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RESEARCH AT A GLANCE

Biotechnology and Genetic Resource Policies

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Infringement of Intellectual Property Rights: Developing Countries, Agricultural Biotechnology, and the TRIPs Agreement

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Parallel revolutions in molecular biology and intellectual property rights over plant genetic resources helped spur the emergence of agricultural biotechnologies and the introduction of genetically modified (GM) products into the food system. Intellectual property rights create economic incentives for research and development by giving innovators claim to the benefits associated with new technologies. Yet although intellectual property rights (or IPRs) purport to protect intellectual property, innovators may not always be able to fully appropriate the benefits associated with the innovation.

When it is profitable for technology users to infringe on IPR, their compliance with IPR provisions is by no means assured. Costly monitoring and enforcement are required to deter unauthorized use of the new technology. Experience from various countries around the world shows that the enforcement of technology use contracts (between technology providers and farmers, for example) and other means of protecting intellectual property is far from perfect, and most, if not all, successful innovations are subject to piracy. This is particularly true in developing countries, where opposition to the very granting of IPRs for agricultural crops is growing. In addition to monopolistic rents transferred to foreign IPR holders, concerns of developing countries include environmental safety and food security. The result is a widespread violation of innovators' rights in these countries, which has become a major international issue.

Concerns about the protection of intellectual property led to the Agreement on Trade-Related Aspects of Intellectual Property (TRIPs) during the Uruguay Round of negotiations for the General Agreement on Tariffs and Trade (GATT). Under this agreement, administered by the World Trade Organization (WTO), innovators in one country whose rights are being violated in another country have a means of defense through a dispute settlement mechanism. Within the next few years the agreement is scheduled to be fully in force among all WTO members, including the poorer countries that were given some leeway in putting intellectual property legislation in place and into practice. The magnitude of fines to be imposed, however, has yet to be determined.

While innovators have actively lobbied for the effective enforcement of their rights, their pricing behavior reveals preferential treatment of customers who least respect their intellectual property. Multinational firms claiming rights usually charge significantly lower prices for the use of protected technologies in markets with lax IPR enforcement than in markets with effective enforcement. In Argentina, where 50–85 percent of the Roundup Ready© soybean seeds grown are either purchased from the "black" market (25–50 percent) or saved by farmers from the previous year's crop (25–35 percent), the

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prices charged by the innovating firm (Monsanto) are less than half those charged to U.S. soybean producers (U.S. General Accounting Office 2000). This discrepancy raises concerns among U.S. producers, who feel they are being penalized for their "honesty." And they are probably right.

This brief examines the economic causes of IPR infringement by agricultural producers that use the products of biotechnology, and the effects of such infringement on the pricing and adoption of new technology and the well-being of various special interest groups. Specifically, I analyze the unauthorized use by farmers of GM seed developed and produced by a foreign company and intellectual property protected in certain, especially developing-country, markets.

Causes and Consequences of IPR Infringement

The more likely farmers are to profit from IPR infringement, the less likely they are to comply with IPR provisions: the possibility of purchasing black market seed at a lower price or using farmer-saved seeds may be economically optimal for producers, in which case they may proceed to use the technology without paying the associated fee.[1] The decision by farmers not to comply with the provisions of an innovator's rights, as well as the extent of infringement, depends on the degree of IPR enforcement in the developing country. The lower the penalty for IPR infringement, or the lower the probability a producer will be detected using GM seed illegally, the greater the expected gains from cheating and the more extensive the likely IPR violation will be.

IPR infringement affects the well-being of both agricultural producers and innovators and has important ramifications for the pricing and adoption of new technology in developing countries (Giannakas 2002). The purchase of GM seed from the black market and the use of farmer-saved seed reduces the GM seed demand for the innovator. Since IPR infringement reduces the demand for GM seed in the developing country, it reduces the price of the new technology and the economic rents that can be extracted by the innovator or IPR holder. The greater the extent of IPR infringement, the lower the innovator's ability to obtain value for its biotech traits.

The reduction in price of new technology under imperfect IPR protection means that while IPR infringement reduces the economic rents accruing to the innovator, it increases the well-being of all biotechnology users in the developing country—both those who use the GM seed illegally and those who purchase the GM seed they use. "Honest" producers benefit from the lower price charged by the innovator in the presence of IPR infringement. Thus the result of imperfect enforcement of IPRs is an increased adoption of the GM technology in the developing country.

Determinants of IPR Enforcement

Consider the decisions of developing-country governments ("domestic governments" hereafter) responsible for enforcing an innovator's intellectual property rights. Since IPR infringement increases the well-being of domestic agricultural producers while reducing the economic rents earned by innovators, the level of enforcement in a developing country is determined by the political preferences of the government. Strictly speaking, the less importance domestic governments place on the rents going to a foreign innovator, the lower the level of IPR protection and the lower the innovator's ability to obtain value for its biotech traits.

When a government does not consider the effect of its choices on the economic rents accruing to foreign innovators, its optimal choice is to allow complete, unauthorized use of the GM seed. Allowing IPR infringement maximizes the well-being of domestic producers and leaves enforcement costs at zero. Moreover, when domestic governments are indifferent to the well-being of an innovator, then IPR will not be enforced even if the innovator wishes to incur the monitoring costs (in which case enforcement is costless for the government). An absence of enforcement also maximizes the production of the GM crop, so zero enforcement will also be the optimal choice of a government wishing to maximize the adoption of the new technology.

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[1] Implicit in this analysis is the assumption that the agronomic characteristics and production potential of GM seed purchased from the innovating firm are identical to those used illegally; that is, the GM seed bought from the black market and that saved by the farmer are perfect substitutes for GM seed purchased from the innovator.

Alternatively, enforcement of IPR will be perfect when the domestic government highly values the economic benefits accruing to innovators or when the innovating firm has control over both audits and the magnitude of the fines on proven IPR violators. While it is possible for the innovating firm to investigate the violation by agricultural producers, it is not very likely that a domestic government will delegate domestic producers' punishment to a foreign firm. Although innovators can (and do) lobby for increased protection of their intellectual property, the domestic government remains responsible for establishing fines for IPR infringement. Thus, even when the innovator monitors the compliance of farmers, the domestic government effectively determines the level of IPR enforcement.

Since the level of IPR protection in the developing country is determined by the political preferences of the domestic government, the question that naturally arises is, what are the determinants of the weight being placed by the government on innovator rents? Factors affecting the importance that domestic governments place on innovator rents include:

- the political influence of the innovating firm in the developing country;
- the bilateral relationship with, and the fear of retaliation from, the country of origin of the innovating firm;
- the severity of the sanctions in cases where developing countries are successfully convicted for imperfectly enforcing the innovator's IPR;
- the conjecture of domestic governments regarding the effects of their enforcement policy on the future development of and domestic access to new technologies; and
- the size of the enforcement costs.

The innovator's political influence or the strength of the relationship between the developing country and the country of origin of the innovating firm will directly affect

- the successful detection and conviction of imperfect IPR enforcement;
- the degree of severity of potential retaliatory sanctions;
- the strength of the government's belief that extensive violation of IPR will adversely affect the future development of new technologies (and domestic producer access to them); and ultimately
- the level of IPR protection in the developing country.

Similarly, these factors will inversely affect the costs associated with IPR enforcement in the developing country.

Enforcement of IPRs and Differential Pricing of the New Technology

Different governments can be expected to have different attitudes toward innovator rents and thus different enforcement policies. Because the extent of IPR infringement affects the price of the new technology, differences in the level of IPR protection provide an alternative justification for (and explanation of) differential pricing of the new technology in different countries around the world—a strategy adopted by leading innovators in the sector.

Consequently, IPR infringement increases the competitiveness of domestic producers who use the new technology by placing foreign producers who comply with the provisions of an innovator's IPRs at a cost disadvantage. The greater the extent of the IPR violation, the lower the price of the new technology and the greater the cost advantage of domestic producers relative to producers in countries where IPRs are more effectively enforced. Thus lax IPR enforcement can be used strategically by governments intent on increasing the competitiveness of their producers in international markets.

Infringement of IPRs and the TRIPs Agreement

Given the absence of an effective supranational monitoring agency and the lack of an agreement on the penalties associated with violating IPRs, the benefits from IPR infringement rationalize the lax enforcement and widespread violation of IPRs in developing countries. In terms of the TRIPs Agreement, it seems well understood that the outcome of the ongoing negotiations on the magnitude of fines for IPR infringement will be critical for the future level of

protection enjoyed by innovators or holders of IPRs. What needs to be equally well understood, however, is that for IPRs to be effectively enforced the TRIPs agreement must go beyond the norms of GATT.

If the penalties determined under TRIPs follow the customary retaliatory sanctions under GATT—simply offsetting the value of losses incurred by innovators—they will prove an insufficient incentive in protecting IPR because the gains from lax enforcement of IPR by a developing country exceed the losses incurred by innovators. Unless the WTO manages to "exceed its usual retaliatory limits" and establish an effective enforcement mechanism for implementing TRIPs, enforcement of IPR will remain imperfect and innovators' abilities to obtain value for their biotech traits will likewise be limited. Given the lack of precedents and the opposition among many developing countries (and their various advocates) to IPRs, reaching an agreement on the establishment of fines that would exceed innovator damages will not be easy.

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For a more detailed version of this summary, see K. Giannakas, The economics of intellectual property rights under imperfect enforcement: Developing countries, biotechnology, and the TRIPS Agreement, EPTD Discussion Paper No. 80 (IFPRI, Washington, D.C., 2001). http://www.ifpri.org/divs/eptd/dp/papers/eptdp80.pdf

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