
Benefiting from Intellectual Property Protection: Take the Medicine, but Get Some Exercise, Too

Governments in many developing countries justify stronger IPRs by claiming hopefully that this policy reform will result in greater inward flows of technology, a flowering of local innovation and cultural development, and a faster ability to close the gap in technological sophistication between themselves and rich countries. But improved IPRs by themselves are highly unlikely to engender such salutary effects. One need think only of the differences between countries in sub-Saharan Africa, with long-standing and relatively strong laws (though limited ability to enforce them), and countries in East Asia, many of which reformed their regimes only in the 1990s. The first group attracts little FDI and registers few patents at home or abroad. The latter group attracts the bulk of FDI in the developing world and is experiencing rising intellectual property protection (Maskus 1998d; Maskus, Dougherty, and Mertha 1998). Expectations that stronger IPRs alone will bring technical change and growth are likely to be frustrated.

A close reading of chapters 3 and 4 indicates that empirical claims that IPRs can generate more international economic activity and greater indigenous innovation are conditional. Other things being equal, such claims may be valid—but other things are not equal. Rather, the positive impacts of IPRs seem stronger in countries with complementary endowments and policies. Countries must ensure that their new IPRs regimes become a positive tool for promoting beneficial technical change, innovation, and consumer gains. In this chapter I consider these interactions.

While national action to complement stronger IPRs is critical, it is also important for the world as a whole to undertake initiatives that could expand the global gains from intellectual property protection and effect

a more equitable distribution of those gains. Thus, the second point of departure in this chapter is to discuss global policy questions that link tightly to IPRs. Each of these issues, such as how to encourage further technology transfer and promote research into diseases endemic to impoverished nations, may be addressed on the grounds of both efficiency and equity. Ultimately, the objective is to strike a balance between the needs of information developers and of information users, with due regard to market externalities that may not be well managed, and could be exacerbated, in a framework of strong IPRs.

National Policies to Optimize IPRs

Implicit in some of the earlier discussion in this book is the claim that intellectual property protection works best in an environment of open competition, risk taking, and adequate engineering and entrepreneurial skills. Further, the inherent market difficulties of providing incentives for invention and innovation are only partially addressed by IPRs, leaving a role for public policy. Accordingly, governments could be advised to complement their intellectual property regimes with policy reforms along the lines of those listed here.

Human Capital Development

Perhaps the most important complementary factor is a firm commitment to education, training, and skill development. The positive role of educational attainment in economic growth is well established. Although no systematic econometric study has looked for a significant interaction between education and IPRs in growth equations, it is plausible that one exists given the results of Gould and Gruben (1996), Borensztein, De Gregorio, and Lee (1998), and Park and Ginarte (1997). The obvious argument is that an economy with greater skills is likely to invest more in innovation and product development, but such investment is more likely where IPRs are protected.

There are other strong arguments. Smith (1999) found that foreign exporters trade more with countries that have strong imitative abilities as they improve their IPRs, because the threat of imitation is reduced. An equally plausible interpretation is that IPRs are a stronger stimulus in countries with adequate skills than in countries where skills are scarce. One reason is that a nation with a greater supply of technical and managerial skills is more capable of successfully adapting foreign technology to local conditions. Teece (1977, 1986) found that the costs of transferring technology decline with increases in the supply of technical and professional workers. As discussed earlier, strengthened IPRs also may reduce

transfer costs as licensors and licensees operate in an environment of freer information flows and greater certainty.

Finally, economies with stronger educational attainment and skill endowments are more capable of diffusing technical information into competitive uses through honest discovery and competition. Nelson and Pack (1999) point to the importance of learning and technical adaptation as critical in fostering structural change in East Asian economies. While this may have happened in an environment of permissive imitation and copying, the abundant formation of human capital was an important factor. With stronger IPRs it becomes yet more important that a sound basis of education and skills be built for competitive purposes.

Factor Market Flexibility

Stronger IPRs are likely to raise pressures for structural adjustment in many economies. Counterfeiting activity will be reduced significantly over time by copyright and trademark enforcement. The task of reallocating toward legitimate activities the jobs engaged currently in piracy will be easier the more flexible the labor market is in terms of internal migration and employment costs. Field evidence suggests that a significant number of pirate firms continue producing similar goods legitimately under licensing agreements after IPRs are enforced (Maskus 1997b). In this sense, the adjustment problem may be less difficult than envisioned. However, net job losses from formerly infringing firms could be significant in countries that rely extensively on counterfeiting. Countries may wish to establish training and assistance programs for displaced workers, an effort that conceivably could be advanced by technical and financial assistance from abroad.

It is also important to foster flexibility in the market for technical and managerial personnel, because they are important conduits for learning and adapting technologies to new uses—being careful not to interfere with the legitimate protection of trade secrets through nondisclosure requirements, however.

The issue of capital markets may be more one of scale than flexibility. In particular, the ability of local entrepreneurs to undertake R&D and to commercialize new products is greatly constrained when capital is limited. The problem is compounded if investment resources are allocated for political purposes, preventing the funding of new products. Thus, countries may wish to liberalize restrictions on international and interregional capital flows, recognizing that foreign investors may be willing to take risks on new enterprises.¹ Establishing venture capital markets may

1. Field research found anecdotal evidence that foreign venture capitalists are actively seeking new projects in Taiwan, Hong Kong, and China to the extent they are allowed to take equity positions (Maskus, Dougherty, and Mertha 1998).

be appropriate in some circumstances. It is also advisable to move toward market allocation of investment and away from public direction of capital, which is liable to be distorted by political imperatives.

Technology Infrastructure

While IPRs are an important encouragement for technology development, acquisition, and adaptation, they may be usefully supplemented by programs to promote national technical change. Developed countries and many higher-income developing countries have extensive systems of such support, ranging from public assistance for basic R&D in universities and research institutes to extension services in agricultural science. They also provide incentives for commercialization of the fruits of public research and encourage collaboration among private firms and between private and public enterprises for the development of new technologies and products. Such models might be usefully adopted in many developing countries if they are tailored to specific circumstances and are pro-competitive.² However, there is an opportunity cost to the allocation of scarce budgetary resources to collaborative R&D programs. For example, the social returns to such programs in the least-developed countries likely would be small in relation to those from further improvements in primary education and other pressing development needs. Thus, the expected benefits of this approach would vary with the level of economic development.

No country has developed the relationships among government, university researchers, and the private sector further than the United States. There is a moral hazard problem associated with university inventions (Jensen and Thursby 1999). The practical development and commercialization of such inventions is unlikely to occur unless the inventor's income is tied to its sales, that is, to sales of a license via royalties or equity. Thus, in the absence of commercialization incentives university inventors would tend not to focus on inventions with marketable applications. In recognition of such problems, the Bayh-Dole Act of 1980 gave universities the right to retain title to and license inventions resulting from federally sponsored research. In response, research-based universities have established extensive offices for acquiring and managing patent rights. Licensing of university-discovered inventions, which mushroomed in the 1990s, now accounts for a significant portion of the use of patents in the United States.

The American model is inappropriate for most developing countries, whose educational resources would be better devoted to improving

2. See UNCTAD (1995b) for a full discussion.

primary and secondary instruction. Nevertheless, this experience suggests that in many countries technology development processes could benefit from greater incentives to bring publicly sponsored inventions to the marketplace. Survey evidence claims that public research institutes in developing countries often create useful inventions that languish without commercialization (UNCTAD 1995b). This problem is common, for example, in state-run academies of science in China, as readily admitted by Chinese officials engaged in fostering domestic technical change (Maskus, Dougherty, and Mertha 1998). Finding mechanisms for public agencies and private enterprises to cooperate in such commercialization could bring a number of new technologies to the market, with benefits for consumers. Intellectual property protection would play an important role in sorting out the appropriate claims to the returns from commercialization.

The issues go beyond public-private research partnerships. To the extent that the private market does not provide enough investment in product development, there would be a rationale for public assistance. Limited R&D could be associated with factors such as an inadequate environment for risk taking, taxation systems that fail to recognize R&D as a business cost, and weak information flows about technological opportunities. Policies could remove such impediments, especially by ensuring competitive prospects for small and medium-sized enterprises, which remain the source of much innovation in both developed and developing countries.

One strong reason for encouraging R&D by local enterprises is that it is an important condition for effectively absorbing technologies transferred from abroad. One clear example is the finding by Dougherty (1997) that in Chinese manufacturing enterprises TFP growth induced by foreign licensing contracts is significantly higher in sectors where domestic partners were engaged in R&D programs of their own.

These examples point out, again, that strengthening IPRs alone is not likely to generate much incentive for additional domestic innovation and inward technology transfer. Governments should also pay attention to mechanisms for improving the local environment for technical change.

Open Market Access

It is not difficult to understand why, relative to closed economies, economies that are more open to trade and FDI experience a growth premium from strengthening their IPRs. Stronger property rights create market power, which is more easily abused in economies that are not open to foreign competition. Perhaps the most significant effect of trade liberalization is the injection of foreign goods and techniques that compete with previously protected oligopolies. These procompetitive gains have been shown to be significant in a variety of contexts and at different levels of

development.³ In that sense, to strengthen IPRs, on the one hand, while maintaining closed markets, on the other, is to work at cross-purposes. For example, a patent takes on greater market power if there is an import quota on similar goods that limits consumer substitution choices. Competitive markets help limit the effective scope of IPRs to their intended function, which is to foster investments in competition but not to prevent fair entry.

There are other reasons why IPRs and open markets are complementary. First, a liberal stance on inward trade and FDI improves a country's access to international technologies, intermediate inputs, and producer services—all items that can raise domestic productivity. However, our evidence demonstrates that such flows are deterred by weak patent rights and trade secrets protection. Second, a critical purpose of IPRs is to encourage investment in improved product quality, which is often a precondition for breaking into export markets. Similarly, IPRs can support marketing investments that raise product demand and permit economies of scale in production. These processes pertain as much to domestic entrepreneurs as they do to incoming foreign competitors.

These observations support certain policy prescriptions for nations as they strengthen their IPRs. First, it is important to complement the new policy regime with continued efforts to remove restrictions against trade, investment, and market access in services. Second, while authorities should remain vigilant about the potential for licensing abuses, the intrusive practice of inspecting all proposed licensing contracts and requiring costly modifications and disclosure clauses seems largely to limit access to advanced technologies. Thus, it may be advisable to adopt a liberal stance toward technology agreements and to replace technology-monitoring offices with a reliance on competition policy.

As a corollary, it is evident that IPRs have the potential both to expand access to new technologies and to raise the cost of that access. Higher costs may be alleviated by reducing import restrictions on critical technologies, such as telecommunications equipment and services, and computer hardware and software. Widespread adherence to the WTO information technology agreements is a useful complement to stronger copyrights, trademarks, and patents. These agreements aim at establishing tariff-free trade in critical products that support the information technology industry.

For their part, the rich countries that stand to gain considerably from stronger global IPRs must recognize their obligations to provide liberal access to their own markets. If IPRs are to support more advanced production structures in developing countries, those countries cannot be denied the ability to compete abroad. Countries adopting new IPRs regimes have a long-term interest in promoting free trade in goods for which

3. See Harris (1984) and Rodrik (1988), for example.

their own emerging intellectual property advantages will support exports. For example, poor countries could develop advantages in such goods as textiles and apparel, handicrafts, local cultural products, and prepared foods. To ensure such gains, developing countries should push their richer counterparts to implement the agreement to phase out the Multifiber Arrangement, avoid the use of arbitrary and protectionist technical product standards, continue to liberalize agricultural protection, and exercise restraint in the use of antidumping restrictions.

Competition Policy

A controversial issue is the specification and use of competition rules to discipline anticompetitive IPRs practices.⁴ The essence of IPRs is to define the boundaries within which the developer of a piece of information with economic value enjoys exclusive rights to its use. These rights are limited for reasons of public policy interests in access, dissemination, and dynamic competition. To abuse an intellectual property right is to try to extend one's exploitation beyond the limitations established. Claims that a rights holder has exceeded the scope of protection by engaging in anti-competitive activity are often complex and require significant judicial and legal expertise in their interpretation. There is a strong link between IPRs and competition policy, with regulatory authorities and the courts empowered to manage this linkage.

Though several developing countries and countries in transition have recently upgraded or adopted competition regimes, this policy area is open to considerable transformation (OECD 1996). The implementation of TRIPs affords an opportunity for considering the intimate linkages between intellectual property protection and competition policy. An extensive discussion is beyond my scope here but it is instructive to set out the major issues in order to understand the trade-offs and complexities they pose.⁵ Three general issues dominate discussion over competition and IPRs.

Regulating Monopoly Prices

Concern about monopoly pricing reflects fear of one such potential abuse, though it is rarely the focus of competition policy per se and more often the subject of regulation for purposes of public health and nutrition. Competition policy tends to ignore the pricing decisions of firms protected by IPRs, because those decisions relate solely to the covered technologies

4. This section borrows from Maskus (1998c) and Maskus and Lahouel (2000).

5. The papers in Anderson and Gallini (1998) provide an excellent and comprehensive overview.

or products. The basic view is that property rights provide the mechanism for firms to extract some portion of consumer surplus as the reward for innovation. Firms set prices in recognition of market substitutes that are rarely absent (in both a static and a dynamic context), suggesting that policy concern over monopoly pricing is misplaced. One exception is the perceived need in most nations to regulate prices of prescription drugs in order to limit patient costs and budgets of public health authorities, an issue discussed further below.

Interpreting Licensing Restrictions

Abuses of the rights inherent in a patent, trademark, or copyright often relate to business strategies, including selling practices and licensing restrictions, that extend the scope of property rights beyond that intended. There is a vast literature on the competitive effects of market power created by patents, trademarks, and protected know-how (see OECD 1989 and UNCTAD 1996).⁶ There are few concrete guidelines because of the complexity of markets for information and technology. Vertical licensing agreements, for example, may ensure downstream product quality on the part of local vendors, which aids competition, but tie-in sales of unrelated products to technology purchasers could be an attempt to extend the scope of the initial property right and be injurious to competition.

Consider the potential competitive problems raised by the exploitation of IPRs. The first general concern is cartelization of horizontal competitors through licensing agreements that fix prices, limit output, or divide markets. Actual and potential competitors can be both licensees and licensors, either in the market for the product or technology itself or in extended markets. For example, patent-pooling and cross-licensing agreements between competing licensors may reduce competition in downstream product markets that use the licensed technologies as key inputs, particularly where the agreements set prices or restrict territories, customers, and fields of use (OECD 1989).

Competition authorities have found it difficult to set rules for such licensing agreements. Instead, the focus has been on whether the agreement presents the potential for cartelization of a significant share of a market (which requires definition of “significant” and “market,” including whether there are competing products and technologies). Concerns also arise over agreements between licensors and licensees that require resale price maintenance of distributors’ prices. Such agreements would have the effect of vertical price-fixing that would not necessarily be related to needs to monitor and enforce quality. Such risks are greater the

6. The OECD also publishes reviews of competition policies in its member countries; these are useful sources of information on how competition authorities define and deal with IPRs abuses.

more regulated is entry into distribution contracts, a common problem in many developing countries.

A second general difficulty relates to the exclusionary effects of license agreements. Such agreements could anticompetitively exclude other firms from competing in particular markets by raising barriers to entry. One means is tie-in sales, in which a licensor gains a dominant position in the market for the tied good. Potential competitors would be forced to enter the markets for both the technology and the tied good, raising their entry costs. Similar problems emerge if licensees must use only the licensor's technology, which could relate both to the subject of the license and future technologies. If a licensor succeeds in so restricting a significant share of licensees, it gains a dominant position in secondary markets, making competitive entry difficult.

A third concern arises when licensors, either individually or in patent pools, seek to hinder the entrance of competing new technologies through exclusive grant-back provisions and exclusivity arrangements in future technology purchases.

Again, competition policy must attempt to assess the potential anti-competitive effects of such arrangements if they are to be regulated, modified, or banned. These effects depend critically on the structure of the markets in which the agreements operate, the share of markets covered, and the difficulty of entry for licensors and licensees.

Another general class of problems relates to attempts to acquire market power beyond a firm's own protected technology or product by purchasing exclusive rights to competing technologies and products. Such efforts are effectively horizontal mergers, which may be analyzed in terms of their impact on current and future market concentration.

A final problem is nonprice predation, in which IPRs may be used to bring bad-faith litigation and opposition proceedings in order to exclude and harass competitors. This may be particularly troublesome where potential rivals are small and new, with insufficient resources to defend themselves. In turn, this problem could stifle the introduction of competing technologies by raising entry costs. Other policies also deter entry; the challenge to competition authorities is to distinguish predation from legitimate enforcement of IPRs. For example, if firms refuse to license technologies in particular markets or to certain firms, this could be construed either as legitimate business practice or unfair predation.

The basic message is that there are complex relationships between IPRs and their potential abuse. Property rights support market power, the exercise of which does not automatically constitute abuse of position. Competition authorities must learn to distinguish how various forms of behavior might affect static and dynamic competition. In this view, it is probably advisable for countries to adopt the US "rule of reason" approach, rather than the EU approach of attempting to codify rules covering specific actions.

Further, it is important to recognize that the anticompetitive effects of licensing and sales agreements depend heavily on market structure, including the potential for competitors to enter. In many developing economies, entry is impeded by monopoly-distributor laws, an absence of parallel imports, general trade and investment protection, and inadequate financial markets (limiting the evolution of venture capital and other risk-taking markets). In such circumstances it is important to consider the wider relation of business regulation to the development of stronger IPRs.

Treatment of Parallel Imports

Policy regarding exhaustion of IPRs is central to a country's regulation of those rights. Because exhaustion is among the most controversial aspects of international trade, it calls for extensive discussion here. Parallel imports (also called "gray-market imports") are goods brought into a country without the authorization of the patent, trademark, or copyright holder after those goods were placed legitimately into circulation elsewhere. For example, suppose that an authorized dealer of compact disks in Thailand produced under license to EMI sells them locally at a wholesale price below the retail price in Japan. The dealer or a third-party parallel trader could ship the disks to Japan and make a profit net of tariffs and shipping and distribution costs. These goods are legitimate copies, not pirated copies or knockoffs. Thus, parallel imports are identical to legitimate products except that they may be packaged differently and may not carry the original manufacturer's warranty.

Policies regulating parallel imports stem from the territorial exhaustion of IPRs. Under national exhaustion, rights end upon first sale within a nation but IPRs owners may prevent parallel trade with other countries. Under international exhaustion, rights are exhausted upon first sale anywhere and parallel imports are permitted. A third option is regional exhaustion, by which rights are completed within a group of countries, thereby allowing parallel trade among them, but are not exhausted outside the region.

A policy of national exhaustion amounts to a government-provided international restriction on vertical distribution. Each country adopting this approach declares itself a separate market with respect to goods and services traded with IPRs protection. Thus, rights owners retain full rights to distribute goods and services themselves or through authorized dealers, including the right to exclude imports. In contrast, countries permitting parallel imports provide no such territorial segmentation, effectively invalidating any right to control imports of goods in circulation abroad.

Because IPRs are stipulated on a national or territorial basis, traditionally each country has established its own policy for parallel imports. Despite efforts by US negotiators in the Uruguay Round to incorporate a global

standard of national exhaustion into TRIPs, it was impossible to reach an agreement. Rather, Article 6 simply states that:

For the purposes of dispute settlement under this Agreement, subject to the provisions of Articles 3 and 4, nothing in this Agreement shall be used to address the issue of the exhaustion of intellectual property rights.

This clause means that no violation or limitation of a TRIPs obligation beyond national treatment (Article 3) and MFN (Article 4) may be invoked to challenge the treatment of parallel imports, although there is legal debate about this interpretation.⁷ It reflects a compromise that preserves the territorial prerogative to regulate parallel trade, rather than mandating a harmonized approach. The compromise was critical in securing the adherence to TRIPs of numerous developing countries, which maintain the right to set specific exhaustion regimes.

Considerable debate persists over whether to amend TRIPs to achieve a global approach. Some analysts advocate a global ban on parallel trade as a natural extension of the rights of intellectual property owners to control international distribution. For example, Barfield and Groombridge (1998) set out comprehensively the case for restraining parallel trade, though they recognize a collateral need for competition policy to discipline particular anticompetitive practices.

The need to ban parallel imports is advanced forcefully by representatives of copyright industries and the pharmaceuticals-biotechnology complex (Bale 1998). Others prefer a consistent rule of international exhaustion, placing no restrictions on parallel imports, in order to further integrate markets (Abbott 1998). In this view, proscribing parallel imports amounts to a nontariff barrier to trade, which is counter to the basis of the WTO. This notion is sometimes modified by recognizing the value of exemptions in particular sectors, such as pharmaceuticals, that may experience price differentials for regulatory reasons.

Exhaustion policies vary widely, even among developed economies (see table 7.1). The EU adopts exhaustion in all fields of intellectual property but bars parallel imports coming from outside the Community. The European Court of Justice (ECJ) consistently has upheld the right to resell legitimately procured goods within the Community as a required safeguard for completing the internal market. There are two important exceptions: (1) Countries may preclude parallel imports in pharmaceutical products that were placed on the market as a result of a compulsory licensing order. (2) The first showing of a theatrical movie or television broadcast abroad does not exhaust international distribution rights because of the need to make repeated showings under copyright.⁸

7. See Abbott (1998), Cottier (1998), and Bronckers (1998).

8. *Coditel SA vs. Cine-Vog Films*, Case 62/79, 18 March 1980.

Table 7.1 Summary of IPRs exhaustion regimes

Country	Trademarks	Patents	Copyrights
European Union	Community exhaustion	Community exhaustion	Community exhaustion
USA	National exhaustion, common control and no consumer confusion	National exhaustion	National exhaustion
Japan	International exhaustion, unless agreed by contract or original sale is price-controlled	Same as trademarks	International exhaustion, except for motion pictures
Australia	International exhaustion	National exhaustion, unless sold by patent owner without clear restrictions	National exhaustion, except for compact disks and books

Sources: National Economic Research Associates (1999) and International Intellectual Property Association (1998b).

American policy on parallel imports is mixed. Within its borders the United States enforces the first-sale doctrine, under which rights are exhausted when the product is purchased outside the vertical distribution chain. Accordingly, US companies cannot prevent purchasers from reselling goods anywhere within the country. This is viewed as an important policing mechanism for exclusive territories, which are permissible under antitrust law subject to a rule-of-reason inquiry.

The United States maintains a “common-control exception” for parallel imports in trademarked goods. This principle permits trademark owners to block parallel imports except when both the foreign and US trademarks are owned by the same entity or when the foreign and US trademark owners are in a parent-subsidiary relationship (Palia and Keown 1991; National Economic Research Associates 1999). This doctrine was upheld in a recent Supreme Court ruling.⁹

In addition, blocking parallel imports requires demonstration that they are not identical in quality to original products and cause confusion among consumers. Owners of US patents are protected from parallel imports by an explicit right of importation. Finally, the Copyright Act of 1976 bars parallel importation of copyrighted goods. A recent Supreme Court case rejected an attempt to extend this treatment

9. *K Mart Corporation vs. Cartier*, 486 US 281 (1987).

to inherently trademarked goods by claiming copyright protection for labels.¹⁰

Japan permits parallel imports in patented and trademarked goods unless they are explicitly barred by contract or unless their original sale was subject to foreign price regulation. Under its case law, Japan is considerably more open to parallel imports than is the United States (Abbott 1998). Australia generally permits parallel imports in trademarked goods but allows patent owners to restrict them. Australia removed protection from parallel trade for copyrighted compact disks in late 1998, complementing its earlier limited deregulation of book imports.

Few developing countries restrict parallel trade in any field. To some degree this reflects the general absence of competition policies and the existence of limitations on IPRs. Some nations substitute laws mandating a sole national distributor for products imported under trademark or copyright, effectively banning parallel imports. However, in other countries parallel imports are widely seen as a useful policing device against the price collusion emanating from exclusive territorial restraints, while parallel exports are viewed as a channel for penetrating foreign markets (Maskus and Chen 1999).

This wide disparity in policies and attitudes toward parallel imports suggests accurately that there is no obvious answer to whether they are beneficial or harmful, although they are certainly detrimental to the interests of IPRs owners. The economic literature on the subject, though limited, provides useful insights.

Three arguments are advanced in favor of permitting parallel trade. First is the view that restrictions on parallel imports amount to nontariff barriers to goods that have legitimately escaped the control of IPRs owners. Such barriers run counter to the WTO principle of liberal trade and sacrifice consumer gains from market integration. That international price differences may emanate from manufacturers' attempts to set market-specific prices is no less a source of comparative advantage than other demand or supply characteristics, including regulatory policies.

A second argument is that parallel imports play an important policing role against abusive price discrimination and collusive behavior based on private territorial restraints. Here, allowing parallel imports is a form of competition policy that acts as an important limitation to the scope of IPRs.¹¹ The notion that complementing exclusive territories with protection from parallel imports and domestic gray-market trade could induce collusion finds support in US economic history (Tarr 1985; Hilke 1988).

10. *Quality King Distributors vs. L'anza Research International*, 96-470, March 1998.

11. A regime of restricted parallel imports combined with appropriate competition regulation might be more appropriate in many circumstances. In practical terms, however, many developing countries do not have adequate competition policies.

Because the colluding firms could well be foreign in the case of parallel imports, the loss to consumers is not balanced by a gain in local profits.

The final argument is that government enforcement of territorial rights invites rent seeking on behalf of firms that claim they need relief from free-riding competitors but are actually interested in setting collusive prices. In this view, it is best to rely on private enforcement of contractual exclusive territories while permitting parallel trade.

Many arguments are made in favor of banning parallel imports. First, as is well known, price discrimination need not be harmful and under certain circumstances can raise economic well-being (Varian 1985; Schmalensee 1981). At the international level, banning parallel trade would result in perfect discrimination in the sense that one price is set per market (Malueg and Schwartz 1994). In contrast, full parallel trade requires uniform pricing by the IPRs holder, subject to differences in transport and marketing costs.

This comparison sets up several trade-offs. Economies with inelastic demand would face higher prices under price discrimination than under uniform pricing, harming consumers. This surely explains the limited permission of parallel imports into the United States, where demands for trademarked goods might be expected to be relatively unresponsive to price. To the extent that countries are not significant developers of intellectual property, they are made worse off by price discrimination. This logic underlies the favorable treatment of parallel imports in Australia, Japan, and elsewhere.

Countries with elastic demand, typically developing economies, would face lower-than-uniform prices under price discrimination. If they allow parallel trade, foreign rights holders may choose not to supply such countries because local demand is insufficient under uniform pricing (Malueg and Schwartz 1994). In this view, international exhaustion would lower the welfare of developing economies through higher prices and lower product availability.

However, most developing countries are opposed to restricting parallel trade (Abbott 1998). In part, this reflects concern that domestic prices under price discrimination could actually be higher for imported goods.¹² This concern is registered most often in the context of pharmaceuticals trade. More fundamentally, many nations see opportunities for achieving export and industrial growth through being parallel exporters, discounting the likelihood of their markets going unserved. Indeed, many view potential restrictions on parallel trade as back-door attempts by industrial countries to close their markets through nontariff barriers.

12. Recall the finding that major software firms tend to set higher prices for legitimate copies of their programs in developing countries with significant piracy than in the United States. However, it appears that legitimate copies of compact disks are markedly cheaper in developing countries than in developed countries, so the software example is not representative.

Thus, whether price discrimination harms or helps particular nations depends on circumstances. There are no robust predictions about global welfare rankings with and without parallel trade. Malueg and Schwartz (1994) argue for banning parallel imports on the grounds that perfect price discrimination would result in net global output expansion and raise global welfare, while ensuring further that low-price markets are provided goods. This result is sensitive to assumptions of the model, but is an important insight.

A second argument is that parallel traders free ride on the investment, marketing, and service costs of authorized distributors. Because these distributors incur costs of building their territorial markets through advertising, discounting, and postsale service maintenance, they require protection from competition by parallel importers, who can procure the goods without incurring similar costs. Indeed, this is the primary motivation for permitting privately contracted exclusive territories in the first place. That restrictions on parallel imports are a natural extension of the right to control vertical markets is espoused by the World Intellectual Property Organization (1993, 10). It claims that, for copyrights, "The principle of territoriality provides security for the chain of authorizations that permit [an] orderly supply of copies for international distribution." Such restrictions may be procompetitive, both through enhancing interbrand competition and through offering incentives to build markets and provide services. Inadequate protection risks the dynamic problem that markets may be underserved due to slower rates of product introduction and more limited service contracts. Thus, the regulation of parallel trade, like IPRs generally, involves a tension between the short-run static costs of market power and the long-run dynamic benefits of faster product introduction.

A third argument is that efficient distribution requires significant vertical control within an enterprise and that private contracts may be inadequate for this purpose. MNEs increasingly build production and marketing networks to extend their reach across borders. Such firms typically find it advantageous to build markets through exclusive territorial dealership rights. Exclusive rights make it easier to monitor marketing efforts and enforce product quality in order to deter local erosion of trademark value. However, it may be difficult in foreign markets to enforce private contracts prohibiting sales outside the authorized distribution chain. In this view, therefore, restrictions on parallel trade are a necessary complement to exclusive territories (Chard and Mellor 1989). This claim is a direct challenge to the idea that regulating IPRs is a matter of national choice rather than a shared international obligation based on universal principles.

A powerful counterargument to the vertical control idea is that a combination of private exclusive territories and parallel trade regulation could invite collusive behavior among exclusive dealers in products protected

by IPRs, a particularly nettlesome problem in developing countries. In this regard, note that some firms may prefer to allow parallel trade as a way to discipline collusion among their dealers (or monopoly behavior by single distributors) that would limit their sales (Hilke 1988).

Maskus and Chen (1999) put forward a simple theory of parallel imports and vertical price control: a manufacturer protected by IPRs in both a home and a foreign market sets sufficiently low wholesale prices to distributors to induce profit-maximizing retail prices, which vary according to demand elasticity. This sets up an opportunity for the distributor to sell the product profitably outside the authorized channels in the other country.

Banning parallel imports always benefits the manufacturer, but has ambiguous impacts on social welfare in the two countries. On the one hand, parallel trade reduces the markup accruing to manufacturers and benefits consumers from integration. On the other hand, parallel trade wastes resources through cross-hauling goods between countries. Indeed, it is possible in the Maskus-Chen model for goods to be traded in both directions and for parallel exports to flow from high-retail-price countries to low-retail-price countries. One significant policy conclusion is that parallel imports are likely to be beneficial when trade costs (including tariffs) are low but harmful when trade costs are high. It follows that regional trade agreements permitting parallel trade may be welfare-enhancing. However, no general proposition about global welfare emerges.

A fourth argument is that efficient recovery of R&D costs might require setting different prices in different markets when R&D costs are joint in the sense of producing goods and services that are sold across borders. Intellectual property is typically produced in one location (a headquarters or research facility) but exploited globally through exports, licensing, and FDI. In principle, a global planner could treat firms as regulated monopolies with an allowable return on R&D. This approach would suggest following a global Ramsey pricing rule, which means setting prices according to demand elasticity in segmented markets (Danzon 1997). Restricting parallel trade supports such pricing schemes. However, the assumptions underlying this model are of questionable relevance in the context of profit-maximizing competitive rivals. Moreover, this model ignores the redistributive effects among countries and between producers and consumers, rendering its practical significance questionable.

A fifth argument is that international price differences may be the result of national price regulations established in order to achieve social objectives, an issue discussed further in the next section. The most prominent example is the global pharmaceuticals industry, in which virtually all nations regulate prices in order to limit consumer costs or health procurement budgets. Such regulations differ widely across countries and account for significant price variations (Danzon 1997). Permitting parallel trade could then defeat the purposes of regulation as distributors in

more regulated (lower-price) markets export to less regulated (higher-price) markets. In this context, some observers think it appropriate to ban parallel exports from regulated markets on the theory that regulation amounts to a sector-specific export subsidy (Abbott 1998).

Finally, it is often claimed that permitting parallel imports invites consumer deception and piracy. The argument is of dubious validity. Deception would occur if lower-quality parallel imports were marketed as legitimate versions of higher-quality products. Piracy is trade in unauthorized versions of products, which is a different concept from parallel trade. In either case, customs authorities are empowered to act against such trade without restricting legitimate parallel imports.

Given this multiplicity of causes and ambiguous results, the question of whether regulating parallel imports is beneficial or harmful is ultimately an empirical question that depends on circumstances. There is not much systematic evidence to inform the discussion, not least because data on parallel imports are rare and often anecdotal. Tarr (1985) and Hilke (1988) found that parallel imports of high-end goods into the United States in the 1980s essentially followed retail price differences associated with lagged responses to exchange-rate changes, supporting a price-discrimination interpretation (“pricing to market”). They found little support for the notion that parallel traders free ride on the investment of distributors, despite consistent complaints of this kind by authorized distributors. The NERA study (1999) estimated that parallel imports within the EU in selected trademarked goods ranged from less than 5 percent in domestic appliances to 10-20 percent in musical recordings. The latter trade flows largely responded to wholesale price differences, consistent with the Maskus-Chen model. Unfortunately, there are no studies of parallel trade to or from developing countries.

Neither are there studies of the fundamental question of whether market segmentation encourages collusive behavior or monopoly pricing that could be effectively disciplined by parallel imports. This view, held widely in many countries, seems to rely on faith rather than sharp analysis, though it is not difficult to understand its source. Unambiguously, restrictions on parallel trade raise the profitability of intellectual property developers, which are overwhelmingly located in a few developed countries. The possibility that price discrimination could cause lower prices in developing countries, in the face of this enhanced market power, must seem a leap of faith to those unschooled in industrial organization theory. Moreover, it is reasonable to anticipate that, even in relatively low-income economies with large markets, such as India, there may well be lower-priced sources of goods in regional trade. For example, if the introduction of pharmaceutical patents were to raise prices in India by the ranges suggested in the Watal (1999) study, Indian authorities might take advantage of potentially cheaper drugs marketed in Bangladesh.

Given this situation, it is impossible to have confidence either in the

prescription for banning parallel imports or in mandates that there be free global parallel trade. More study is needed of the experiences of countries with varying policies on product prices and availability. The best advice seems simply to permit the status quo to continue, with each country or region selecting its own policy.

IPRs and Social Regulation

The private exploitation of any property right can, in principle, interfere with the attainment of social, noneconomic objectives. In the case of IPRs, two issues dominate discourse:

1. In all nations the maintenance and improvement of public health is viewed as partially or wholly a government responsibility. Governments are interested in making sure that patients have access to medicines on reasonable terms and in limiting their budgetary exposures in public procurement of health care.
2. The use of an economy's natural resources and indigenous genetic materials may have cultural and environmental costs. Governments are concerned with managing the speed of such exploitation and the technologies used for it.

Clearly, an externality argument is used to justify both these objectives. Many private consumers are incapable of paying the true cost of their health care, choosing to consume less than they need for health. Inadequate health reduces productivity. As for environmental resources, private development may proceed faster than would be socially optimal if the true costs of the resources were not borne by developers or consumers. For these reasons, each area is extensively regulated, with public provision of health care and various taxes on environmental use and land development.

It should be no surprise, then, that IPRs, themselves a suboptimal solution to externality problems, could make these social regulations either more or less effective. In medicines, the obvious problem is access, a worsening of the static distortion. If pharmaceutical patents support monopoly pricing, fewer patients could afford the protected drugs and public budgets would be stretched. Over the long term, however, the patents could result in new drugs coming onto the market, a dynamic gain.

In the environmental area, exclusive rights to market or use a bio-engineered plant variety could squeeze out traditional agricultural techniques, raising concerns about reductions in biodiversity. Similarly, patent races to develop new disease therapies or cosmetics based on indigenous plants could accelerate their exploitation beyond socially preferred levels.

However, newer technologies also may make agriculture more productive, reducing the land required to meet nutritional demands. And IPRs may provide incentives for contracts that result in more rational and equitable development of resources.

It is evident that IPRs and systems of social regulations may either be at odds with one another or be mutually complementary. Undoubtedly, as IPRs are strengthened, nations will consider alterations to their regulatory positions in order to manage the new rights. This issue is again broad, multifaceted, and complex. It can only receive an airing here through two examples: pharmaceutical price controls and biotechnology regulation.

Regulating Pharmaceutical Prices

Virtually all countries have some regulation of prescription drug prices and budgetary costs. For example, prices and price increases in France, Italy, and Spain are tightly controlled for drugs reimbursed by social insurance (Danzon 1997).

- Canada abandoned compulsory licensing in 1993 but retains a vigilant pharmaceutical price review board.
- Germany strictly limits the pharmaceutical budget of doctors and health institutions.
- The United Kingdom limits the allowable rate of return on capital to pharmaceutical firms, while not restricting individual drug prices.
- Germany, the Netherlands, and New Zealand set reference prices defined across all effective formulations within a therapeutic class, including generic drugs, in order to keep down the prices of patented and prescription medicines.
- Japan sets reimbursement prices for each drug but permits physicians to prescribe and dispense essentially without limits, resulting in huge numbers of prescriptions being written per patient.
- Though prescription drug prices are largely uncontrolled in the United States, managed care organizations have used their buying power to extract price reductions. The pharmaceutical industry in the United States has expressed fears that expanding Medicaid benefits to cover prescription drugs would usher in price controls.

Throughout the developing world, such regulations are extensive. Indeed, the unwillingness of many nations to provide drug patents may be seen both as a form of industrial policy (to encourage local imitative industries) and as implicit price regulation. However, layered onto patent limitations are detailed rules covering pricing formulas and markups,

which stem from negotiations among public health authorities (and often other ministries, such as labor, industry, and trade), hospitals, pharmaceutical suppliers (manufacturers and wholesalers), and retail pharmacists. Regulations typically extend to regional distribution requirements, packaging and labeling, and the size and strength of dosages.

Public policy may also require pharmacists to engage in cost-reducing practices. A common example is generic substitution, whereby retailers are required to sell generic versions of drugs so long as those drugs provide adequate therapeutic benefits and patients are informed of the availability of branded alternatives. On top of all this are extensive regulatory approval procedures and safeguards against the dispensing of ineffective or harmful formulations.

An instructive example is the South African Medicine and Related Substances Control Act Amendments enacted in November 1997. The law permits the health minister to revoke any pharmaceutical patents in South Africa if he deems the associated medicines to be too expensive. It also permits parallel importation of drugs and allows the health minister to override regulatory decisions concerning the safety and registration of medicines. It requires pharmacists to employ generic substitution unless the doctor or patient forbids it, sets limits on pharmacy markup rates, and bans in-kind inducements from drug manufacturers to physicians.

The law was immediately challenged in court by US drug makers, while Merck and Company dropped a planned \$10 million investment and Bristol-Myers Squibb, Pharmacia and Upjohn, and Eli Lilly all closed South African factories. Application of the law was suspended by the South African government, pending negotiations with the United States, which claimed that it would nullify the advantages provided under TRIPs. An oral agreement between the two governments was reached in September 1999 under which South Africa would implement the law but would amend it in early 2000. In return, American trade authorities suspended their pressure on the South African government. In December 1999, the United States Trade Representative Charlene Barshefsky announced that the application of American trade law to intellectual property issues would pay more attention to the need of foreign countries to address health crises. She also removed South Africa from the Special 301 "watch list."¹³

Few developing countries seem willing to abandon their price control schemes. In light of extensive and similar regulations in many rich countries, the research-based pharmaceutical companies have little ground on which to demand a policy change. Rather, countries need to consider the benefits and costs of price regulation on its own merits. It may be that such controls are effective in managing the exposure of patients and

13. See "The Protection of Intellectual Property and Health Policy," USTR press release, 1 December 1999.

health expenditures to the higher prices associated with new patent regimes. At the same time, they may be counterproductive if they discourage entry of new products or joint ventures and licensing agreements between local and international pharmaceutical firms. Again, there is tension between static needs for access at reasonable cost and dynamic needs for product innovation.

Danzon (1997) argues persuasively that controls have restrained prices considerably in France and Italy, which had the lowest outpatient drug prices among nine developed countries in 1992. As economists would expect, however, the controls had a number of unintended behavioral responses:¹⁴

1. Because price increases were held to the rate of inflation, French and Italian consumers shifted health expenditures sharply away from other forms of therapy into drugs. In consequence, the increase in real drug expenditures per capita in Italy and France was the highest in the sample, suggesting there was little real budget saving.
2. Limited prices reduced incentives for the entry of generic drugs that would otherwise compete with expensive branded drugs, as they do in the United States. The lack of generic competition implied that the price differences between France and the United States in patented, branded, and generic drugs combined were not as great as the other figures would suggest.
3. The French market had a relatively small share of active ingredients that were available also in the United States. This suggested that a disproportionately high percentage of drugs on the French market were either too ineffective to meet the stiff US regulatory requirements or not economically valuable enough to make American sales worthwhile. In fact, French pharmaceutical R&D is largely aimed at small modifications of existing drugs rather than at new discoveries. Although France ranked third in the number of new chemical entities introduced between 1975 and 1989, none were global products (defined as those launched in all seven major developed markets) over that period (Danzon 1997, 62). Rather, discovery of global products was concentrated in the United States (45 percent), the United Kingdom (14 percent) and Switzerland (8 percent). Prices are least controlled in the United States and the United Kingdom.
4. Finally, French productivity in making drugs, measured by value added per employee, was far below that of American pharmaceutical firms in 1990.

14. Danzon's figures are persuasive but no attempt has been made to demonstrate causation or to hold other important economic variables constant in discussing these responses.

These findings support the claim that, if an economy wishes to increase productivity and encourage fundamental invention in its pharmaceutical sector, price controls are counterproductive. Developing countries may not share these objectives, of course. In many countries, imitative R&D among reasonably competitive firms in the absence of patent protection has brought major international therapies onto the market with a relatively short lag.¹⁵ This imitation flourished even under the threat of price controls. Controls do not necessarily mean that manufacturers and distributors lose money; they may be constructed to ensure stable markups or rates of return.

Controls do mean that price-controlled firms in developing countries are not likely to engage in fundamental R&D that could produce global discoveries and win major patents abroad. In fact, however, the controls themselves may not serve as binding constraints to this. Few, if any, firms in developing countries are likely to find it attractive to engage in fundamental R&D in competition with the major international research-based pharmaceutical companies, which have expertise in research and marketing and benefit from significant economies of scale. Developing countries may therefore wonder what advantages could accrue from abandoning or weakening their control regimes.

The effectiveness of price and expenditure controls in developing economies has attracted little study. Lanjouw (1998) described India's price regulation and the problems it has encountered. Since the system was modified in 1995, approximately 50 percent of the Indian pharmaceutical market has been controlled (Watal 1999). The system is based on a straightforward cost-plus formula, with allowable retail price ceilings (including excise tax) calculated as markups over material costs, production costs, and packaging charges. The markup, which is divided between wholesale and retail margins, is set by the health authority. Prices are controlled in products with high volumes and moderately concentrated market structures and in products with low volumes and heavily concentrated market structures.¹⁶

As might be anticipated, such a thorough scheme has a number of problems. The domestic pharmaceutical industry is not cooperative in negotiating these controls. Disputes arise over the criteria for defining costs, what data to submit, the levels of wastage to count, and the like. The administration and enforcement costs are high and the system lacks transparency.

15. Lanjouw (1998) reported that certain drugs on patent elsewhere were imitated effectively in India within three years, sometimes even before foreign regulatory processes were completed and patents granted.

16. As Watal (1999) pointed out, this system automatically would subject any patented drugs to controls.

Beyond such structural problems, administrative price ceilings raise three additional interesting complications:

1. Companies that are awarded patents may choose not to supply particular markets at the regulated prices, suggesting that a balance must be struck between public-health needs and access.
2. As in India, price regulations are typically stated on a cost-plus formula, which encourages firms to set high transfer prices on imported ingredients (Lanjouw 1998). As a result, formulaic price ceilings might actually raise prices higher than they would be if prices were not controlled unless transfer prices are otherwise controlled.
3. Price ceilings set in some developed countries, such as Canada and France, seem to be tied increasingly to comparative indices of prices in other markets (Danzon 1997). Multinational firms thus have an incentive to bargain for the highest possible prices in low-price economies like India in order to gain a higher set of global reference prices. This issue, which is becoming increasingly important in the international pharmaceuticals markets, promises to be controversial in low-cost countries as patents are adopted. Rather than having firms set country-specific prices according to local demand and market structure characteristics (price discrimination supported by international proscriptions against parallel imports), markups could be a function of public-health concerns in developed economies, biasing prices upward in the larger poor economies.

Given these problems and the available evidence, developing countries might be advised to employ price ceilings with caution, perhaps limiting them to patented products with high market concentration, and accounting for the disincentive effects they imply. Innovative forms of procurement might include forgoing price controls in favor of prices negotiated between firms and public-health authorities. The buying power of such plans could extract price concessions without arbitrarily restricting returns to pharmaceutical companies. Health authorities could then limit costs to patients through rebates or discounts built into co-payments. If negotiations fail to restrain monopoly pricing, compulsory licensing under transparent conditions and demonstrated need might be an option.

Countries may perceive that, among the dangers of introducing pharmaceutical patents, the largest is that they would place competitive pressures on imitative local industries. However, pharmaceutical markets are not generally monopolized by patents. Rather, patents provide market power for new products but leave room for generic entry (post-patent), competitive inventing around the patent, and the promotion of brand recognition. An exception is pharmaceutical classes where patents

provide considerable price-setting power, as in the case of treatments for AIDS. Overall, however, the danger of monopolization is weakened in open and competitive markets, which again points to the desirability of liberal trade and investment regimes as patents are introduced. Indeed, there is evidence that competent and competitive imitators may readily link up with foreign pharmaceutical firms through production agreements, technology licensing, and joint ventures in order to exploit patents and marketing rights through a local presence.¹⁷ Thus, neither the threat of market-power pricing nor major industrial restructuring is likely to be a significant problem in open and competitive economies.

Biotechnology, Genetics, and the Environment

Nothing is more controversial in the IPRs area than the treatment of biotechnological inventions and plant varieties. The development, use, and protection of life forms bring up issues of science, law, economics, environmental conservation, and ethics. Since such technologies promise unprecedented advances in pharmaceutical therapies, industrial processes, food production, and nutritional status, all countries would seem to have strong dynamic interests in linking themselves to these advances. Yet there is concern about possible environmental degradation, the diversity of natural biological resources, food safety and human health, and the viability of traditional farming. Many of these concerns are likely based on exaggerated views of the likelihood that genetic engineering could result in mutant strains that might escape their intended uses and destroy or modify traditional organisms. In principle, effective regulation in the name of protecting biological safety would provide adequate safeguards against such low-probability, high-risk events. Other concerns are not misplaced, however, being firmly rooted in the economics of intellectual property exploitation.

The traditional view around the globe was that to patent living organisms in any form was unethical, for it would provide incentives to engage in the questionable practice of inventing life. The advent of the biotechnology industry greatly stressed this approach because, to move forward, its inventions required protection from misappropriation. Biotechnological inventions, like pharmaceutical products (these days, the latter often stem from the former), require substantial investments in R&D but are easily imitated. The US Supreme Court considerably advanced protection for biotechnological processes with its celebrated decision in 1980 awarding a patent for an invented microorganism that could ingest spilled oil. The court recognized the industrial utility of the invention

17. See Maskus (1997b) for Lebanon and Maskus, Dougherty, and Mertha (1998) for China.

and saw no reasonable bars to patenting, providing the organisms met all criteria for eligibility.

Practices in this area vary considerably around the world. The United States recognizes patent eligibility in all life forms save cloned human beings. This broad standard permits patenting of genetic research tools, gene sequences, and, since the 1988 granting of a patent on the Harvard oncomouse, higher-order (multicellular) life forms resulting from genetic manipulation. The United States permits broad patent claims covering all potential products from genetic engineering of a particular plant. It also recognizes patents for research tools, such as a genetic sequence for one drug that could be required to effectuate other pharmaceutical products. The later drugs would be subject to the initial patent, requiring licensing agreements (Barton 1995). Such a highly protective approach raises difficult questions regarding how to commercialize dependent patents if the patentee refuses to license. These standards for protection are thought by many to be excessive; debate continues within the United States, where a public agency, the National Institutes of Health, is attempting to fund the mapping of the human genome in order to place the genetic sequences into the public domain.

As clarified in the July 1998 directive on the Legal Protection of Biotechnological Inventions, the EU patents microorganisms and microbiological processes as well as plant and animal inventions that result from microbiological processes, though in general animal and plant varieties are excluded from protection. Many upper-income industrializing economies, such as South Korea and Singapore, patent biotechnological inventions and plant varieties, having a dynamic interest in these technologies themselves. Others, such as Brazil, Argentina, and nations of the Andean Group, provide wide exclusions, refusing to patent genomes from all life forms and excluding all or any part of living things found in nature (Watal 2000).

Setting aside the ethical issues, the proper scope of patents for biotechnological inventions is widely debated on legal grounds. Because biotechnological research is expensive but its therapeutic and genetic results are easily imitated, patents are considered crucial for promoting the industry. However, it is possible to question how patents apply when products stemming from recombinant DNA techniques may be more the result of luck and patience than of originality: it is not clear whether under classical terms particular products are “inventions” (and therefore patentable) or “discoveries of nature” (and therefore not patentable).

The TRIPs agreement clearly reflects different preferences, both among developed economies and between developed and developing countries. For example, Article 27(2) allows countries to exclude from patent eligibility any inventions that might threaten human, animal, or plant life or health or might result in “serious prejudice to the environment.” This exclusion is limited by the requirement that any such inventions may

not otherwise be put into commercial use on the market, rendering it of dubious practicality. While all countries must patent microorganisms and microbiological processes, the definitions they choose for these terms and also for “nonobviousness” and “inventive steps” may sharply limit protection, as they do in Brazil and Argentina. There are likely to be many disputes in the biotechnology area as standards are implemented.

Two issues dominate international debate about the implications of protection for life forms in specific countries. First, because countries must now protect plant varieties either through patents or PBRs, there is concern that small farmers and farmers in poor countries will be unable to afford the technologies. Plant variety patents preclude the breeders’ exemption and, unless explicitly allowed for in the law, also the farmers’ privilege. Accordingly, most developing countries are adopting PBRs with both exceptions. As may be expected, plant developers in the United States and elsewhere who consider such protection to be inadequate are pushing for a revision of TRIPs to require patents. However, a proposal to require patent systems in PBRs, to the extent they preclude the use of retained seeds by farmers, would be questionable economics in its own right and would be widely resisted without some other mechanism for the diffusion of seed technologies.¹⁸

Developing countries are unlikely to agree to a patenting requirement in plants or plant varieties for the foreseeable future. Rather, they will implement and refine their PBR systems and monitor the costs to local farmers. If such costs are high, governments might consider public purchase of seeds for dissemination to farmers at discount. Purchasing programs by public authorities can put downward pressure on prices, though a balance must be struck to accommodate the needs of plant developers.

A second concern is that providing patents in biotechnology encourages firms to locate genetic materials around the world for purposes of testing them as sources for new drugs, food products, and cosmetics. Such materials include plants and animals that often do not carry adequate private property rights in the source countries. That is, plants may be extracted from public lands or from farms and villages that are incapable of representing their own interests. In consequence, such resources may be taken without adequate compensation.

Although many pharmaceutical and chemical firms remain opposed to attempts to share the rents from such exploitation, a few have undertaken voluntary programs to do so. Moreover, it makes economic sense to ensure that compensation is paid. It is disingenuous of authorities in developed countries to oppose such systems, which some do on the questionable grounds that it would slow down new product development,

18. The recent decision by Monsanto to forgo commercialization of the so-called “terminator gene” is eloquent testimony to the controversy.

because those same governments charge fees for exploitation of their own public resources and the environment.¹⁹

In principle, this problem calls simply for contracts that value the resources appropriately and effect payments that both conserve the materials and give incentives for innovation. In practice, the prescription is fraught with difficulties, including finding and paying for effective representation of resource owners in source countries. The owners may be indigenous tribes, farmers, local villages, regional governments, or other actors that cannot adequately represent their own concerns. It is important for international authorities to provide legal and technical assistance. The Convention on Biodiversity, signed at Rio de Janeiro in 1992, provides some guidance. Unfortunately, it is a vague and confusing document with strictly exhortatory powers.

International Initiatives

While the previous discussion provides a broad blueprint for policy in specific nations, strengthening IPRs globally also calls for international approaches to particular problems. These approaches come in two general categories: those that fit naturally into the WTO framework and those that go beyond it.

Extending the WTO Approach

While TRIPs is a comprehensive agreement, it remains in flux. Certain issues were left unresolved, while much of the compromise language on flexible interpretation of standards remains to be tested. This raises questions about the effectiveness of the agreement as it stands and about avenues for its extension.

Technology Transfer Commitments

Governments in many developing countries remain suspicious of the proposition that the intended benefits of TRIPs, especially technology transfer on reasonable terms, will be forthcoming. Articles 66 and 67 commit industrial nations to use their best efforts to identify measures they could take to encourage such transfers, in particular to the least-developed countries, and to promote mechanisms to build a sound and viable technological base in the recipients. To date those best efforts have been nil, generating concerns that technology exporters do not intend to use TRIPs

19. The argument is questionable on economic efficiency grounds to the extent that the issue is the split of inframarginal rents to resource exploitation.

in a manner that would be seen as equitable by technology importers. Concerns are mounting that firms owning critical technologies for the management of important public health and environmental problems could choose to use TRIPs to support highly restrictive licensing arrangements or not to license them at all (Watal 2000).

The omission may well induce technology importing countries to mount an effort to roll back some of the TRIPs standards. It certainly could diminish the support for TRIPs in many parts of the world. Thus, an important initiative for enterprises and agencies in developed countries in the near term would be to announce a program to make the technology transfer commitments more effective. That could remove any impediments to outward transfers that persist in the developed economies. The program might also incorporate a fund to finance considerably more technical and financial assistance to poor countries as they implement and administer IPRs. Thus, within the context of TRIPs as it currently stands, developed countries could do much to raise enthusiasm for it by working harder to find ways to enhance technology transfer and to provide additional technical assistance to poor countries. Such programs could be viewed as investments in raising local awareness and support for IPRs, with potentially fruitful payoffs.

A Future Competition Agreement

TRIPs invites regulation of competition as a way to discipline anticompetitive abuse of IPRs. It remains to be seen how aggressively such authority will be used and how well the positive comity approach TRIPs envisions will function. However, its introduction into the WTO raises the issue of multilateral coordination in competition regulation. There are grounds for working toward a multilateral accord on competition policy (Maskus and Lahouel 1999; Graham and Richardson 1997a). As regulation increases, concerns will mount about cross-border jurisdictional and review questions, policy coordination, asymmetric enforcement, competitive aspects of parallel trade, and other problems that could justify a trade agreement in this area.

My view about the form of a desirable WTO agreement supplements that in Fox (1995). Nations would negotiate shared competition principles for the trading system, including a commitment to increase market accessibility. Enforcement would consider harm to foreign interests with the same gravity as harm to domestic competition. Members damaged by the actions of another member could petition for enforcement in the other country and, failing satisfactory resolution, have access to dispute resolution within the WTO. Cooperation and transparency would be emphatically emphasized. Most important for IPRs, nations would agree on principles recognizing that some licensing arrangements potentially enhance efficiency while others are presumptively anticompetitive. This could

do much to resolve uncertainty for both licensors and regulators about protecting intellectual property.

IPRs in Cyberspace

The rapid expansion of the internet makes increasingly important the treatment of IPRs for electronic commerce and databases transmitted electronically. Numerous complex issues can only be mentioned here.²⁰ For example, the interests of firms and individuals that produce content (transmittable products and services) often differ sharply from the interests of content carriers, such as telecommunications companies and internet service providers. The former group would prefer strong copyrights and encryption devices that prevent unauthorized downloading; the latter group might find that such devices restrain the growth of demand for their services. Among related issues are ways to safeguard privacy on the internet.

The economics of IPRs within network providers is only now being analyzed. While many classical principles still apply, new questions have emerged. For example, in certain circumstances it may be beneficial to issue defined licenses to use IPR-protected technological standards in order to promote network development.²¹ Similarly, because interoperability is critical to the growth of networks and the diffusion of their benefits, international variability in standards for protecting software and protocols could erect roadblocks to efficient cross-licensing.

International policy responses are in their infancy. It is unclear, for example, how responsibilities for promoting network growth using standards and licensing parameters should be allocated. In some circumstances, product and technical standards set by private associations have been efficient; in others they exclude competition. There could be scope for multilateral monitoring of standards and licensing, or even for public intervention to alleviate failures to achieve network gains across borders. Such an approach would incorporate elements of technology management, competition policy, trade policy, and IPRs, making problematic the assignment of responsibilities among such agencies as WIPO, the WTO, and the International Telecommunications Union.

Despite the uncertainty, some policy conclusions may sensibly be put forward. TRIPs could be extended to incorporate the evolving copyright rules that govern electronic transmissions over the internet (WTO 1998). Vigorous international growth in electronic transactions requires enforceable copyright laws and protection of trademarks and electronic domain names. The expanded use of electronic information networks is important

20. See Shapiro and Varian (1999) for extensive analysis.

21. Recall the earlier discussion that the United States effectively has a policy of compulsory licenses to ensure that rural areas receive cable and satellite transmissions.

for developing countries in administering their own IPRs regimes and in promoting technology diffusion through access to international databases.

Standard copyright principles apply to electronic transmissions under TRIPs. Therefore, rights to copy and distribute products over the internet extend to computer programs and recorded entertainment. However, enforcing these rights in digital products is extremely difficult, and TRIPs itself says nothing about how countries may deter their unauthorized downloading and distribution.

The 1996 Copyright and Performances and Phonograms treaties call for measures to protect against circumventing technical devices that limit access to, or control copying of, digital works. They also facilitate licensing and collective management of copyrighted materials on the internet by permitting identifying watermarks on materials and making unauthorized removal of those marks illegal. The treaties amplify the rights of performers, authors, and producers to authorize electronic communications of their works. These new treaties extend the frontiers of copyright protection, as is appropriate in light of the technical changes in copying associated with digital transmissions.

However, some observers argue that strict anticircumvention rules and extension of copyrights to databases unreasonably penalize those who need access to information for scientific and educational purposes. Developing countries and other technology importers should be leery of accepting the strong property rights accorded to databases adopted in the EU and pending in the United States. Electronic access on reasonable terms to the fruits of international scientific discovery will be critical in permitting technology followers to learn new technologies and adapt them to local needs. Thus, it will be important for countries to determine the scope for fair use of internet materials, balancing desires for access and learning against the needs of providers. It is inadvisable to undertake international negotiations within the WTO or WIPO that would extend strong database protection.

Trademarks are recognized on a territorial basis and support licensing restrictions on distribution, including restrictions against parallel trade. However, internet commerce inherently operates without borders. True, merchandise bought over the internet must be shipped, so that regulatory restraints (taxes and import barriers) are feasible. Yet imposing tariffs on products and services traded electronically would slow development of cross-border electronic commerce. Adoption of proposals to ensure free trade in internet transactions would be desirable.

Downloadable materials and services are less subject to border control. One challenge will be to devise mechanisms for identifying the true origin of products, enforcing permissible territorial restraints (a problem for which there may be private solutions), and defining the exhaustion of rights. These will be important for the evolution of TRIPs.

Beyond the TRIPs Framework

The advent of stronger global IPRs under TRIPs and other agreements offers an opportunity to consider international initiatives lying outside the purview of trade rules that could manage difficult aspects of intellectual property protection. The main problems relate to international market failures that could be exacerbated by stronger patent rights.

A Vaccine Fund for the Diseases of Poverty

As discussed in chapter 5, the amount of global R&D aimed at finding treatments or vaccines for diseases endemic in poor countries is minuscule. The problem largely reflects a substantial market and policy failure. It is conceivable that the stronger patent protection required by TRIPs could expand demand sufficiently to overcome this difficulty and direct adequate resources to finding cures for such diseases. However, this seems quite unlikely over the medium term as long as disease sufferers in such countries remain impoverished. The available evidence is not persuasive that patent protection in poor countries would make much difference.

In writings directed at this issue, Sachs cited a study by Wellcome Trust claiming as little as \$80 million per year is devoted to malaria research and little of that to developing vaccines.²² Similar difficulties plague research in tuberculosis. Further, virtually all the global research into treatment for HIV infection is devoted to the strain affecting people in developed countries. Almost none is aimed at the strains endemic in sub-Saharan Africa and South Asia, where the great majority of cases exist. These three diseases—malaria, tuberculosis, and AIDS—currently account for perhaps 5,000,000 deaths per year and considerably reduce productivity among the living sufferers.

The Sachs proposal for a public international fund to reward R&D in designated diseases presents an intriguing mix of private and public incentives. Private firms that develop an effective vaccine for any of these maladies would get a guaranteed payment per dosage sold to the fund. The payment would be calibrated to cover anticipated costs of developing the vaccine and could be adjusted upward if needed. For example, a malaria vaccine procured at \$10 per child for the 25 million children born each year in sub-Saharan Africa would achieve \$250 million in revenue. Given current costs of developing a new medicine,²³ this might not be sufficient. However, a price of \$20 per unit would achieve \$500

22. "Helping the World's Poorest" by Jeffrey Sachs, *The Economist*, 14 August 1999. See also Sachs, Kremer, and Hamoudi (1999).

23. These cost estimates may be excessive if the costs of clinical trials in poor countries are lower than those in developed countries.

million, which should be attractive for research-based pharmaceutical firms, while further revenues would come from immunizing children in Asia. The fund managers would then transfer these dosages to health authorities in target countries at low cost, perhaps incorporating a co-payment.

Sachs and his colleagues (1999) calculate that the maximum annual cost of a vaccine program against each of these three diseases would be \$6.4 billion—a small portion of total development assistance to the least-developed countries. Moreover, it could have an important long-term benefit in terms of health status, productivity, and growth. In short, such an approach would be an effective and low-cost public health intervention.

With these payments as an inducement, it would be considerably more likely that pharmaceutical firms would see potential gains from engaging in such research than they do now. The proposal needs to be fleshed out to examine its feasibility and cost. It is not clear, for example, whether any firm developing a vaccine would be eligible for the funds or whether a patent-like “winner-takes-all” approach would be optimal from a procurement perspective. The former method could generate too little research if firms saw potential for competition; the latter could result in wasteful duplication of research. Ensuring efficient distribution of the vaccines would be necessary. Moreover, extensive controls on parallel exports of dosages would be required to support low pricing regimes, unless a (presumably suboptimal) decision were made to distribute in all countries at the same price.

Despite such difficulties, the Sachs proposal is an example of a sweeping and positive idea for addressing a critical need that is only partially addressed by IPRs. Determination to go forward with such a system could do much to restore confidence among developing countries in the new intellectual property system.

Managing IPRs to Improve Environmental Protection

A number of problems arise in the treatment of international environmental externalities that may be affected by stronger global IPRs. These complex issues should occasion serious thought, though they can only be mentioned here.²⁴

It remains unclear how stronger patent rights, trade secrets, and protection for plant varieties might affect international environmental use. There are many cross-currents. For example, it is conceivable that some natural and genetic resources are being extracted at rates beyond those that would be nationally or globally optimal due to a lack of adequate property rights in those resources. If IPRs were attached to the products

24. Although he does not consider the role of IPRs, the discussion here complements Esty's proposal (1994) for a World Environmental Organization.

of those resources, there would be derived demands for the inputs that could help sort out competing demands in an orderly and efficient way. On the other hand, it is also possible that the promise of patents on the products of environmental resources could induce excessive exploitation at the research stage. In principle, contracts could be devised to manage this resource extraction, keeping both private incentives and public objectives clearly in mind. Considerable expertise in defining such contracts would be required, which again points to the need for technical assistance in many countries. Moreover, because these are issues of common use of resources with international spillovers, a role could arise for an international organization to assist in setting the parameters of rights and obligations.

A second issue is biodiversity, or the worry that widespread introduction of a few new and genetically manipulated plant strains could replace the great variety of traditional strains, with unforeseen consequences for the environment and human health. The rapid penetration of genetically modified plants in producing American crops attests to their advantages in terms of enhanced disease resistance, reduced use of chemical inputs, and higher yields. It also lends credence to the view that traditional varieties could be pushed out of the market, for these are powerful economic forces. Again, IPRs cut both ways, providing incentives for producing better crops and higher yields but potentially limiting consumer choice.

Governments in many countries, particularly in the EU, express reluctance to permit consumption of food products that are genetically modified through biotechnological techniques. This policy preference has so far resulted primarily in trade restrictions designed to keep out potentially unsafe foods, though there may be a protectionist element as well. However, interested observers are pushing for a rollback in the patent protection provided the biotechnological inventions of foods and plants, hoping to forestall widespread development of such products in the future.

From an economic standpoint, it makes little sense to retard incentives for plant development and food products by restricting IPRs beyond the usual public-interest limitations. Rather, the solution lies in labeling programs that allow consumers to express preferences for traditional crops and produce and also provide market incentives to sustain their production. Further, if the disappearance of plant varieties were seen as potentially damaging in environmental terms, a solid externality argument would exist for domestic and international public agencies to stockpile such strains to keep them alive as a form of social insurance. Because this would clearly spill across borders, the effort should be collaborative.

A significant and contentious question is whether stronger IPRs are likely to induce additional international transfer of cleaner technologies and products. The incentive effects of patents should do so in light of rising global demands for environmental protection. However, if adoption of new technologies becomes more costly, local firms could be slower

to abandon polluting technologies, while inventors of environmentally friendly technologies could use their market power under TRIPs to choose not to license them in particular markets or to do so at high royalty rates. This could be particularly likely where there are few substitute technologies. However, as discussed earlier, stronger IPRs also provide incentives for efficient licensing.

Where a new technology might reduce environmental damages, with spillover international benefits, the inability of recipient countries to access the technology on reasonable terms is globally costly. Such situations could support public intervention to ensure both effective international access and adequate remuneration to the inventor. In particular, it should be possible to design a system of licenses of right in which critical environmental technologies would be supplied to national authorities in return for a negotiated schedule of royalties. These authorities would also guarantee that the technologies would not find their way into competing innovations for a certain period. So long as those technologies are protected in recipient markets inventors should have little concern about accelerating competition from second comers.

Such a scheme would offer a guaranteed market position to firms with technological solutions to global environmental problems in return for a compulsory right of license to ensure their diffusion. Given the incentives to free ride that could emerge, some multilateral agency would probably be necessary at the negotiation and transfer stages and to monitor the use of the technologies.

This proposal is purely preliminary. It would need to be fleshed out considerably, with due regard for its budgetary costs and the disincentives it might create, before it could be advanced seriously.

Summary

Adequate and effective intellectual property protection can be an important spur to competition at all levels of economic development. However, simply erecting a system of IPRs and expecting extensive gains in investment, technology acquisition, and growth as a result is unrealistic. The system needs to be accompanied by comprehensive policies that promote dynamic competition and technical change. Important among such initiatives are programs to build human capital and technical skills, ensure flexible factor markets, and liberalize restrictions on international trade and investment. The evidence seems clear that the payoffs to stronger IPRs are higher in countries with a strong skill basis and reasonable openness.

Some vigilance may be required to manage the costs that could emerge from the exploitation of stronger property rights. Each of the major policy concerns—competition policy, price regulation of pharmaceuticals, and

management of biotechnology and plant protection—is complex and demands care in designing an appropriate yet competition-oriented program. The difficulties point to the importance of providing adequate technical and financial assistance to developing nations.

Finally, implementing stronger IPRs on a global scale raises issues regarding coordinated international policies to deal with externalities that might be accentuated. These are new and complex issues that require serious study into appropriate mechanism design, but their resolution could materially assist IPRs in advancing widespread sustainable growth.