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Can International Patent Protection Help a Developing Country Grow?

International patent protection was a key issue at the multilateral trade talks sponsored by the World Trade Organization in Cancun in September 2003. Indeed, since the organization was founded almost ten years ago, the international protection of intellectual property rights (IPR) has been a bone of contention between developing and industrialized countries. At that time, developing countries did agree to adopt some minimum protection by 2006. But since then, they have continued to argue that the international protection of IPR entails high costs to their economies. For example, a patent system is costly to set up and enforce. In addition, only a few exceptions permit the use of patented technology for public health reasons without paying the innovators. International patents also limit the developing countries' ability to copy expensive technologies that they claim are essential to their economies.

One issue that gets somewhat less attention in the debate is the potential for certain dynamic benefits of international protections of IPR for developing countries. Specifically, IPR may increase growth in these economies and thus improve their living standards. This *Economic Letter* explains how the benefits may accrue. IPR increase the incentives for the creators of innovations that improve productivity. Even if faster productivity occurs initially in industrialized countries, IPR protection may lead to an increase in the spread of these technologies to developing countries. If the rate of the spread of new technologies is fast enough, then the economies of developing countries can grow faster, allowing them to improve their living standards, even after taking into account the higher price needed to pay for patented technologies.

Productivity differences, income differences, and technological diffusion

Recent work by Parente and Prescott (2002) finds that the main determinant of income differences

across countries is not so much the quantity of capital and the number of workers available, but rather the productivity of these factors of production; that is, what matters is the output per hour from that capital equipment and those workers. Indeed, the authors illustrate by citing the post-World War II "growth miracles" in countries such as Japan, South Korea, and Taiwan. After the devastation of the war, Japan rebuilt its plants and infrastructure adopting the latest technologies from abroad, making it among the fastest growing economies in the world during the 1950s, 1960s, and 1970s; indeed, its income per capita grew by a factor of five between 1955 and 1980. Similarly, South Korea and Taiwan made deep structural reforms between 1965 and 1990 that encouraged the adoption of foreign technology and led output per capita to grow by a factor of 5 and 6.3, respectively, over the period (Parente and Prescott, 2002).

Adopting technologies from abroad is part of the phenomenon called technological diffusion. According to recent studies, technological diffusion may boost a country's productivity and growth faster than investing its resources in research and development and innovating domestically; the reason, presumably, is that the latter is a more costly way to introduce new technologies into the economy. For example, Eaton and Kortum (1996) examined 19 mainly industrialized countries and estimated that 50% of their GDP growth can be explained by innovation in the United States, Germany, and Japan. For developing countries, research by Connolly (2003) finds that foreign technology imports from industrialized countries contribute more to their GDP growth than domestic innovation does; these imports also encourage research and development and raise productivity more in those countries than in industrialized countries.

The process of technological diffusion across countries generally takes one of two forms. One form

involves imitating existing foreign technology without paying for it, for example, through reverse engineering or by producing technological goods using information from patent applications. The other form involves importing new technology through licensing or importing intermediate goods that embody the new technology (for example, through foreign investment). Clearly, the first form, which runs counter to the principle of international protection of IPR, is less costly, at least in the short run. But in the longer run, it may be more costly if it entails significant adverse incentives for creating the very technological advances that ultimately promote developing countries' economic growth.

How do intellectual property rights affect the incentives to innovate?

To understand how violating the international protection of intellectual property rights can reduce the incentives to innovate, first consider the protection of these rights within a country. Technology is what economists call a "public good" — its use by one person or organization does not prevent others from using it. In a perfectly competitive world, people might have little incentive to innovate, as their new technology may be distributed freely, leaving the innovator unable to reap benefits from its production. Therefore, the argument goes, it is socially optimal for the market for technological innovations to be imperfectly competitive for some period of time, that is, for the government to protect the innovator temporarily by conferring intellectual property rights. Typically, intellectual property rights are patents, which give innovators a temporary monopoly over the sales of the knowledge or good; this provides the innovator with the profits needed to cover the R&D expenditures and, thereby, the incentive to innovate. In the United States, for example, patents are given for twenty years, dating from the time of the application.

The notion that patents are socially desirable has not been without challenge. Boldrin and Levine (2002) argue that patents may not be necessary to foster the creation of new technologies because copying new technology is often expensive and time-consuming. As a result, the innovator has time to sell the product and reap temporary profits even without patent protections. In fact, Boldrin and Levine argue that shortening the duration of a patent can benefit society by enabling the new technology to enter the public domain faster, increasing competition among existing producers and fostering faster productivity growth. The development

of computer operating systems is one area with contrasting approaches to promoting innovation: open-source software, such as Linux, does not enjoy IPR protection, while closed-source software, such as Microsoft Windows, does enjoy IPR protection. Thus, for some industries, IPR protection is not essential to innovation.

Most growth economists, however, agree that some degree of patent protection is needed to give innovators incentives to create new technologies for many industries, especially if the new technologies become public quickly before the product can be sold. The most frequently cited example is pharmaceuticals. Developing new drugs is costly in part because there are often far more failures than successes; in addition, the drug technology may be public for quite some time before the drug is marketed because of the lengthy approval process imposed by health authorities. Thus, without patent protection, the pharmaceutical companies would not be able to recover the costs of their R&D, and, as a result, many drugs might not be developed.

How does weak international protection of IPR hinder technological diffusion to developing countries?

Weak international enforcement of IPRs affects technological innovation and diffusion by changing the incentives to innovate and to imitate in both developing and industrialized countries. If developing countries do not enforce IPRs and appropriate new technology without paying for it, the industrialized country producers' profits are reduced as are their incentives to innovate. In addition, if developing countries use the appropriated technology to export goods that compete with the goods produced in the industrialized country at a cheaper price, then the industrialized country producers' profits are further reduced. In these circumstances, an industrialized country would engage in less R&D investment and less innovation would occur. Thus, the pool of innovations that could diffuse to emerging markets would be smaller.

Countries with weak enforcement of IPRs also may suffer a reduced flow of goods that embody technology. Innovators in industrialized countries may decide not to export those goods to them in the first place for fear of imitation. In addition, weak enforcement of international IPR may affect decisions about where to locate production facilities. There is much anecdotal evidence about firms choosing not to locate facilities doing work on

higher technology production stages in China and India for fear of losing the intellectual property; these firms usually move only their lower value-added assembly work to those countries. Again, less innovation occurs and less technology flows to developing countries, making both industrialized and developing countries worse off. In the end, the rate of growth is reduced for all.

To illustrate how the long-term gains from international IPR protection can outweigh the short-term costs, consider the case of pharmaceuticals. If the original innovators had not received patents, then perhaps the rapid advances in medicine would not have occurred. Today, developing countries can often import medicines and improve living standards at greatly reduced prices without having to pay the cost of the initial development. Eventually, as drug manufacturing becomes standard to produce, production stages with high value-added are moved to the developing countries. In this way, these countries can benefit not only from purchasing higher technology at a cheaper rate in the future, but perhaps even from producing it. These benefits may outweigh the initial high cost of protecting IPR.

Conclusion

Technological diffusion is an important mechanism by which developing countries can grow faster, improve their standard of living, and perhaps catch up to the income levels of more industrialized coun-

tries. The international protection of IPR affects the incentives to innovate and imitate and, therefore, is an important determinant of the rate at which new technologies flow to developing countries. While there may be short-term benefits for developing countries from copying new technologies without paying license fees, there are potential costs from an overall slowdown of total knowledge creation. Weighing these costs and benefits, then, should be a key element in deliberations about policies for protecting intellectual property rights.

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