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*Globalization combined
with international
coordination can
enhance the global rate of
technological change.*

Intellectual Property Protection in a Globalizing Era

by Edwin Lai

Innovation is key to global growth and rising living standards. Most technologies originate in the more-developed countries (nominally, the North), making the pace of diffusion to the rest of the world a critical factor in the well-being of less-developed nations (the South).

Technologies will diffuse quickly only if the South's consumers can afford them. Yet, as our world becomes more globalized, technology- and knowledge-intensive products are increasingly subject to patent rights and other intellectual property (IP) laws that maintain high prices.

Even staunch free-market advocates accept protecting intellectual property as necessary to stimulate innovation. Some analysts, however, worry that overly strong IP laws could restrict the South's access to technology, adversely affecting living standards.



These concerns contribute to the inherent tensions of protecting IP in a globalizing era. The North, being the technology-originating countries, wants the South to strengthen its IP rights, but the South resists, citing unfairness. International agreements that seek to strengthen the South's IP protection aren't likely to succeed without attendant commitments to ensure developing nations' access to affordable knowledge goods.

IP Protection Gaps

In 2007, Thailand decided some pharmaceuticals were unfairly expensive and threatened to impose compulsory licensing on drugs developed and sold by Western companies. In response, U.S. and European producers dramatically lowered prices. This episode underscores the friction between North and South in an era of globalizing IP protection.

Two factors contribute to the North-South divide on IP protection. First, the North specializes in innovation- or knowledge-intensive industries, such as pharmaceuticals, computers, precision machine tools and business software. The South relies more on producing traditional goods, such as textiles and toys.

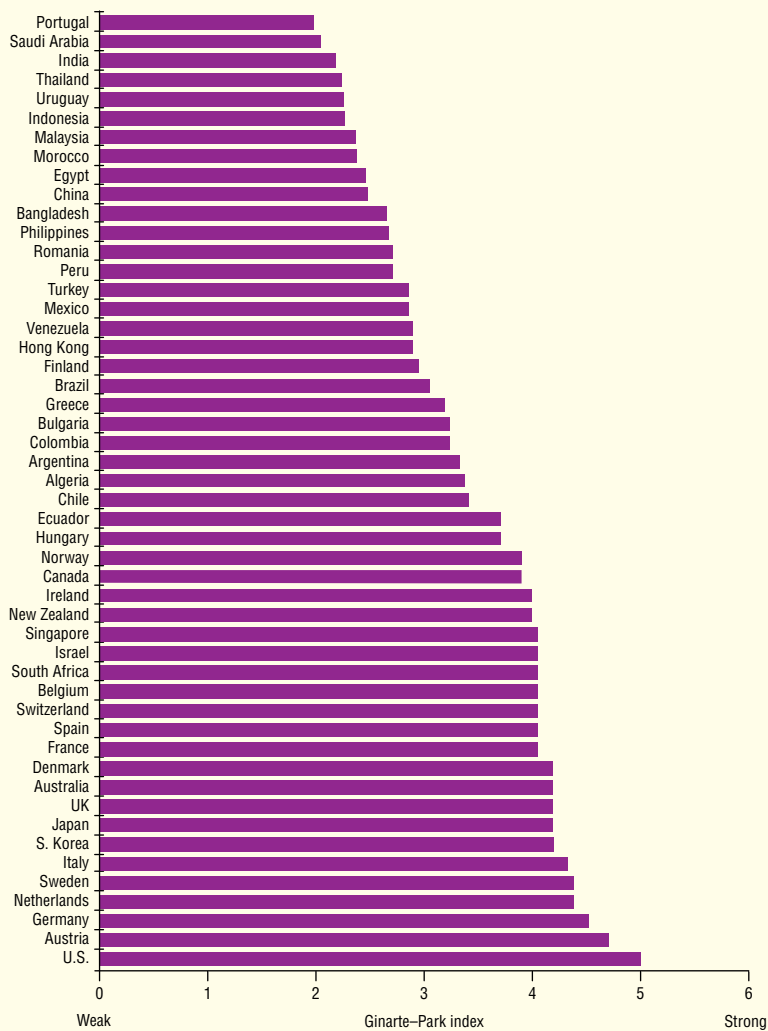
Second, markets for the North's innovation-intensive goods have become increasingly globalized through trade liberalization, declining transport costs and new communications technologies.

Why have these two forces made IP protection more important? The answer lies in the relationship between IP protection and innovation. Basically, each innovation is an idea. Ideas have value, but they can often be copied at little cost.

Think of pharmaceutical formulas. Typically, developing new drugs involves huge investments of time and money, involving lengthy laboratory trials as well as testing on animals or humans.¹ Once a drug becomes available, however, imitators can analyze its chemical composition and produce it.

Chart 1

Patent Rights Vary Among Countries



SOURCE: "Index of Patent Rights," by Walter G. Park and Smita Wagh, in *Economic Freedom of the World: 2002 Annual Report*, The Fraser Institute, 2002, pp. 33-41.

Chemicals, data-processing equipment and software are other examples of IP-sensitive industries in which ideas can be copied quickly without significant cost.

If we rely on the market for innovation, IP protection is essential for incentives to introduce new products and technologies, a process that usually involves investing capital and labor in hopes of future profits. IP laws basic-

ly give temporary monopoly power to inventors, so they can at least retrieve the cost of their R&D investment.

These temporary monopolies—U.S. patents last 20 years from date of filing—are important to sectors that contribute a lot to the U.S. economy. In 2003, consumption of IP-sensitive goods was about 17 percent of GDP, and these industries' total output constituted 40 percent of goods and



services exports. IP-sensitive sectors employed about 18 million U.S. workers.²

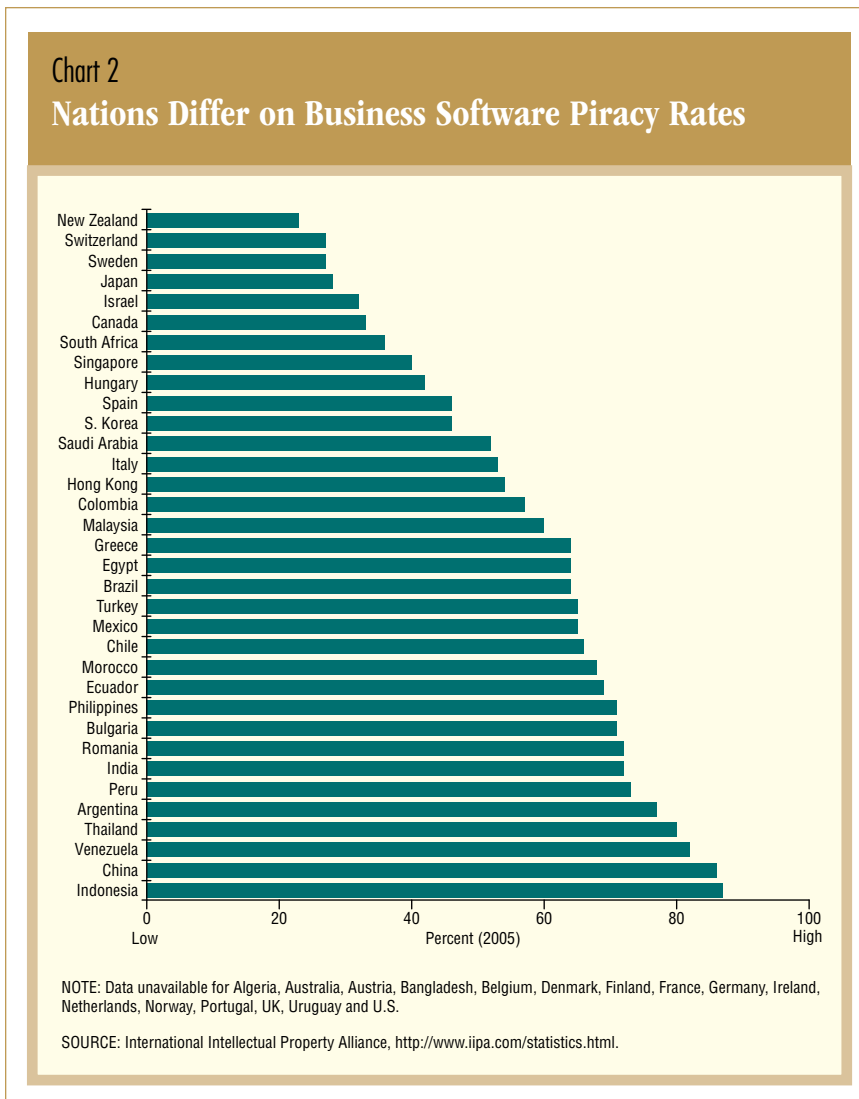
Not all innovations require patent or copyright protection. Some products, such as Coca-Cola, aren't easy to reverse-engineer, and maintaining trade secrets may be sufficient when imitation lags are long relative to patent length. Patents require disclosure of technical details, so some firms are reluctant to obtain them for inventions that take a long time to copy.

Other innovations, such as new management methods, may not require formal IP protection. The first-mover advantage can keep innovators ahead of potential competitors, and imitation lags may be long enough for innovators to recapture investment costs. Moreover, well-established brand names or reputations can sustain the ability to earn economic rents for a long time.

While trade secrets and first-mover advantages have their place, innovation-intensive industries rely more heavily on legal forms of IP protection. Since the North specializes in these industries, it places greater importance on IP laws and grants stronger protection than the South does.

Timely, comprehensive data on IP protection and innovation are scarce, but several measures confirm the gap between developed and developing nations:

- The Ginarte–Park index of patent rights for a representative sample of countries in 2000 shows the strongest laws can be found in the U.S. and other developed nations (*Chart 1*).³ Among the top 15 in patent protection, only South Korea and Spain had per capita incomes below \$22,100 a year in 2000. The group's average was \$24,100. The weakest protection was found among developing nations. Except for Portugal, the bottom 15 in strength of patent protection all had per capita incomes below \$10,500 a year. The group's average was \$6,674.
- The International Intellectual Property Alliance estimated piracy rates



by looking at the difference between legally purchased and installed business software in 2005. Piracy rates are three times higher in some developing nations than they are in the most protective developed countries (*Chart 2*).

- Comparing these two measures shows that countries with strong patent rights tend to have high copyright compliance (defined as 1 minus the piracy rate). In addition to being closely correlated, the measures are weaker in less-developed countries (*Chart 3*).

The variation of IP protection across countries emerges from fundamental economic differences. Firms in the North, which benefit from stronger IP laws, contend they lose profits

in the South, where IP protection is weaker. Not surprisingly, the North advocates international harmonization of IP standards—that is, developing nations adopting developed countries' standards.

The South, however, is reluctant to harmonize, arguing that its stage of economic development doesn't justify highly protective IP standards. Moreover, developing nations contend that developed countries excessively protect IP to appease powerful IP lobbies at home.

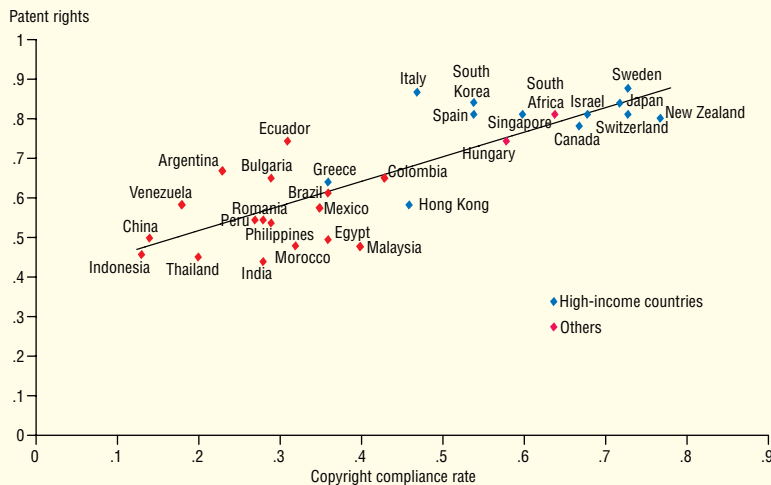
Closed vs. Open Economies

Patent protection involves both benefits and costs. In examining the



Chart 3

Intellectual Property Protection's North–South Divide



NOTES: High-income countries are classified according to the World Bank's definition. Copyright data unavailable for Algeria, Australia, Austria, Bangladesh, Belgium, Denmark, Finland, France, Germany, Ireland, Netherlands, Norway, Portugal, UK, Uruguay and U.S.

SOURCES: Copyright compliance rate: International Intellectual Property Alliance, <http://www.iipa.com/statistics.html>. Patent rights: Walter G. Park and Smita Wagh, in *Economic Freedom of the World: 2002 Annual Report*, The Fraser Institute, 2002, pp. 33–41.

calculus that determines optimal patent length, we consider changes in societies' overall welfare that result from strengthening protections for innovators.

In an economy closed to international trade, increasing patent length allows more inventors to profit from investing in new ideas, speeding up innovation rates that benefit consumers with new, better or cheaper goods and services. Patent holders also benefit from higher profits. These positives constitute the *marginal benefit* of extending patent protection.

The downside is that consumers pay higher prices for longer periods—the *marginal cost* of extending patent protection.

When patent lengths are short, adding even a year of protection leads to relatively large increases in innovation rates. Inadequate patent protection had greatly discouraged innovation; therefore, even strengthening

IP protection slightly can bring many low-cost inventions to market. The added benefits are large, eclipsing the burdens imposed by higher prices. So overall welfare rises.

Further increases in patent length will produce net benefits until incremental gains from faster innovation and profits (that is, the marginal benefit of extending patents) just balance incremental consumer burdens (that is, marginal cost of extending patents). This is the *optimal* patent length. Any further lengthening reduces overall welfare because the technology gains and added profits no longer outweigh the consumer burdens.

In closed economies, all the marginal costs and benefits of extending patent length accrue to domestic consumers and companies. When patent policies are purely domestic, North–South tensions don't arise.

Let's see how it changes when globalization introduces new actors—

foreign consumers and foreign innovators.⁴ In open economies that grant foreign and domestic firms the same patent rights, global innovators earn only a fraction of their profits in the home market. The rest come from foreign sales.

So lengthening patents in an open economy doesn't raise incentives to innovate as much as it does in a closed economy. What's more, increases in foreign firms' profits aren't counted in domestic welfare. Therefore, the marginal benefits of extending patent length are reduced in an open economy.

Economic logic leads to an important conclusion: In a globalized world without international coordination, each country's optimal patent length is shorter than it would be in a nonglobalized world. Open economies can rely partly on IP protection provided by foreign countries, and they can provide less protection than closed economies without hurting the incentives to innovate.

Globalization should benefit American consumers because U.S. producers of IP-sensitive goods, such as pharmaceuticals, are able to sell to a larger market in which foreign countries at least partly foot the R&D bill. These companies have more incentive to develop new goods without seeking stronger domestic IP protection. At the same time, U.S. consumers are potentially better off because American IP protection can be weaker and still provide the nation's innovators the same incentives. Easing domestic monopoly power would lead to lower prices without inhibiting the development of new technologies.

If countries trade freely, more-innovative countries have greater incentive to offer greater patent protection—at least in the absence of international agreements. For these countries, the marginal benefit of extending patent length is higher because a larger share of innovation comes from domestic firms whose profits are counted in national welfare.



We do see this in practice. Measuring innovative capacity by patents issued to residents shows that eight of the top 10 most innovative countries are also among the top 10 in strength of patent rights protection. Eight of the bottom 15 countries in innovation are among the bottom 15 in patent protection (*compare Chart 4 with Chart 1*).⁵

If patent-sensitive goods are traded freely, countries with larger domestic markets for these products also have greater incentive to offer stronger patent protection because additional years of patent protection will spur more worldwide innovation.

This, too, we see in practice. Looking at consumption of patent-sensitive goods in 2000 shows that five of the top 10 countries in market size are among the top 10 in strength of patent rights. Six of the bottom 15 countries are among the bottom 15 in patent rights (*compare Chart 5 with Chart 1*).

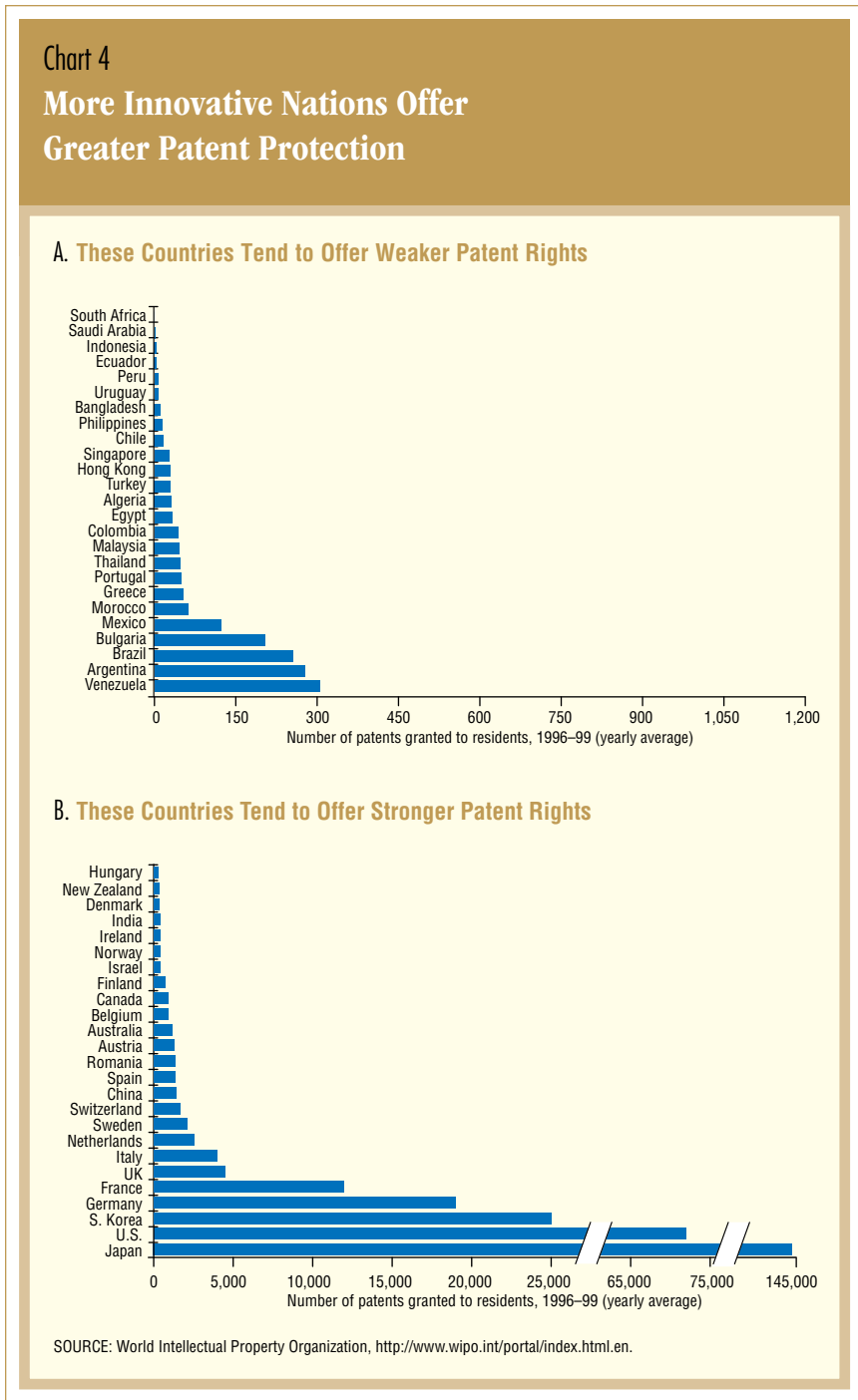
The North offers more IP protection than the South because these developed nations have both higher innovative capability and larger domestic markets for patent-sensitive goods.⁶ The North wants the South to harmonize its IP policies with the North, but the South doesn't have the same economic interest in protecting technology.⁷

Some developing countries fail to protect legitimate IP rights because of bad policy choices. But the fact that the South generally provides weaker protection than the North does at least partly reflects its rational choices.

International Coordination

Economic analysis suggests that the world might fail to adopt IP policies that achieve maximum economic gain from the global patent system. There are two reasons, but the underlying logic is the same: Protecting countries don't capture all the benefits of their actions.

First, national treatment commits countries to give the same protection to foreign and domestic firms, but



domestic welfare doesn't include overseas producers. Second, as a country strengthens patent protection, it quickens the pace of innovation around the world, which makes foreign consumers better off without raising their burdens.

We call the benefits conferred on foreign countries positive externalities. These two sources of positive external-

ities explain why international accords that require at least some countries to strengthen patent protection might increase global welfare.

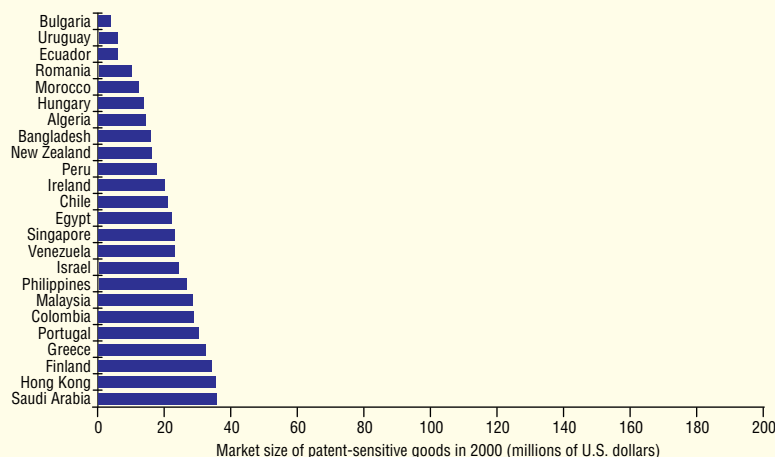
The agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), a pact requiring substantial stiffening of the South's IP protection, was signed in 1994. It required all



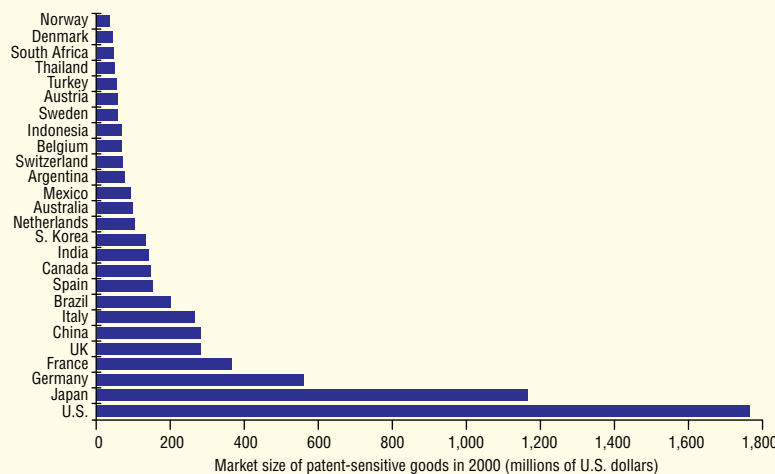
Chart 5

Large Markets Encourage Stronger Intellectual Property Laws

A. These Countries Tend to Have Weaker IP Laws



B. These Countries Tend to Have Stronger IP Laws



SOURCES: Author's calculations. See also "International Protection of Intellectual Property: An Empirical Investigation," by Edwin Lai, Samuel Wong and Isabel K. Yan, manuscript, November 2007.

developed countries to adopt minimum IP standards by Jan. 1, 1996. The corresponding deadlines were Jan. 1, 2000, for all developing and transition economies, and Jan. 1, 2006, for the least-developed countries.⁸

The TRIPS agreement effectively strengthens global IP protection by

requiring some countries (mainly those in the South) to substantially raise IP protection while allowing others (mainly those in the North) to maintain or exceed their pre-TRIPS protection.⁹

The TRIPS agreement leads to significant wealth transfers between countries. The U.S., as the largest producer

of innovation-intensive goods and services, receives the greatest benefit from foreign countries strengthening their patent protection to comply with the agreement (*Chart 6*).¹⁰

Because innovative firms sell to both regions and TRIPS increases global protection, the value of each patent increases. This creates incentives for more firms to innovate. As a result, globalization combined with international coordination can enhance the global rate of technological change.

The TRIPS agreement mainly requires raising IP protection in the South, which boosts the innovation rate without increasing the price burden on the North's consumers. This benefits the North at the expense of the South. To resolve this problem, the North agreed to open its markets for the South's exports of traditional goods. The possibility of reaching this *quid pro quo* proves that international IP agreements plus market opening can bridge the gap between North and South.

Excessive IP Protection

In the past quarter century, developed countries have greatly strengthened their IP protections. Supporters justify this by noting that the North has come to specialize in the production of innovation-intensive goods. At the same time, the TRIPS agreement commits developing countries to stronger IP protection.

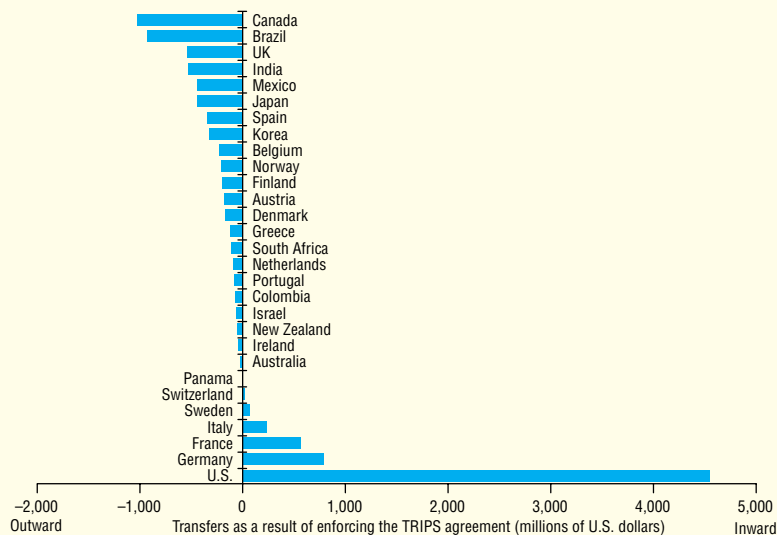
Does the North strike the right balance between the costs and benefits of IP protection? Do the TRIPS requirements strike the right balance between costs and benefits for the South?

Those questions are hard to answer, but we can point to some potential dangers from IP protections that go too far:

- *Reducing access to affordable knowledge goods.* TRIPS requires less-developed countries to strengthen IP protection without attempting to ensure the South's access to knowledge goods. To reduce this problem, some commentators urge developing

Chart 6

U.S. Benefits Most from TRIPS Agreement



SOURCE: "Reaping What You Sow: An Empirical Analysis of International Patent Harmonization," by Phillip McCalman, *Journal of International Economics*, vol. 55, no. 1, 2001, pp. 161–85.

A sound IP system would place less-developed countries on a more sustainable development path.

countries to use competition policy to counterbalance the anticompetitive aspects of IP protection. Others recommend that patent holders take more flexible approaches in the South.¹¹

- *Privatizing basic scientific knowledge.* Imagine, for example, the burden on innovation if firms had to get permission to use calculus. Narrowing the availability of data and output from university research could shrink the “global knowledge commons” and slow scientific progress.

- *Privatizing traditional knowledge.* A lot of traditional knowledge has been around for many centuries. Carving up the rights to use it can curtail the ability of firms and individuals to innovate.

- *Excessive IP-related litigation.* The number of patent lawsuits has increased dramatically in recent decades. Before 1985, no more than 1,200 were initiated in any one year; by 2001, that number was around 2,500.¹² In 2005, Microsoft reported spending about \$100 million a year to

defend itself against lawsuits—35 to 40 at any one time.¹³

- *Broadening what can be patented.* In 1980, the U.S. Supreme Court ruled that genetically engineered bacteria could be patented, establishing the precedent for life forms. Business methods, such as the one-click shopping method by Amazon.com, later became patentable.¹⁴ So did computer programs. These trends contributed to the dramatic increase in the number of patents granted since the 1980s. Before 1985, the U.S. awarded no more than 80,000 patents in any year. By 2000, that number was around 175,000.¹⁵

The potential dangers of over-protection serve as warning that IP strengthening should be carried out with caution. Finding the right balance in IP protection is complex. Governments need to make sure scientific and economic progress isn't adversely affected.

In principle, a TRIPS-compliant IP system is good for many less-

developed countries. A sound IP system would place these countries on a more sustainable development path. However, fully implementing TRIPS in the South can greatly increase costs of accessing technology. This can have tremendous implications on the South's growth and living standards. A more gradual and cautious approach in implementation would be advisable.

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Notes

¹ A Tufts University report stated that the average cost to develop and bring a new drug to the market was \$802 million in 2001. The report, *Outlook 2007*, by the Tufts Center for the Study of Drug Development, is available at <http://csdd.tufts.edu/InfoServices/OutlookPDFs/Outlook2007.pdf>.

² *Engines of Growth: Economic Contributions of the U.S. Intellectual Property Industries*, by Stephen E. Siwek, Economists Incorporated,

2005, commissioned by NBC Universal, www.nbcumv.com/corporate/Engines_of_Growth.pdf.

³ The Ginarte–Park index criteria include (i) coverage of the patent laws in the country, (ii) membership in international agreements, (iii) the risks of having patent rights forfeited in the country, (iv) enforcement as stipulated by the law, and (v) duration of protection. See “Determinants of Patent Rights: A Cross-National Study,” by Juan C. Ginarte and Walter G. Park, *Research Policy*, vol. 26, October 1997, pp. 283–301, and “Index of Patent Rights,” by Walter G. Park and Smita Wagh, in *Economic Freedom of the World: 2002 Annual Report*, The Fraser Institute, 2002, pp. 33–41, www.cato.org/pubs/efw/efw2002/efw02-ch2.pdf.

⁴ We assume there are no trade barriers and that domestic and foreign firms are given the same IP protection in each country. But we assume that countries are not required to harmonize their IP with other countries. We further assume governments in a globalized world are committed to protecting foreign inventions as much as domestic ones. We call this the national treatment principle, which was respected by most countries even before the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement of 1994.

⁵ We have to be careful with the Japanese statistic since Japan tends to grant a large number of narrow patents, unlike the U.S. or EU. Nonetheless, Japan was among the top 10 most innovative countries.

⁶ Although the South may have higher population, the per capita demand for patent-sensitive goods is much lower because these goods are usually less affordable to low-income countries.

⁷ “International Protection of Intellectual Property,” by Gene M. Grossman and Edwin L.-C. Lai, *American Economic Review*, vol. 94, December 2004, pp. 1635–53.

⁸ The Doha Declaration of 2001 offered an extension to 2016 for pharmaceutical patent protection in the least-developed countries.

⁹ Countries required by TRIPS to strengthen their patent protection would be reluctant to do it voluntarily. They have to be given incentives. Commentators argue that the North had given the South increased market access of low-tech goods in exchange for the South’s acceptance of TRIPS. “Universal Minimum Standards of Intellectual Property Protection Under the TRIPS Component of the WTO Agreement,” by Jerome H. Reichman, *The International Lawyer*, vol. 29, no. 2, 1995, pp. 345–88. Also see “The North’s Intellectual Property Rights Standard for the South?” by Edwin L.-C. Lai and Larry D. Qiu, *Journal of International Economics*, vol. 59, no. 1, 2003, pp. 183–209.

¹⁰ “Reaping What You Sow: An Empirical Analysis of International Patent Harmonization,” by Phillip McCalman, *Journal of International Economics*, vol. 55, no. 1, 2001, pp. 161–85. The estimates were based on patents existing at the time of study only. They would be higher today.

¹¹ To help the South access essential medicine, some commentators suggest implementing price discrimination in pharmaceuticals in favor of the South, which presumably has higher income elasticity of demand for medicine. See, for example, *International Public Goods and Transfer of Technology Under a Globalized Intellectual Property Regime*, by Keith E. Maskus and Jerome H. Reichman, eds., New York: Cambridge University Press, 2005.

¹² *Innovation and Its Discontents*, by Adam Jaffe and Joshua Lerner, Princeton, N.J.: Princeton University Press, 2004.

¹³ “Microsoft, Oracle Call for Patent Reform,” by Declan McCullagh, CNET News.com, April 25, 2005.

¹⁴ The one-click shopping method patent is often cited as an example of U.S. authorities awarding a patent that is too obvious, violating one of the two major criteria in awarding patents—non-obviousness and novelty. Moreover, it’s also too broad, critics say.

¹⁵ Jaffe and Lerner (2004).

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