nonprotected countries.¹¹² However, the effectiveness of these measures is debatable. For example, higher prices persisted in Turkey following abolition of patent protection for pharmaceuticals in 1961.¹¹³ Additionally, recent studies indicate that over ninety percent of the drugs on the World Health Organization's ("WHO") Essential Drug List would not benefit from patent protection.¹¹⁴

Many LDCs have called for "special and differential treatment" in the intellectual property area.¹¹⁵ Some of the effects of intellectual property protection, such as higher prices and limited access, can adversely affect the LDC's ability to educate its population and develop. Discussions of increased intellectual property protection in LDCs are politically volatile because of the sensitivity of these adverse effects. For example, the price difference between a legitimate textbook (\$30.00) and a pirated copy (\$6.00) can be significant,¹¹⁶ and can influence the availability of education in the LDC. Further, most LDCs are the primary health care providers

The Japanese Experience, 26 COLUM. J. TRANSNAT'L L., 131, 165 (1987), cited in Kasstner & Beier, *supra* note 15, at 302 n.50.

109. Higher prices may be achieved through patents, copyrights, and trademarks.

110. These are attempts to assure the quid pro quo for the LDC society. The Third World seems to prefer a liability rule system in contrast to the property rights system preferred by the First World.

111. See Williams, *supra* note 15.

112. Greer, *supra* note 84, at 236. But see Williams, *supra* note 15 (price factor would only involve 20-30 drugs per year).

113. See Kirim, *supra* note 102, at 224.

114. See Rapp & Rozek, *supra* note 9, at 90-91.

115. See GATT OR WIPO?, *supra* note 5; Maskus, *supra* note 8, at 173.

116. See Rita Gomez, *Leading Publishers Launch Crackdown on Book Piracy*, Reuters North European Service, Oct. 13, 1984, available in LEXIS, Nexis Library,

for their populations, and thus are particularly sensitive to monopoly pricing of pharmaceuticals.¹¹⁷ LDCs typically approach issues concerning the protection of intellectual property in a manner very distinct from that of the developed nations. Due to the pressing social problems in many LDCs, social welfare benefits are often driving factors in the intellectual property systems which these countries implement. Developed nations, on the other hand, often have fewer social problems to contend with, and therefore look to other factors in structuring their intellectual property systems.

V. WHO IS RIGHT? WHEN DOES IT MAKE SENSE TO PROTECT INTELLECTUAL PROPERTY?—THE ECONOMIC MODELS

In most situations, the right answer to the question usually depends on a nation's stage of development. Piracy does provide short-term benefits to the LDCs.¹¹⁸ It permits access to the technology needed for growth at low prices, develops critical skills in the LDC's workforce, earns precious foreign exchange, produces and mobilizes domestic capital, and provides employment and cheaper products for the population. These needs are critical. LDCs contain half the world's population and have an average per capita income of \$673, compared to \$7162 in the developed nations.¹¹⁹ With many of these LDCs crippled by existing debt payments,¹²⁰ the lures of piracy are extremely potent, and the demands for protection are not very convincing.

As an LDC develops, however, it does reach a threshold where the long-term costs of piracy begin to be outweighed by the benefits of increased protection. At this point the positive consequences of increased protection touted by the developed countries actually do begin to materialize. Piracy can build the foundation for the development of a LDC's infrastructure. A developed infrastructure enables the LDC to benefit from increased protection.¹²¹ This infrastructure then attracts direct foreign investment and technology transfers. Once this occurs, the lack of effective intellectual property laws does restrain self-sustaining growth. "Adequate" intellectual property laws have themselves been seen as part of a na-

REUTER File (Hong Kong Professional Teachers Union calls for discounts on textbooks).

117. See Rapp & Rozek, *supra* note 9, at 90; McLeland & O'Toole, *supra* note 67, at 246; Williams, *supra* note 15 (pharmaceutical patent protection called a social welfare issue).

118. IP RIGHTS IN SCIENCE, *supra* note 4, at 40.

119. Creel & Wintringham, *supra* note 86, at 256 n.4.

120. WORLD BANK, WORLD DEVELOPMENT REPORT 1990 (1990).

121. A developed infrastructure would include, for instance, an educated workforce, a developed road and telecommunications network, and a capital base.

tion's industrial infrastructure.¹²² Thus at the threshold, the long-term benefits to an economy, such as the increase in technology transfer, incentives for DFI, and the creation of an infrastructure that promotes domestic innovation,¹²³ outweigh the benefits provided by the pirate activities.

A. THE THRESHOLD

Increased intellectual property protection is beneficial only after an LDC has reached a threshold level of economic development. Not surprisingly, there is a direct relationship between the level of economic development and the degree of intellectual property protection provided by a nation.¹²⁴ Historically, the preconditions for the introduction of patent protection were "the presence of some scientific/technical infrastructure, the conversion from agricultural or handicraft production to industrial production, freedom in the conduct of business, and the desire and will of the state to advance technical and industrial development."¹²⁵ Many of the prerequisites for the threshold level of development parallel these historical conditions.

The threshold level requires the development of the LDC's infrastructure so that it can realize the benefits provided by strong intellectual property laws. The infrastructure includes an educated workforce, a basic industrial capacity, domestic entrepreneurial ability, and domestic capital mobilization. Piracy fosters many of these factors.¹²⁶

1. *Educated Workforce*

An LDC needs a literate workforce and the existence of trained scientific and technical personnel to attract foreign investment, utilize transferred technology, and implement and sustain domestic inventive ability. Thus, the education level of the LDC is critical if increased intellectual property protection is to yield its advertised positive results.¹²⁷ Statistics which appear to be reliable indicators

122. See SHERWOOD, *supra* note 75, at 191.

123. See Janet H. MacLaughlin et al., *The Economic Significance of Piracy, in INTELLECTUAL PROPERTY RIGHTS: GLOBAL CONSENSUS, GLOBAL CONFLICT?* 89 (R. Michael Gadbaw & Timothy Richards eds., 1988) [hereinafter GLOBAL CONSENSUS].

124. See Rapp & Rozek, *supra* note 9, at 79; Friedrich-Karl Beier, *The Significance of the Patent System for Technical, Economic, and Social Progress*, 11 INT'L REV. INDUS. PROP. & COPYRIGHT L. 563, 573 (1980).

125. Beier, *supra* note 124, at 571.

126. See Hansen, *supra* note 99, at 436.

127. Education, both within the general population and the scientific/technical community, is probably the most important element of the threshold. See Ellen Salem, *Back to School*, FAR E. ECON. REV., Aug. 25, 1988, at 59 (In Singapore only 5% of the workforce is college educated, and only 11% has some other postsecondary schooling. The Singaporean government sees the continued upgrading of its labor force as crucial if

of when an LDC has reached the threshold level of education are: literacy rates, the percentage of the population attending postsecondary education, and the number of scientific and technical articles published.¹²⁸

2. *Basic Industrial Capacity*

An LDC requires some level of industrialization, with its accompanying infrastructure, to be able to achieve the benefits of increased intellectual property protection. Indicators of this industrialization include the overall annual growth rates in GNP, the annual growth rates in industry and manufacturing sectors, per capita energy consumption, and annual energy production.¹²⁹ LDCs require industrialization to a level beyond subsistence agriculture and basic cottage industry for the incentives of an intellectual property system to operate. Further, the development of a basic infrastructure (roads, telecommunications, electrification, banking) is required for MNCs to respond to the protections offered by the intellectual property laws, as well as for domestic enterprises to succeed.

3. *Domestic Capital Mobilization and Entrepreneurship*

Base levels of domestic capital mobilization and entrepreneurship are also necessary preconditions to realizing the benefits of increased intellectual property protection. Domestic investment and savings rates reflect this capital mobilization and entrepreneurship ability.¹³⁰ The development of these factors enables domestic enterprises to participate in, and gain directly from, the incentives provided by increased intellectual property protection.

B. THE ECONOMIC MODELS

Two economic models have attempted to provide a framework to identify when an LDC has reached the threshold level where the benefits of implementing increased intellectual property protection outweigh the costs.¹³¹ Both models attempt to identify the factors

Singapore is to move beyond a labor-intensive economy, to one dominated by knowledge-intensive industries. Education is a crucial bottleneck in its development); Shim Jae Hoon, *Korean Education: What to Teach to Whom*, FAR E. ECON. REV., June 28, 1990, at 45, 46. (According to Dr. Han Jung Ha, KEDI VP in charge of education research, "Education gave us a start on development. It will now complete our success." The average urban household in Korea spends 7.5% of annual family income on education expenses; the average rural household, 11%).

128. See app. cols. 2, 3, & 11.

129. See app. cols. 4, 5, 6, 7 & 13.

130. See app. cols. 9 & 10.

131. Carlos A.P. Braga, *The Economics of Intellectual Property Rights and the GATT: A View from the South*, 22 VAND. J. TRANSNAT'L L. 243 (1989); MacLaughlin et al., *supra* note 123.

to be used by an LDC in its calculation of the costs and benefits, and discount the benefits by the social rate of discount.¹³² Both models use essentially the same cost-benefit approach.

1. *The Braga Model*

In Braga's model, the costs to society from intellectual property protection implementation arise from 1) the displacement of pirate firms,¹³³ 2) the increased royalty, license, or purchase payments to foreigners, 3) the opportunity costs of additional domestic R&D,¹³⁴ and 4) the eventual loss of consumer surplus brought about by higher prices.¹³⁵

The benefits to an LDC from intellectual property protections arise from: 1) the cost savings associated with the new technologies developed by the new domestic R&D; 2) the cost savings from technology transfers that would occur only in the presence of the heightened intellectual property protection; 3) the additional investment fostered by the new intellectual property regime.¹³⁶

2. *The MacLaughlin Model*

In the second model, MacLaughlin analyzed seven LDCs¹³⁷ using a framework similar to that described above. By analyzing empirical data of pirate industries in the seven LDCs, she found that increased growth rates of only .07% to .2% were needed to offset the short-term costs of eliminating piracy. MacLaughlin's analysis identified two key factors in determining net benefits—the economy's current growth rate, and the relative contribution of pirate industries to the economy as a whole. The worst case scenario in this analysis was for an economy experiencing 0% growth and 4% of total GNP coming from pirate industries. In that scenario the increase in the annual growth rate necessary to offset short term losses was only .6%.¹³⁸

132. This reflects the LDC's preference for present benefits. See Braga, *supra* note 131, at 258.

133. The displacement of pirate firms is lessened to the extent that these firms become legitimate producers of the intellectual property product under license agreements with the owner.

134. Since educated personnel are in short supply in most LDCs, the opportunity costs of their activities in industry must be taken into account.

135. Braga leaves out the cost of implementing and administering the intellectual property system itself.

136. Other potential benefits discussed by Braga include the availability of higher quality products and the possibility of world technological growth brought about by more stringent national intellectual property protection. Braga, *supra* note 131, at 256.

137. See MacLaughlin et al., *supra* note 123, at 93 (India, Brazil, Taiwan, Korea, Argentina, Mexico, and Singapore are all identified as problem countries).

138. *Id.* at 107.

C. PIRATE NATIONS WHICH HAVE REACHED THE THRESHOLD

Many countries reach the threshold level without adopting more stringent intellectual property protection, aided perhaps by "pirate" activities. A recent study analyzed sixteen countries identified as "problem" countries in the protection of intellectual property—Argentina, Brazil, Taiwan, Indonesia, South Korea, Mexico, the Philippines, Turkey, Colombia, Costa Rica, Egypt, India, Pakistan, Peru, Singapore, and Thailand.¹³⁹ These nations shared many characteristics. Most were larger than other LDCs in population, economy, and industrial and scientific/technical capacity.¹⁴⁰ These "low protection," or problem countries, often considered newly-industrialized, patented more heavily in the U.S. than did other LDCs¹⁴¹ and most had significant domestic scientific/technical capacity. All of these characteristics suggest that these countries are approaching, or have surpassed, the threshold level where increased intellectual property protection would benefit their economies.

Another study recently analyzed the relationship between the level of a nation's economic development and its level of protection for intellectual property.¹⁴² It did so by correlating eight modernization indicators with the strength of patent protection.¹⁴³ The direct relationship between economic development and the strength of patent protection, when combined with historical data, suggests a causal link between the two.¹⁴⁴ This study also identified certain nations which fell outside of the levels of patent protection expected from their level of economic development.¹⁴⁵ Many of these "out-of-phase" nations—namely, Indonesia, Turkey, India, Brazil, Argentina, and Mexico—have been identified as "pirate" nations.¹⁴⁶ Their status as being out of phase may suggest that they have passed the threshold where increased intellectual property protection is in their best interests, and perhaps where it is necessary for further successful growth.¹⁴⁷

139. J. Davidson Frame, *National Commitment to Intellectual Property Protection: An Empirical Investigation*, 2 J.L. & TECH. 209, 212 (1987).

140. *Id.* at 215.

141. *Id.* at 210.

142. See Rapp & Rozek, *supra* note 9.

143. *Id.* at 80 (The factors are per capita Gross Domestic Product, the percentage of households with electricity, the percentage of households with water, the presence of a social security system, the infant mortality rate, the percentage of the work force in agriculture, the proportion of physicians to total population, and status as a former British colony.).

144. See *id.* at 79.

145. *Id.* at 80-81.

146. See 1988 USITC REPORT, *supra* note 8; GAO REPORT, *supra* note 34; IP RIGHTS IN SCIENCE, *supra* note 4, at 42, tbl. 3.1. (Listings of problem pirate countries). Many of the earlier-identified nations have responded to trade pressure and improved their laws.

147. See Rapp & Rozek, *supra* note 9, at 79-81.

VI. EMPIRICAL RESULTS OF THE THRESHOLD PROPOSITION: SINGAPORE CASE STUDY

Of all the nations identified as "problem" pirate countries in the mid 1980s,¹⁴⁸ Singapore, one of the "Asian tigers,"¹⁴⁹ was the most obvious candidate for having passed the threshold where increased intellectual property protection would benefit its economy. In 1984, its per capita GNP was \$6885¹⁵⁰ and its annual growth rate was 5.7 percent.¹⁵¹ By 1988, Singapore's per capita GNP had risen to \$9070.¹⁵² Singapore, a small industrialized city-state, has a highly skilled population which earns a relatively higher wage than that of its neighbors. As an important international trans-shipment point,¹⁵³ the bulk of its economy is tied to foreign trade. In 1985, \$14.8 billion of its \$17.7 billion GNP was from domestic exports.¹⁵⁴

In the early 1980s, Singapore was described as the world capital of piracy.¹⁵⁵ It was estimated to have produced over 20 million pirate music cassette tapes in 1986, worth over 100 million dollars.¹⁵⁶ In 1981, its peak year, Singapore exported an estimated 120 million pirate tapes.¹⁵⁷ This large pirate industry figured prominently in Singapore's export dominated economy.¹⁵⁸

In 1979, Singapore implemented a deliberate strategy to become a regional focal point for research and development in the high technology sectors.¹⁵⁹ The goals of this strategy were "to support native creativity, encourage foreign investment in technology, and transform Singapore into a brain services center for exporting technological goods."¹⁶⁰

At the same time that this change in domestic goals occurred, the U.S. began to pressure Singapore to reform its copyright laws. The 1984 Amendment to the Trade and Tariff Act allowed U.S.

148. IP RIGHTS IN SCIENCE, *supra* note 4, at 42.

149. This term is used to describe the newly industrialized countries of the Pacific Asia area—South Korea, Taiwan, Singapore, and Hong Kong.

150. Frame, *supra* note 139, at 226.

151. WORLD BANK, *supra* note 120, at 181.

152. *Id.* at 179.

153. Timothy J. Richards & Leigh A. Kenny, *Singapore*, in GLOBAL CONSENSUS, *supra* note 123, at 311, 321 n.34.

154. *Id.* at 320.

155. See Ray Moseley, *Copyright Piracy: It's a Plague*, CHI. TRIB., Mar. 19, 1986, at 6.

156. Roger Beale, *Action Against Offenders Stepped Up*, FIN. TIMES, Nov. 3, 1986, at 23.

157. *Id.*

158. See Richards & Kenny, *supra* note 153, at 320 n.34; see also Elizabeth A. Freidheim, Comment, *Singapore's New Copyright Law: Turning Pirates into Discounters?*, 2 SOFTWARE L.J. 203, 205 (1988).

159. See Freidheim, *supra* note 158, at 211.

160. See *id.*; see also Beale, *supra* note 156, at 23.

negotiators to threaten the loss of GSP¹⁶¹ benefits, covering over \$730 million of Singapore's exports in 1985,¹⁶² if the piracy situation did not improve. As a result of both U.S. trade pressure and changing domestic economic goals, Singapore passed a new Copyright Act in 1987.¹⁶³

The new Copyright Act remedied former complaints of weak enforcement efforts, minor penalties, lack of protection for computer software,¹⁶⁴ and discrimination against foreign authors. Its terms included stiffer penalties of up to \$5000 per pirated copy or \$50,000 total (whichever was lower), and/or a jail term of up to five years.¹⁶⁵ It also explicitly protected computer software. On May 18, 1987 the U.S. and Singapore concluded an agreement establishing reciprocal copyright protection for U.S. works within Singapore.¹⁶⁶

The passage and vigorous implementation of the new Copyright Act resulted in a number of positive economic consequences for Singapore's economy.¹⁶⁷ The number of licenses sold to Singapore's video dealers by overseas copyright owners increased dramatically, resulting in increased profits for the Singapore dealers.¹⁶⁸ Sales of legitimate records and cassettes doubled following the implementation of the Copyright Law.¹⁶⁹ Former cassette tape and video pirates became legitimate producers of blank cassettes and repair parts.¹⁷⁰

As a result of the increased protection of the new copyright law, music companies began to promote Singaporean singers, and started using local studio engineers, songwriters, and producers.¹⁷¹ The local film and video industry was revitalized since it was no longer possible to obtain copies of recently released movies from video pirates.¹⁷² The protection of computer programs has encouraged sales and investment by foreign computer and software manufacturers. Prior to the passage of the copyright law, piracy in

161. GSP treatment allows developing nations to export goods to the U.S. without many of the duties imposed on developed nations. See Berliner, *supra* note 39.

162. See Richards & Kenny, *supra* note 153, at 321.

163. See Freidheim, *supra* note 158.

164. See Richards & Kenny, *supra* note 153, at 313; Freidheim, *supra* note 158 (providing a good analysis of the structure of the old and new laws and their major differences).

165. Tan Bok Hoay, *The 1987 Singapore Copyright Act and Its Economic Consequences*, 4 ASIA-PAC. LAW. ASS'N J. 111 (1988).

166. *Id.* at 111.

167. All data on the economic consequences of the new Act come directly from Tan Bok Hoay, *supra* note 165.

168. *Id.* at 113.

169. *Id.*

170. *Id.*

171. *Id.*

172. *Id.*

Singapore was so widespread that Microsoft estimated that over ninety percent of its software packages sold in Singapore and Malaysia were pirate copies.¹⁷³ The combination of legal protection and a highly skilled workforce has now enabled Singapore to become a second "Silicon Valley."¹⁷⁴

Following the passage of the Copyright Act, export printing revenues jumped by thirty-nine percent.¹⁷⁵ Previously, Singapore's reputation as a piracy haven had harmed the country in the worldwide printing business.¹⁷⁶ Advertising companies, which could no longer use music without paying royalties, turned to local jingle writers and composers rather than negotiate for international copyright clearance. This resulted in a tripling of the local artists' incomes.¹⁷⁷

The effects of the new copyright law have not been entirely positive. Many of the pirates have simply gone underground. Video pirates are still estimated to control twenty percent of the market¹⁷⁸—compared to eighty-five percent before the passage of the new copyright law.¹⁷⁹ Music pirates have turned to copying the lyrics and the music of foreign entertainers rather than the actual recordings.¹⁸⁰ Music pirates have also engaged in the counterfeit production of blank tapes.¹⁸¹

In addition, much of the former piracy has migrated to Malaysia, supplying Singaporean consumers from across the border. Some of the adverse economic impact on Singapore's economy from this piracy migration will lessen as Malaysia takes action to improve its copyright laws.

Trademark infringement continues across a wide range of products such as perfume, liquor, and watches. Nevertheless, Singapore has successfully eradicated the bulk of its copyright pirate industry. It is no longer ranked as a "problem" country and has been considered as one of the success stories in the international effort to eradicate piracy.¹⁸² In 1990 Singapore joined WIPO.¹⁸³

173. Beale, *supra* note 156.

174. Tan Bok Hoay, *supra* note 165, at 114.

175. Sally A. Taylor, *Asian Authors Push for a Statute of Limitations*, FAR E. ECON. REV., Oct. 20, 1988, at 48 (Singapore exceeded Hong Kong's growth rate for the first time).

176. *Id.* at 48 ("Publishers did not want to risk having their books printed in double the quantities they had ordered and then finding that extra stock, virtually identical pirated versions, for sale at a later date.").

177. *Id.* at 48-49.

178. Tan Bok Hoay, *Report from Singapore on Recent Counterfeiting Activities*, 12 EUR. INTELL. PROP. REV. 112, 113 (1990).

179. See Moseley, *supra* note 155.

180. See Tan Bok Hoay, *supra* note 165, at 113.

181. See *id.*

182. See *Copyright Holders Name Top 12 Pirate Nations*, *supra* note 33.

183. See *Singapore to Join World Intellectual Property Organization*, Xinhua Gen-

VII. THE THRESHOLD AND THE PIRATES— THE FUTURE

Data on the impact of changes in intellectual property laws is difficult to obtain, and even more difficult to extract from other economic causes and effects operating in a LDC's economy. The U.S. has successfully pushed for stronger intellectual property protection laws in Mexico,¹⁸⁴ Hong Kong, Singapore, Korea, Taiwan,¹⁸⁵ Malaysia, and Indonesia. The first six of these countries have reached the proposed threshold level. They have per capita GNP levels far above the subsistence level, and at least twice that of the average LDC. The World Bank has characterized the first five countries as upper middle, or high income, economies; and all of the countries except Indonesia are at least at the middle income economy level.¹⁸⁶ The literacy levels of all seven have surpassed seventy percent. All have a domestic scientific/technical capacity and have experienced industrial growth and capital formation.¹⁸⁷ Further, all have also been significant pirate nations, perhaps fueling the growth and the development of their technical capacity through piracy.

The first six nations listed above, as well as Argentina and Brazil, have reached the threshold level where increased intellectual property protection will benefit their economies.¹⁸⁸ However, many of these countries continue their pirate activities.¹⁸⁹

Both Turkey and Thailand are nearing the threshold level. However, Thailand currently is one of the worst offenders in both copyright piracy¹⁹⁰ and trademark counterfeiting.¹⁹¹ Turkey has been listed on the USTR Special 301 list for its copyright practices.¹⁹²

A. MALAYSIA

Of all the nations listed above, Malaysia is the most likely can-

eral Overseas News Service, Oct. 8, 1990, available in LEXIS, Nexis Library, XINHUA File.

184. *Mexico President to Propose Stricter Copyright Law*, Reuters, May 29, 1990, available in LEXIS, Nexis Library, REUTER File.

185. The World Bank does not maintain data on Taiwan.

186. WORLD BANK, *supra* note 120, at 178 tbl. 1.

187. *See app.*

188. *See app.*

189. *See C. Hills, Citing Significant Progress, Declines to Name Countries Under Special 301 Provision*, 7 INT'L TRADE REP. 616, 617 (1990).

190. *See id.*; *see also* Winter, *supra* note 48; Steven Erlanger, *Thailand is the Capital of Pirated Tapes*, N.Y. TIMES, Nov. 27, 1990, at C15 (Protection of pharmaceuticals is a point of controversy between Brazil and the U.S.).

191. *See* Amina Rahman, *Thailand: Copyright Pirates Terrorist Investigators*, Inter Press Service, Dec. 6, 1990, available in LEXIS, Nexis Library, ARCHIV File (Pirates control up to 95 percent of the Thai music market.).

192. *See* chart 1 at app.

didate to follow Singapore's lead and become the next "Newly-Industrialized Country" ("NIC"). Its per capita income is rising steadily, passing the US\$2000 level in 1989, with a growth rate of 8.1 percent in 1988.¹⁹³ Its industrial infrastructure is well developed,¹⁹⁴ its population relatively well educated, and its economy has moved well beyond subsistence agriculture.¹⁹⁵ Malaysia meets every criterion of the threshold test.

Malaysia recently amended its copyright act to provide increased protection, and joined the Berne Convention in 1990.¹⁹⁶ Malaysia has already experienced some positive results from its increased copyright protection. *Search*, a new Malaysian rock band, has been very successful. The new style of Malaysian rock nurtured by this group has found a large audience and has resulted in a quadrupling of both the number of record companies and the number of rock bands in Malaysia.¹⁹⁷ *Search* sold over 40,000 cassettes in Indonesia, a success made possible by the increase in copyright protection that occurred in Indonesia in 1987.¹⁹⁸

Continued improvement in intellectual property protection in Malaysia should result in the same positive economic consequences as in Singapore. The Malaysian government is currently revamping its investment regulations in an attempt to attract foreign high-technology investments, mirroring many of the incentives offered by Singapore.¹⁹⁹ Many foreign high-technology companies are responding to this positive investment climate, restrained only by a

193. See N. Balakrishnan, *The Next NIC*, FAR E. ECON. REV., Sept. 7, 1989, at 96, 97 (per capita income of US\$2079 based on data to the end of 1988, twice that of Thailand).

194. See *id.* at 96-97. Malaysia's schools, roads, and telephones are evenly distributed, its managerial infrastructure is well developed, and it has domestic capital supplied by the Chinese Malaysians. Its wages are low, and industrial land is available. Its labor force is well educated and English-speaking. *Id.*

195. See *id.* at 96.

196. See *Malaysia Becomes Member of International Copyright Pact*, Reuters Library Report, Oct. 2, 1990, available in LEXIS, Nexis Library, REUTER File. The Malaysian Trade and Industry Ministry representative stated membership in the international copyright pact will help check piracy and bolster growth in the computer, music, and publishing industries. Amendments to the 1987 Copyright Act were approved in July 1989. *Id.*

197. See Margaret Scott, *Kutu Culture Clash*, FAR E. ECON. REV., April 13, 1989, at 36.

198. See *Malaysian Band Finds Success in Indonesia*, BILLBOARD, Dec. 16, 1989, at 65. The cassette was released by a local licensee of BMG. The Indonesian success was seen as boding well for future exchanges of talent between the two countries. Malaysian artists are also gaining ground fast in other Asian countries. The success of *Search* shows that local writers can export their songs. *Id.*

199. See Francis Pearce, *Asian Sales a Boost to US Manufacturers*, FAR E. ECON. REV. July 7, 1988, at 66. (The Malaysian government is offering the following incentives: pioneer status to companies whose products are seen to offer high added value such as computer software companies, five-year tax exemptions for pioneer companies, and exemptions from foreign equity ownership restrictions).

concern over Malaysia's intellectual property laws.²⁰⁰ Continued improvement of Malaysia's intellectual property laws should reduce the concerns of these companies, and stimulate the increased investment Malaysia needs to become the next NIC.

B. KOREA

All of the nations which have reached the threshold and have increased their level of intellectual property protection have experienced positive economic consequences. Korea, for example, which implemented increasingly stronger patent laws in 1987 and 1990,²⁰¹ has reported a rise in the number of domestic patent applications since 1987.²⁰² Significant numbers of domestic Korean inventors are moving toward filing patent application rather than utility models.²⁰³ Additionally, there are reports of a "reverse brain drain" as Korean scientists return to Korea to pursue research careers in this new environment.²⁰⁴ After the implementation of a stronger copyright law in 1987,²⁰⁵ Korean export printing revenues rose forty-one percent in that year.²⁰⁶ The South Korean Broadcast Systems granted broadcasting royalties to music authors for the first time in 1988.²⁰⁷

C. HONG KONG

After the implementation of a stronger copyright law in Hong Kong in 1978, the local recording industry flourished. Local recordings subsequently accounted for seventy percent of record sales in Hong Kong, with sales of local artists' recordings garnering a

200. See *id.* (Doubts over intellectual property rights are balanced against the easing of regulations governing company ownership.); see also Carl Goldstein, *Chips of Change*, FAR E. ECON. REV., Sept. 7, 1989, at 98, 99 (Many high-technology companies such as Matsushita, Sony, Sharp, Motorola and National have invested in Malaysia. Malaysia is the world's largest exporter, and the third largest producer, of semiconductor devices. Two companies have set up wafer production facilities in Malaysia.); Carl Goldstein, *The Hunt for Volume*, FAR E. ECON. REV., Nov. 2, 1989, at 60. (A large Singaporean printing house owns a printing factory in Johor that produces case-bound books for the Malaysian and Singaporean markets. It is currently the subject of a merger attempt by a large Hong Kong printing house).

201. See R. Michael Gadbow, *Republic of Korea*, in GLOBAL CONSENSUS, *supra* note 123, at 272, 292-308 (providing a good discussion of the interest groups within Korea supporting or opposing increased copyright and patent protection); WIPO, *Changes to Korean Patent Law Under Newly Enacted Legislation*, 4 World Intell. Prop. Rep. (BNA) 54 (Feb. 1990).

202. See SHERWOOD, *supra* note 75, at 156.

203. See WIPR, *KIPO's 1989 Statistics for Patents, Utility Models*, 4 World Intell. Prop. Rep. (BNA) 94 (May 1990).

204. See SHERWOOD, *supra* note 75, at 156.

205. See Gadbow, *supra* note 201, at 299.

206. See Taylor, *supra* note 175, at 48.

207. *Id.*

large market share.²⁰⁸

Other industries have prospered as well. The printing industry in Hong Kong has developed into a US\$333.3 million²⁰⁹ business, due in part to the protection of stronger copyright laws.²¹⁰ Hong Kong's film industry is the third largest in the world²¹¹ and relies heavily on foreign sales, primarily in Taiwan, Singapore, and Malaysia. The film industry is also earning income through the release of video copies of its movies.²¹² A large Hong Kong videocassette manufacturer recently concluded an exclusive licensing agreement with Thorn EMI to become its worldwide agent for EMI brand-name licensed products such as blank tapes and head cleaners.²¹³ This agreement would have been impossible without the legal framework in place to protect the proprietary technology.

D. TAIWAN

Taiwan increased its copyright protection in 1985 and 1989, and its patent protection in 1985. Many Taiwanese firms have been able to take advantage of these new protections. One Taiwanese company, Acer, began as a trading company. It was responsible for the introduction of the Intel microprocessor to Taiwan in 1975. Its familiarity with the technology enabled it to move into the production of original-equipment manufacturer ("OEM") computers, and then into the production of computers developed by its own in-house research and development staffs.²¹⁴ Chase Manhattan Bank recently invested US\$1.4 million in Acer, the bank's first venture capital investment in Asia.²¹⁵ Acer also recently entered into a joint venture with Texas Instruments to produce semiconductors in a

208. See SHERWOOD, *supra* note 75, at 156; MacLaughlin et al., *supra* note 123, at 105.

209. See Carl Goldstein, *Inking Big*, FAR E. ECON. REV., Nov. 2, 1989, at 60.

210. See Taylor, *supra* note 175.

211. See Carl Goldstein, *Hong Kong's Screen Test*, FAR E. ECON. REV., Feb. 8, 1990, at 40 (following the U.S. and India).

212. *Id.* at 41.

213. See Carl Goldstein, *Fast Forward*, FAR E. ECON. REV., July 26, 1990, at 43. In 1978, Swilynn International Holdings originally started as an audio cassette manufacturer, but abandoned that venture in favor of video cassettes in 1982. Swilynn originally produced low quality, no-name video products but soon obtained a license from Victor Company of Japan, the original inventor of the VHS format. Swilynn is ready to enter the new market of computer media, and has the exclusive rights to market technology developed by Unitech, a Japanese private research house. It will soon begin to manufacture 3.5 inch double and high density disks under this agreement, and has plans to produce rewritable, rerecordable optical memory disks within two years. *Id.*

214. See Jonathan Moore, *Apple of Taiwan's Eye*, FAR E. ECON. REV., July 14, 1988, at 62 (Acer spends over 5% of its earnings on R&D each year and 500 of its 3639 employees are in R&D).

215. See Bob Johnstone, *Send Out the Clones*, FAR E. ECON. REV., Jan. 14, 1988, at 46 (Acer/Multitech has an in-house R&D staff of 400 engineers, and Mitac, a rival company, has 200).

factory in Taiwan's Hsinchu research park.²¹⁶

The increased R&D activity undertaken by Taiwan's new high-technology industry resulted in a reverse brain-drain as new job opportunities became available for Taiwanese engineers and scientists.²¹⁷ Additionally, computer exports were responsible for four percent of Taiwan's GDP in 1988,²¹⁸ and have spurred the development of a domestic software industry.²¹⁹

E. INDONESIA

Even Indonesia has responded to the economic incentives of increased intellectual property. The country implemented a new copyright law in 1987, and passed a new patent law which became effective in August 1991.²²⁰ Indonesia's media has experienced a recent upsurge as many business groups are launching new magazines and newspapers.²²¹ The government is still maintaining a limited number of publishing licenses as its primary barrier to entry, but changes in the law have recently made it easier to transfer ownership of these licenses.²²²

216. See Bob Johnstone, *Chipping In*, FAR E. ECON. REV., May 25, 1989, at 82.

217. See Jonathan Moore, *Taiwan's New Breed*, FAR E. ECON. REV., July 21, 1988, at 55; Bob Johnstone, *Diverting the Brain Drain*, FAR E. ECON. REV., Jan. 28, 1988, at 70. (Hsinchu Research Park was developed as a base to move from a labor-based to knowledge-intensive production, create jobs for local talent and opportunity for Taiwan expatriates who want to return, and to motivate entrepreneurship. Previously, 20% of college graduates go abroad to get higher degrees, and only 20% of them return).

218. See Bob Johnstone, *Taiwan Holds Its Lead*, FAR E. ECON. REV., Aug. 31, 1989, at 50.

219. See Pearce, *supra* note 199, at 64, 66.

220. See *Treaties: Indonesia Signs Bilateral Agreement with U.S. to Protect Copyrights*, 37 Pat. Trademark & Copyright J. (BNA) 634 (1989); Adam Schwartz, *Patent Protection*, FAR E. ECON. REV., Nov. 2, 1989, at 52. Indonesia's government passed a new patent law on October 13, 1989. It had amended its old copyright law in October 1987 after a storm of criticism arising from the collection of a tax on a pirated version of the *We Are the World* audio cassette. A bilateral agreement between the U.S., the E.C., and Indonesia protects books, audio recordings, and computer software. The Indonesian government is also currently revising its trademark laws. The patent legislation provides patent protection for 14 years from the date of application with a possible two year extension. It currently takes up to 4 years for the patent to issue. The new patent law does not exclude pharmaceuticals despite Indonesian concern over the possible increase in the price of drugs. The government addressed this concern by implementing a program to supply cheap generic drugs from already expired patents. The largest potential loophole in the new law lies in its denial of patent protection on imported products. Under this law only the importation of finished pharmaceuticals would be banned. *Id.* at 52-53.

221. See Michael Vatikiotis, *Masses of Media*, FAR E. ECON. REV., July 26, 1990, at 46.

222. *Id.* at 46 ("Licences have become a commodity.').

F. EXPLANATIONS FOR CHANGES IN INTELLECTUAL PROPERTY LAWS

Most of the changes in intellectual property protection laws described above have occurred as the LDC's economic goals and capabilities have changed, assisted in part by increased trade pressure from developed-world trading partners.²²³ In many cases the LDCs' former pirate activities strongly contributed to the development of the infrastructure and technical capacity necessary to ensure that the touted advantages of intellectual property protection actually materialize.

VIII. RECOMMENDATIONS

Enlightened self-interest can indeed be a powerful inducement to abolish pirate industries and establish strong intellectual property laws.²²⁴ The U.S. carrot and stick approach has succeeded to a certain extent, but more emphasis is needed on the carrot.²²⁵ The LDCs need to weigh the variables in their cost-benefit calculation in the direction of increased protection. Reducing the immediate costs of implementing stronger intellectual property laws, or shortening the lag period before benefits appear, could be more effective than trade sanction "sticks" or moral condemnations in encouraging threshold nations to adopt increased intellectual property protection.²²⁶

Reducing the immediate costs of implementing a new intellectual property system could also strengthen those domestic entities within the LDC that favor increased intellectual property protection. Establishing a regional entity to administer the intellectual property systems of several nations might be one way to reduce the

223. See Winter, *supra* note 48; see also Philip P. Altbach, *Economic Progress Brings Copyright to Asia*, FAR E. ECON. REV., Mar. 3, 1988, at 62, 63. India, one of the foremost advocates for free access in the 1950s, moved to calling for increased copyright protection as its domestic printing industry matured. India's printing industry is currently the eighth largest in the world, and its film industry the second largest. Taiwan also moved to advocate copyright protection as it developed its own knowledge-based industries. *Id.*

224. See IP RIGHTS IN SCIENCE, *supra* note 4, at 33 (noting that developing nations which initially supported free access to germ plasmas reversed their stance in only two years as they developed new crop varieties through their own research); see also Altbach, *supra* note 223, at 63.

225. After threatening Singapore with the loss of GSP benefits if the protection of intellectual property was not increased, the U.S. lowered GSP benefits anyway despite Singaporean compliance. U.S. policy must be cohesive if it is to be effective. See Altbach, *supra* note 223, at 63; Kastenmeier & Beier, *supra* note 16, at 304 n.60.

226. See Robert Hudec, *Remarks of Professor Robert Hudec*, 22 VAND. J. TRANSNAT'L L. 321 (1989) ("The United States always has high principals [sic] when it pursues its interests. Its interests are never just interests, they are always matters of high principal [sic].").

administrative cost on any single country.²²⁷ This regional board might also increase the incentive to work a patent in at least one country in the cooperative.²²⁸ Increased assistance by the U.S. or WIPO could also encourage intellectual property protection. Japan and several other Asian nations have recently conducted talks on the establishment of a regional organization to assist with intellectual property issues.²²⁹

In addition, direct linkage of increased protection to the policy objectives of the LDC, such as increased technology transfer or direct foreign investment, could also positively influence LDCs' political decisions on increased intellectual property protection. Developed nations could offer preferential tax treatment to companies that invest in LDCs with strong intellectual property protection.²³⁰ This direct investment in the LDC could provide new legitimate opportunities for the displaced pirates. Transitional lower royalty or licensing fees offered to current pirates, as an inducement, could lead to their ready acceptance of increased intellectual property protection, and more importantly encourage their support in the LDC legislature. Additional import preferences for LDC goods, as a trade-off for increased intellectual property protection, could be another mechanism of positive linkage.

The U.S. and other developed nations need to recognize that they must provide positive inducements for pirate nations to adopt increased protection of intellectual property. Threats and bluster are only marginally effective. Developed nations do not need to

227. See Creel & Wintringham, *supra* note 86, at 288, 289 (The Libreville agreement established a common patent system for thirteen African nations—Cameroon, the Central African Empire (Central African Republic), Chad, the Congo (Zaire), Dahomey, Gabon, the Ivory Coast, Madagascar (the Malagasy Republic), Mauritania, Niger, Senegal, Togo, and Upper Volta (Burkina Faso). This became the African Intellectual Property Organization. In 1988, over 274 patents were issued by this organization.); Massel, *supra* note 3, at 660 (the European Community is also moving in that direction).

228. See Creel & Wintringham, *supra* note 86, at 288-92 (MNCs argue that economies of scale prevent local working of a patent in all patent-granting countries. Regional cooperatives that recognize local working in one member of the cooperative as effective local working in the others would invalidate that argument.).

229. See WIPO, *Japan-ASEAN Feasibility Study*, 4 World Intell. Prop. Rep. (BNA) 52 (Mar. 1990); see also U.S., *Canada Rap ASEAN Over Investment, Property Rights*, Kyodo News Service, Sep. 12, 1990, available in LEXIS, Nexis Library, JEN File (ASEAN agreed to cooperate with the U.S., Japan, Canada, South Korea, Australia, and New Zealand in trying to produce international rules for intellectual property protection.).

230. This measure would directly encourage the working of patented technology within the LDC and would provide employment and further education of the LDC workforce. See Kastenmeier & Beier, *supra* note 16, at 302-05 (listing some policy options for the U.S. to encourage increased intellectual property protection); Helen E. Weidner, Note, *The United States and North-South Technology Transfer: Some Practical and Legal Obstacles*, 2 WIS. INT'L L.J. 205, 223-27 (1983) (detailing some policy initiatives by the U.S.).

carry the pirates over the threshold, but they do need to provide inducements to get LDCs to recognize the intellectual property threshold and cross it on their own.

APPENDIX
Chart 1 — THRESHOLD DATA

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Low Income													
1. Mozambique	100	37	0	-2.8	-7.1	—	-39	-6.6	33	-15	2	0	2
21. China	330	69	0	10.3	12.4	11.0	5.5	14.4	38	37	1761	7	580
22. India	340	43	—	5.2	7.6	8.3	6.9	4.3	24	21	13565	35	211
34. Indonesia	440	74	—	5.1	5.1	13.1	1.0	1.9	22	25	56	2	229
Middle Income													
43. Bolivia	570	74	17	-1.6	-5.7	-5.6	-2	-19.5	11	6	9	1	249
44. Philippines	630	86	38	0.1	-1.8	-0.3	9.0	-10.9	17	18	116	13	244
57. Thailand	1000	91	20	6.0	6.6	6.8	35.2	5.0	28	26	218	4	331
65. Turkey	1280	74	10	5.3	6.7	7.9	8.9	4.4	24	26	340	3	822
71. Mexico	1760	90	16	0.5	-0.1	2.2	2.4	-6.9	20	23	706	114	1305
74. Malaysia	1940	73	7	4.6	6.1	7.3	15.6	0.0	226	36	180	8	784
76. Brazil	2160	78	11	2.9	2.6	2.0	9.0	0.0	14	18	1548	69	813
Upper Middle Income													
84. Argentina	2520	95	39	-0.2	-0.8	-0.2	2.6	-7.7	29	28	1293	52	1523
89. South Korea	3600	90	36	9.9	12.6	13.5	9.7	10.5	30	38	389	94	1515
High Income													
101. Singapore*	9070	86	—	5.7	4.5	4.8	—	2.6	37	41	244	18	4464
102. Hong Kong*	9220	88	—	7.3	—	—	—	3.0	28	33	—	65	1554
118. U.S.	19840	95+	60	3.3	2.9	3.9	.4	5.0	15	13	142248	110542	7655

1. Per Capita GNP (U.S. \$) 1988

2. Adult Literacy %

3. Post Secondary Education—% of Age Group Attending-1988

4. Average Annual Growth Rate in GDP 1980-88

5. Average Annual Growth Rate Industry 1980-88

6. Average Annual Growth Rate Manufacturing 1980-88

7. Average Annual Energy Production Growth 1980-88

8. Average Annual Growth Rate in Gross Domestic Investment 1980-88

9. Distribution of GDP % to Gross Domestic Investment 1980-88

10. Distribution of GDP % to Gross Domestic Savings 1980-88

11. Number of Scientific/Technical Articles Published

12. Number of U.S. Patents

13. Energy Consumption Per Capita (Kilograms of Oil Equivalent) 1988

*Numbers to the left of each country name indicate the per capita GNP ranking for that country.

• Although listed as high income countries, the World Bank classifies these countries as developing nations.

SOURCES: WORLD BANK, WORLD DEVELOPMENT REPORT (1990); CIA, WORLD FACT BOOK (1990) (for Korean literacy figures).