

Intellectual Property: A Chip Withheld in Error

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“We well understand the benefits that improved intellectual property protection will probably bring us, but we must resist making those improvements so we will have a bargaining chip for our trade negotiations.” Public remarks made early in 1999 to this effect by an Argentine foreign ministry official responsible for his country’s trade negotiations sharply etch a dilemma faced by many developing countries. Historically, the chief function of intellectual property (IP) has not been to facilitate trade. IP evolved as an investment stimulant: that is, it emerged over centuries as a means to encourage a nation’s inventive people to contribute to national growth and development. Intellectual property standards were grafted onto the world’s trading arrangements at the end of the Uruguay Round in 1995. This somewhat artificial linkage has tended to confuse analysis of the role of intellectual property in developing economies.

The withholding of higher levels of intellectual property protection as a bargaining chip in trade negotiations is being done, of course, in the expectation that in future international-trade negotiations, developing countries can gain advantages by withholding and bargaining with this chip. There may be some truth in this supposition, particularly to the extent that it is among a limited number of bargaining chips available to many developing countries.

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However, this consideration deserves to be weighed against gains that would result from using, rather than withholding, this chip. To conduct a dynamic analysis, three observations appear relevant.

- (1) While there has been a great deal of speculation and theoretical discussion, there is only limited empirical indication of what robust protection for intellectual property will produce in the economies of developing countries. At the same time, there is little solid evidence to support the alleged benefits of weak protection.
- (2) Every country on earth has gifted individuals capable of inventive and creative activity at world-class levels, yet they are typically a wasted resource in countries with weak IP systems. The loss may be significant.
- (3) Different levels of IP protection are possible and different things happen in an economy at different levels of protection. To make their contribution, the inventive and creative individuals may require a level of protection higher than the TRIPS Agreement, the trade-fostered IP arrangements being adopted currently by most countries.

This paper elaborates these three observations.

What we know and what we do not know

While there has been a great deal of speculation and theoretical discussion, there has been only limited empirical study of what robust protection for intellectual property might produce in the economies of developing countries. Indeed, until more of these countries shift their IP systems to high levels of protection, it will continue to be difficult to appraise the potential effect. The main candidates for such research thus far are Mexico and South Korea. They are almost alone among the developing countries in having made adjustments to their IP systems that are significant enough to merit study in depth.¹

The seminal empirical work is that done by Edwin Mansfield for the World Bank (Mansfield 1994, 1995). His studies of the influence of IP on investor behavior in 14 developing countries found that “in relatively high-technology industries . . . a country’s system of intellectual property protection often has a significant effect on the amount and kinds of technology transfer and direct investment” (1995: 1). Beyond this finding, it appears valid to transport to the context of the developing countries other findings from broader economic research on the American economy begun by Robert Solow and carried forward by Mansfield.

Solow showed the importance of newly introduced technology for national economic growth. In his famous study (1957), he attributed

one-half of economic growth in the United States between 1909 and 1949 to a “residual” factor later identified as largely the technology injected into the nation’s industrial base over that period. Mansfield, in a series of studies (see Mansfield 1988 for overview), then showed the significant social-welfare benefit gained from the introduction of new technology. The work of these two men invites the suggestion that comparable or even greater benefits can be anticipated as higher levels of IP lead to higher private rates of return on research in developing countries. This, in turn, would lead to enhanced social-welfare rates of return there.

A specific observation is in order. Argentina is blessed with vast natural resources in agriculture. Nature has produced great wealth for the country. In an increasingly competitive global-trade setting, however, nature alone is proving less competitive. In countries with high-level IP protection, higher science is being applied to agriculture more and more, largely by private sector actors and less so by the state. The Argentine Ministry of Agriculture has not received funds sufficient to compete in the global application of biotechnology to a wide range of agricultural activities, from more advanced sheep breeding to improving the protein content of crops like soya. The issue is whether Argentina will be able to compete internationally as other countries develop improved versions of what until now have been commodity crops.

It should also be noted that there is little solid evidence to support the alleged benefits of weak protection. A review of some of the major claims for weak protection, together with suggestions for their probable lack of veracity as derived from micro-studies, is available (see Sherwood 1990). In brief, it has been claimed that weak protection saves a country money, promotes local industry, helps acquire technology, and lessens dependency. Various assumptions on which these claims rest deserve to be tested against the empirical evidence provided by a wide range of cases. It appears that these assumptions falter under this examination. It further appears that these claims were articulated after the fact to justify weakened protection.

In countries with weak protection, the political economy of intellectual-property reform deserves comment. In such countries, those interests that benefit from weak protection tend to become well organized and articulate in public discourse. In contrast, precisely because the protection is weak, few interests that typically rely on strong protection will be present. The inventive and creative local individuals are not actively contributing to national wealth; local companies do not conduct in-house research; university research results are not effectively available to increase market activity; start-up firms are not able to attract private risk capital. As a consequence, public discourse is

lopsided, with only the voices that favour weak protection being heard. India may be a good current example, although the Indian film-making industry has long sought better protection for its output.

Inventive minds: a national resource

Every country on earth has gifted individuals capable of inventive and creative activity at world-class levels, yet they are typically a wasted resource in countries with weak IP systems. The “brain drain” from developing countries has long been noted but weak IP protection has seldom been highlighted as causative.

The World Development Report for 1998/99 produced by the World Bank under the title *Knowledge for Development* stressed an increasing awareness of the intrinsic economic value of knowledge. While many factors converge to support the creation, transfer, adaptation, and use of knowledge, it seems clear that intellectual property protection provides encouragement to the process which, as Mansfield found (see Mansfield 1994, 1995), is significant in developing countries.

There are abundant examples of gifted individuals in developing countries who have made inventions only to fail in their efforts to bring them to commercial usefulness because of the weak intellectual property system of their country. One telling example involves an invention by a Brazilian professor and two Americans academics. Working at the University of Florida at Gainesville, they invented a genetically altered microbe that digests the bio-waste of sugar production to produce ethanol. For this invention of potentially great significance for energy generation in sugar producing countries, the United States Patent Office awarded them United States Patent 5,000,000.

Patents were eventually obtained in five other large sugar producing countries but not in Brazil, where such inventions were not patentable at that time. Commercial development of the invention is progressing in the United States and elsewhere but not in Brazil, where this new technology could bring substantial benefits. The Brazilian co-inventor returned to Brazil and attempted to generate commercial interest among local companies in development of the process but, in the absence of local patent protection, he was unable to find any interest.

In another example from Ecuador, a small firm had been exporting cut flowers to markets in North America and Europe. The firm owners saw an opportunity to produce a new type of exportable flower through genetic modification of an existing plant that grew well in Ecuador. Just as the first field-grown test crop of the new plants was ready for harvesting, 70 plants were stolen. Without any effective means under the then-existing Ecuadorean IP system to go after the thieves and stop their infringement of the invention, the firm had to

consider abandoning Ecuador. The potential to increase Ecuador's export earnings suffered an unnecessary blow.

In Costa Rica several years ago, a young computer engineer had written a spell-checking program for Spanish. It began to enjoy acceptance and commercial success locally, and in Colombia, Panama, and the Spanish-speaking communities in Miami, New York, and elsewhere. However, he could not halt rampant piracy of the program in Costa Rica because of the weakness of protection for IP at the time. His firm survived and began to grow, particularly after an upgrade of the country's IP protection, thereby adding to Costa Rica's foreign exchange earnings and providing his firm with a base from which to develop other software of commercial value to the local economy.

In Nicaragua, a local inventor hit upon the concept of a "melon saver," a simple plastic stand placed under melons as they ripen in the fields. Its function is to increase production by reducing spoilage, eliminating the need to apply pesticides to control rot. He obtained a patent in Nicaragua and also in the United States. Armed with this protection, he was able to attract the capital needed to produce the plastic stands and offer them to melon growers.

This handful of anecdotes points toward a widespread loss for developing countries that fail to encourage their own inventive people. The range of these examples and many more gathered by the author indicate dysfunctions caused in many segments of a developing country's industrial and agricultural base. The cumulative opportunity loss has not yet been measured but is likely to be found substantial.

Different things happen

Many different levels of protection are possible within the concepts of intellectual property and different things happen in an economy at different levels of protection. The implications of this observation for research conceptualization are considerable.

Between 1992 and 1996, the author made diagnoses of the intellectual property systems of 11 Latin American countries for the Inter-American Development Bank. The diagnoses were conducted from the perspective of investment facilitation. This led to development of a numerical rating system for comparing and assessing intellectual property systems. Analyses of other countries were added to the study, for a total of 18. The countries studied to date are Argentina, Barbados, Bermuda, Brazil, Chile, Costa Rica, Ecuador, El Salvador, Guatemala, India, Mexico, Nicaragua, Panama, Pakistan, Paraguay, Peru, South Korea, and Uruguay. The study has been reported in a law review article (Sherwood 1997a) and in Spanish translation in a book (Sherwood 1997b).

The methodology involved detailed interviews with intellectual property lawyers, government officials, and users of the intellectual property systems in each country. A point system was utilized to evaluate components of each IP system: enforcement, administration, treaties and the statutory treatment of copyright, patents, trademarks, and trade secrets. An eighth component, called "life forms," was introduced to spotlight the relevance of IP to the agricultural sectors of these countries. Sub-categories were developed for each component. For example, under enforcement, an assessment was made as to whether the courts suffered from lack of judicial independence, corruption, poor formation of judges, lack of authority to effectively enforce IP rights, and so forth. A range of points was assigned to each of these categories. A total of 25 points was allocated to enforcement, 15 points to trade secret protection, and so on.

A score was derived for each country. For example, Brazil was assigned 49 of 100 points while South Korea was given 74 points. Guatemala was rated at 13 points and Chile at 62, Peru at 61, Mexico at 69, Uruguay at 48, Argentina at 39 and Panama at 36. With some caveats, the rating system was also applied to the TRIPS Agreement and a rating of 55 points was assigned. While these comparative scores are of interest, their significance in terms of economic development was derived from a cross-reference to the findings of Edwin Mansfield discussed above.

Mansfield had found that investors became concerned about their best and latest technology in relation to five levels of activity: sales and distribution, assembly of parts, manufacture of components, complete manufacture of sophisticated products, and research and development. By comparing his findings with the findings of the numerical rating system study, it was seen that when countries have IP systems that rate in the lower portion of the scale, say below a rating of 45 to 50, the economy will be characterized by sales and distribution, assembly and component manufacture. Only as a country's IP system rises above that level will more sophisticated manufacturing flourish, and only as an IP system rises to a rating of, say, 65 to 75 will local inventors be encouraged to conduct research and development.

Several observations can be made from this cross-reference to the Mansfield findings. One is that at the lower levels of IP protection, the investments a country will attract come swiftly and can leave as swiftly. Only as the IP system moves to robust levels of protection does investment in technology-producing activity become more durable. This is because the types of activity characteristic of the lower ranges of IP protection utilize facilities that can be easily abandoned and sold. At the higher levels of protection, the facilities built for so-

phisticated manufacturing and for research and development tend to have low salvage value—that is, they are hard to sell at a price that recovers their original cost. Thus, investors assess their risks more carefully before investing.

Another observation is that at the lower levels of intellectual property, employers are reluctant to train their employees in more than rudimentary tasks. At higher levels of protection, companies are willing, even eager, to train their people by exposing them to the cutting edge of their technology. This enriches the human-resource base of the country, essentially without public expense.

Innovation occurs at all levels of IP protection. At the lower levels of protection, however, innovation tends to be random and sporadic. At the middle levels of protection, innovation begins to occur more frequently in some fields. At the higher levels, innovation is planned and constant. Ceramics companies in Cuenca, Ecuador, for example, have reported that they do make innovations in their products and processes from time to time, but almost exclusively in response to a specific problem. These owner-managers indicated that if they believed that innovation could be protected by an effective intellectual-property system, they would gladly devote their time and their company resources to research and development of new processes and products.

Under lower levels of protection, acquisition of proprietary technology is extremely limited. In Ecuador, a textile manufacturer had licensed rudimentary process technology for thread making from firms in Scotland. After some losses of this proprietary technology through infringement without recourse to IP protection, both the licensor and licensee agreed to abandon plans for transfer of more advanced technology. Both recognized that the Ecuadorean firm would be placed at a competitive disadvantage if the newer technology were stolen and used by another Ecuadorean firm that would not pay for the advanced technology. Both firms agreed they would renew their technological cooperation after the IP system of Ecuador improved.

Protection of intellectual property facilitates numerous linkages that operate in the background of technology development. For example, if a firm wishes to collaborate with another firm in some way, it is common to enter into a preliminary agreement that permits both firms to “peek” at the technological assets of the other before entering into an agreement. One of the firms may seek inputs from the other or they may desire a joint venture to achieve some specific objective. These pre-negotiation agreements typically involve confidentiality clauses (trade-secret protection) and will commonly use patents or patent applications as a means of defining the technology that is to be brought to the negotiating table. At the lower levels of IP protection, such

agreements are not viable. Consequently, technology development is stunted in a way that the public does not see. At the middle levels of IP protection, there will be some attempts to use these pre-negotiation agreements but usually only in restricted ways. At the higher levels of IP protection, firms feel relatively comfortable in relying on pre-negotiation agreements to facilitate their deal-making.

Under low levels of IP protection there is scant private investment in any kind of technology. At middle levels of protection, private investment can be found for rudimentary technology, whereas at high levels of protection, private investments in high technology become common. Private risk capital is famous for its role in generating new firms, spawning new technology, and even new industries. Many developing countries have attempted to attract this risk capital without realizing the profound relevance of IP protection for venture capital. When venture-capital firms receive applications for funding, they examine first the proposal to ascertain whether there will be adequate protection for the intellectual property involved. If not, the balance of the application will not be considered. It is not by accident that venture capital firms are all but extinct in countries with low levels of IP protection.

Artists, composers, writers, and others who generate the cultural expressions of a country cannot live on praise alone. They must eat. If their works are not protected from piracy, they starve, or they turn to other pursuits, or quite often they leave the country. As a consequence, the country loses the contribution of its potential artists. The evolution of the country's cultural expression is stunted. In subtle ways, this turns the country to reactionary attitudes, making it more difficult to embrace the flow of historical developments in all fields, including the economic and social, as well as the cultural, aspects of life. Low levels of IP protection defeat sustainable cultural expression. However, middle levels of IP protection are sufficient to stimulate cultural advancement. At the higher levels of IP protection, cultural expression is fully encouraged.

In most countries, the universities tend to concentrate some of the best minds in the country. Under low levels of IP protection, the attention given to technology in university settings tends to be theoretical and unused. At the middle levels of IP protection, a more practical orientation emerges alongside theoretical pursuits, and university generated technology begins to find application in the technical base of the country. At high levels of IP protection, university research in science and technology more frequently finds practical application in the local economy, often as graduating engineers join or create local firms that appropriate the inventions based upon university research.

At low levels of protection, the agricultural sector continues chiefly to utilize older science. At the middle levels of IP protection, the agricultural base receives some newer science but it is the higher levels of protection that appear to encourage application of the latest and best new science to the fields and farms of the country. In many developing countries, the agricultural sector remains dominant in the economy, providing employment to large elements of the population. In these countries, applying even small increments of new science to agriculture can have a significant impact on overall economic performance.

At low protection levels, the industrial base is typified by sales and distribution of imported products and by assembly operations. In the middle levels of IP protection, countries experience the manufacturing of components and simple products. Only at higher levels of IP protection is the industrial base characterized by complete manufacturing of more sophisticated products. Most important, it appears that this is the level that fosters research and development of new and improved products and processes. This is the level of IP protection required to tap the natural resource of the country's brightest minds, thereby helping to generate and introduce the new technology that, as Solow and Mansfield found, contributes significantly to economic growth and social welfare.

If nothing more, this brief survey of some of the arenas in which IP plays an influential role in economic development will perhaps serve to suggest a landscape for deeper research (for a fuller treatment, see Sherwood 1997c). The observation that different things happen at different levels of IP protection may contribute to the design of studies that seek to calibrate the influence of IP on a broad range of activities.²

Chips withheld: the error

On the eve of new global trade negotiations, many developing countries may feel concern because during the Uruguay Round of the GATT negotiations, they committed themselves to a package of trade arrangements that, among other things, established minimum standards for protecting intellectual property embodied in the TRIPS Agreement. They did so in the expectation that, among other things, they would gain expanded access for their agricultural products to the markets of developed countries. Because that expectation has not been entirely fulfilled, there will be a tendency toward skepticism regarding implementation of TRIPS commitments, to say nothing of hesitation regarding possible demands for new and higher standards.

Companies that operate at the global level, improve and find new products through research they conduct in countries of their choice.

They then sell those products to other countries under cover of the IP protection being established under the TRIPS Agreement. Firms and individuals in developing countries normally do not have that option. They must conduct their research and develop their products in their home country under cover of whatever protection their own IP system affords. Although such countries are moving to the TRIPS level of protection, this middle level of protection will probably not be sufficiently robust to support research and development activities there.

This raises the question whether it is sound policy for developing countries to withhold adoption of high levels of IP protection in the hope of eventual gains in their trade accounts. These would be gains largely for the export of commodity products to which there is limited value-added content. In order to add more value, it will be expedient to improve the quality of the nation's technological base, including the application of new and higher science to agriculture.

A strong argument can be made that through enhanced IP protection many developing countries will improve their ability to export. Commodity crops with improved characteristics give a greater competitive trade advantage. Trade is also expanded, of course, by more advanced products of higher quality. On balance, robust IP protection could eventually do more for export enhancement than any gains obtained from withholding this bargaining chip until the end of a prolonged trade negotiation.

Looking beyond trade enhancement, the upgrading of intellectual property protection to fairly high levels could be expected to attract more domestic and foreign private investment, facilitate the transfer and adaptation of new technology, and contribute to improved social welfare in many developing countries. Thus, it may well be a serious error to withhold higher levels of protection for intellectual property today in expectation of trade gains through international negotiation tomorrow, particularly should the upcoming round prove less productive than earlier rounds.

Notes

- 1 Ecuador made sweeping improvements in its system in early 1998 but they have not been implemented.
- 2 Keith Maskus (forthcoming), under commission by the Institute for International Economics, will identify an exceptionally broad range of linkages between IP and patterns of activity, many of them not considered previously in studies of intellectual property. The working title of the manuscript is Intellectual Property Rights in the Global Economy.

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