TRIPS and the Pharmaceutical Industry:
A Welfare Analysis

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This paper explores the welfare effects of the TRIPS Agreement for industrialized and developing countries, focusing on the pharmaceutical industry. I discuss the theoretical effects of an expansion of IPRs on welfare in developed and developing countries and relate these results to the context of the TRIPS Agreement and pharmaceuticals. I use a case study of India's pharmaceutical industry to provide empirical evidence of the effects of TRIPS. I conclude that the agreement is likely to have a large negative impact on consumer and producer welfare in a developing country, and only a small positive impact for foreign pharmaceutical firms. Finally, I discuss ways that developing countries can minimize their losses.

A fundamental tension exists between the social desirability of spreading knowledge, and the need to provide adequate returns for the inventors of new knowledge. This tension is due to the public goods nature of ideas: knowledge is non-rival because it can be used by many people with zero marginal cost, and it is non-exclusive since once an idea is made public, anyone can use it without paying the inventor (Chin and Grossman 1988). As a consequence, while it might be socially desirable to make information accessible to everyone, doing so would encourage free-riders and provide no incentive for future innovators to create knowledge. Intellectual property rights (IPRs) are society's current answer to the public goods problem in information. IPRs are enforced through the granting of ownership titles such as patents or copyrights to inventors of innovations resulting from intellectual thought. IPRs prevent others from reproducing for sale the protected ideas or creative products, ensuring that all profits made on these objects are allocated to their original inventors. A primary justification for IPRs is the

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claim that in the long-run their existence will foster investment in R&D and provide an incentive for innovations from which everyone can benefit. However, IPRs can also impose large costs on a society by granting monopoly power to title owners (Yu 2007).

The most recent international agreement concerning the issue of intellectual property protection is the World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), signed in 1994 at the Uruguay Round negotiations. The agreement sought to expand intellectual property rights (IPRs) to less developed countries and universalize these laws across the globe (Richards 2004). One of the most controversial requirements of the TRIPS Agreement was the implementation of IPRs protecting pharmaceutical products. The pharmaceutical aspect of TRIPS was especially concerning to developing and less developed countries because of the potential effects of allowing foreign pharmaceutical companies to capture larger market shares in their countries, where many people already could not afford or did not have access to necessary medicines.

This paper evaluates the possible effects of expanding international IPRs for both the industrialized and developing world, focusing specifically on the consequences for the pharmaceutical industry. I begin by giving an overview of the TRIPS agreement, its treatment of the pharmaceutical industry, and the objections to it held by developing countries. In the second section, I review the current literature on the topic of IPRs and the developing world. I discuss papers that claim that stronger IPRs in developing countries will only allow foreign firms to take advantage of emerging markets through monopoly pricing, as well as those arguing that stronger IPRs will lead to long-term capital accumulation and aid the economic growth of developing countries. Then, I

discuss the potential welfare effects of stronger IPRs in the pharmaceutical industry for both the developed and developing world. I use India as an example, and I conclude that the agreement is likely to have a large negative impact on consumer and producer welfare in the developing country, while only having a small positive outcome for foreign pharmaceutical firms. Finally, I discuss possible ways that developing countries can minimize their losses under the new agreement.

The TRIPS Agreement and its Accompanying Controversy

The most recent and most comprehensive international agreement on the protection of intellectual property is the World Trade Organization's (WTO's) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). The agreement was established with the goal of harmonizing intellectual property protection policies across international borders. TRIPS builds on the previous Paris, Berne, Rome, and Washington conventions on the same topic, but adds more specific standards and also includes a clause stating that any disagreement over the implementation of the agreement is subject to a procedure in accordance with the Dispute Settlement Understanding (DUS), which provides an institutionalized, multilateral means to settling disputes (WTO 2006).

The TRIPS agreement includes several clauses that function specifically to lend some flexibility to the implementation of its standards in less developed countries. Articles 7 and 8 state that the standards for IPRs set by the agreement are intended to promote "technological innovation" and the "transfer and dissemination" of technology, both of which are particularly beneficial for developing countries. Article 8 also

stipulates that “Members may, in formulating or amending their national laws and regulations, adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development” (WTO 2006). Article 40 recognizes the potential for anti-competitive practices to result from IPRs, and gives government’s the right to add in national legislation to combat such practices. Finally, Article 31 allows compulsory licensing, which is when a government allows someone else to produce a product without the consent of the patent owner. Compulsory licensing usually refers to the pharmaceutical industry’s role in the TRIPS agreement. Licensing is allowed only after the proposed user has made an effort to receive authorization from the patent holder, unless the request is a matter of “national emergency” or “other circumstances of extreme urgency” (WTO). Additionally, if a compulsory license is issued, “adequate remuneration” must still be paid to the patent owner (WTO).

The establishment of the TRIPS agreement incited disagreement between the developing world and the industrialized world. Joseph E. Stiglitz, chief economist for the World Bank, argued that the intellectual property regime developed under TRIPS “overwhelmingly reflected the interests and perspectives of the producers, as opposed to the users in developing countries” (Stiglitz 2002). This opinion was echoed by Carlos M. Correa, the Argentinian government’s official delegate to GATT and WIPO during the during the negotiations on IPRs, the TRIPS agreement was created under strong pressure from industrialized countries, and seeks to “universalize the standards of protection that are suitable for industrialized countries or, more precisely, for certain industrial sectors in which firms based in such countries dominate…and ignores the profound differences in

economic and technological capabilities between the North and South" (Correa 2000).

In particular, Correa (2000) is referring to two main asymmetries between the industrialized (North) and developing world (South) that particularly caused concern about the TRIPS Agreement. The first is a political asymmetry. Many less developed countries lack the reliable institutions needed to enforce the stringent standards set by industrialized countries. However, under the terms of the agreement, this inability to enforce laws can cause members to be punished for non-compliance. Moreover, this lack of reliable institutions, especially legal institutions, could also prevent less developed countries from taking full advantage of the flexibilities offered in the Articles written specifically to minimize their welfare losses (Correa 2000).

The second is an asymmetry in the composition of the economies of industrialized versus developing countries. The industries protected by TRIPS tend to be industries involving high levels of R&D, technology, and capital. The industrialized world has a comparative advantage in most of these industries, since they have relatively more abundant supplies of human and physical capital needed for innovation, leaving the developing world dependent upon the inventions of the North (Richards 2004). This dependence is reflected in the fact that 95% of patents granted in the US between 1977 and 1996 were rewarded to applicants from only 10 industrialized countries, while developing countries accounted for less than 2% of patents during that period (Correa 2004). Thus, by simply observing the specific industries it protects, the TRIPS agreement can be seen as biased toward promoting the economic interests of the industrialized countries over the lesser developed countries.

Literature Review

In the wake of the establishment of the TRIPS Agreement, much has been written about the potential effects of stronger IPRs on both the developing and developed world. Hence, the literature review presented below uses this schema to review the theory and evidence published by previous authors on the TRIPS Agreement.

The Choice of the South

Developing countries face a trade-off when they decide whether or not to honor IPRs of multinational firms from industrialized countries. On the one hand, the negative effects of stronger intellectual property protection generally imply a rise in prices in the developing country, as well as a decrease in product variety as firms producing copies or generic versions of a patented good leave the market. On the other hand, stronger protection in the developing country will increase the sales of the patenting firm, and could also lead the firm to invest more of their R&D resources in producing goods for the developing market. The overall welfare consequences depend on the strength of each interacting effect.

Chin and Grossman (1988) and Diwan and Rodrik (1989) both analyze the South's tradeoff and the potential effects of its decision on R&D allocation. Chin and Grossman (1988) assume that the North and South have differing technological needs, and must compete for the use of scarce R&D resources to address their specific needs. If the South chooses to protect the North's patents, then the Northern firm will gain a competitive advantage over the Southern firm, but the North will also be more likely to devote its R&D resources to the development of products demanded by the Southern market. On the other hand, if the government of the South does not protect the North's

patents, the Southern firm will be able to pirate the North's technology and compete with the Northern firm but the Northern firm will be less likely to devote any of its R&D efforts to developing products for the South. Under this model, the South will only find it efficient to protect the North's intellectual property when R&D is highly productive and the Southern consumers comprise a majority of the market. Only in this case will the payoff of gaining a greater share of the highly-productive R&D will be worth the rise in prices and decrease in variety. On the other hand, the North always gains when its patents are protected, but its gains are only greater than the South's losses when R&D is highly productive (Chin and Grossman 1988).

Like Chin and Grossman (1988), Diwan and Rodrik (1989) find that an increase in protection in either country leads to greater innovation skewed toward the preferences of the protecting country. The study also notes that a narrowing of the gap between the preferences of the two regions will lead to less protection in both countries. This effect occurs because as the preferences of the North and South converge, the range of innovations shrinks, reducing the marginal benefit of innovations to both regions. Diverging from the results of Chin and Grossman (1989), the study concludes that the North's gains from the South protecting its patents would be large enough to compensate the South for its losses in all cases. Thus, a utilitarian global welfare function would assign equal levels of intellectual property protection in both regions, although they authors note that a benevolent planner who puts greater weight on the welfare of the South would require less protection in the South than in the North (Diwan and Rodrik 1989).

Deardorff (1992) takes a step further by modeling the effects of stronger IPRs as they spread to many countries, rather than just one hypothesized "South." The model shows that it is not optimal, from a world welfare point of view, to extend intellectual property protection to the entire world. Deardorff (1992)'s model predicts that for every additional country that protects the patents of the innovating country, the welfare of the innovating country increases from monopoly profits, while the welfare of the protecting country decreases. As more and more of the world is already covered by patent protection, the extra market that can be covered, and the potential innovation that can be stimulated by further protection decreases. Thus, as the returns to the patent owners decrease, and the cumulative population of the protecting countries increases, the losses to the protecting populations will eventually outweigh the gains to the population in the patenting country.

Long Run Effects: IPRs and FDI

Several authors discuss the long run dynamic effects of stronger IPRs by focusing on the link between stronger IPRs and economic growth. Theoretically, there is support for both a positive and negative correlation between the strengthening IPRs in developing countries and the FDI flows to these countries. Braga and Fink (1997) claim that stronger IPRs in the South would not only lead to greater investment in the region, but could also stimulate R&D investments in the North, making both regions better off. However, they also point out that stronger IPRs could provide title holders with so much monopoly power that they could divest and reduce their service to foreign countries in order to raise prices. Additionally, Yu (2007) notes in his study of economic development in China that "strong intellectual property protection is not always needed for attracting FDI" (11), and

in fact, stronger protection may encourage investors to conduct trade through licensing rather than through FDI. Without FDI, developing countries will not be able to reap any of the benefits of technology transfer leading to future growth. The United Nations (1993) echoed this concern when they predicted that in the post-Uruguay world, innovative Northern firms would be more likely to sell directly the products incorporating their innovations rather than transfer the technology to other countries.

Empirical studies on the effect of stronger IPRs on FDI are also quite mixed. Surveys of multinational firms gathered by Mansfield (1994) indicate that the degree to which IPRs effect investment decisions strongly depends on the type of investment a firm conducts. While most firms did not identify strength of IPRs as an important factor in the decision to invest in sales and distribution or assembly facility investments, over four-fifths of those surveyed thought the strength of IPRs was very important in the context of R&D investments (Mansfield 1994). A study by Park and Ginarte (1997) that observes the relationship between IPRs and economic growth in a cross section of countries over the years 1960 to 1990 confirms these survey results. Park and Ginarte (1997) found that IPRs do influence economic growth indirectly by stimulating the accumulation of information and human capital. However, the authors also noted that countries without pre-existing innovative or R&D-based industries, or high levels of investment by multinationals that could transfer technical information, “would enjoy few, if any, of the benefits of intellectual property protection since an innovative sector through which IPRs affect economic growth is absent” (Park and Ginarte 1997). Since the least developed countries are also the most likely to lack a pre-existing innovative industry, and the least likely to attract FDI from developed countries, the study implies that stronger IPRs will

probably not encourage growth in the countries that need it most. Similarly, Yu (2007) points out, “even if stronger intellectual property protection is beneficial to less developed countries in the long run, they may lack the needed wealth, infrastructure, and technological base to take advantage of the opportunities created by the system in the short run” (12).

Along the same line of reasoning, Correa (2000) suggests that the impact of stronger IPRs on FDI will vary substantially across countries, according to differences in other characteristics of countries’ economies (Correa 2000). Before the TRIPS agreement, the large majority of FDI flowing to developing countries was directed at the emerging Asian markets largely due to other economic factors other than IPRs, such as availability of skills, infrastructure, strength of institutions, etc. (Yu 2007). Thus, by standardizing intellectual property protection, TRIPS will give these other economic factors even greater influence over the flow of investment than before, implying that the least developed countries will continue to be left behind (Correa 2000).

Instead of focusing on whether stronger IPRs will lead to higher levels of investment, Helpman (1993) instead models the different welfare outcomes that would occur with and without the addition of FDI following the tightening of IPRs in the South. Welfare analysis is broken down into four channels through which stronger IPRs affect an economy: terms of trade, production composition, available products, and R&D investment patterns. Helpman (1993) finds that “if anyone benefits, it is not the South” (1274). Under all circumstances, the North always gains from tightening IPRs because stronger IPRs secure better terms of trade for the North, and also shift manufacturing resources toward the preferences of the Northerners. The only situation in which there is

no conflict of interests between the North and South is when there is a low rate of imitation in the South; in this context, both countries gain from lax protection policies. For example, a decrease in protection would allow the rate of imitation to rise slightly in the South, leading to expansion of the South's economy and possibly more technological transfer through reverse-engineering. The North will also gain because the expansion of the South's market will give the North more opportunities to exploit its monopoly power. Although the North's terms of trade deteriorate from an increase in imitation, the positive effects of cheaper production and greater product variety outweigh this negative effect. Under every other situation, however, stronger IPRs worsen the terms of trade for the South and shift manufacturing toward production of the higher priced Northern products, decreasing welfare for Southern consumers. Moreover, Helpman (1993) also finds that an increase in protection does not guarantee a long-run rise in the rate of innovation in the South. The model shows that while the rate of innovation initially rises in the South, it eventually falls to a level lower than its original rate, resulting in reduced product variety and a further loss of welfare for the South. When FDI is present, increased investment from Northern multinationals somewhat alleviates the South's losses, but the overall result is still negative as the South still loses from the production shift toward more, higher priced Northern products.

TRIPS and the Pharmaceutical Industry

The pharmaceutical industry has incurred substantial losses due to international infringements of intellectual property in the past. A study conducted by the US International Trade Commission in 1988 that asked companies to estimate their forgone

profits due to infringements of IPRs estimated the total loss to be around $24 billion dollars for 1986 (Helpman 1993). However, another study done by Feinberg and Rousslang (1990) derived a lower estimate of $2.3 billion in lost profits for 1986 by modeling the foreign market for a good as consisting of a dominant firm and a "fringe" firm that violated the protection rights of the dominant firm. Although the estimates are quite different, it is safe to conclude that pharmaceutical companies have suffered meaningful losses from foreign pirating, thus providing a basis for the argument in favor of tougher international IPRs.

A further justification for stronger IPRs in the pharmaceuticals results from the fact that the pharmaceutical industry is characterized by heavy investments in R&D. In 2001, the US pharmaceutical industry invested 18.5% of its profits back into R&D, more than any other manufacturing industry in the country (Schweitzer 2007). Furthermore, pharmaceutical R&D is particularly expensive: the cost of developing and bringing a new drug to the market is estimated as half a billion dollars (Richards 2004). There is also a high degree of risk involved in pharmaceutical R&D. Between 1961 and 1983, only about 1 in 60,000 chemical compounds made by pharmaceutical firms could be considered "highly successful," where success is defined as global sales greater than $100 million per year. Additionally, each year, 55% of pharmaceutical profits come from only 10% of products, showing that while some drugs are extremely profitable, most are not (Schweitzer 2007). Thus, the high cost and high risk involved in pharmaceutical development create a situation in which R&D must be incentivized.

However, Stiglitz argues that the implementation of TRIPS on pharmaceuticals was especially brutal for less developed countries due to the necessity of pharmaceutical

products for public health. Stiglitz claimes that the new intellectual property regime would cause “thousands to be effectively condemned to death, because government and individuals in developing countries could no longer pay the high prices demanded” (2002). There are several reasons to believe that Stiglitz’s pessimistic vision of the effects of TRIPS on pharmaceuticals could be true. First of all, the pharmaceutical market is already highly concentrated, with few firms holding a large share of market power. In 2003, the top twenty pharmaceutical firms worldwide captured 60.8% of the total prescriptive sales market, and concentration is predicted to increase as mergers and acquisitions are becoming more frequent in the industry (Schweitzer 2007). The high degree of market power in the industry gives pharmaceutical firms control over the pricing of their products. For instance, a model developed by IMF economist A. Subramanian estimates that prices of drugs would rise by 5% to 67% for Asian countries, 71% for Argentina, and five-to-six fold in Egypt in response to the implementation of IPRs in pharmaceuticals (Subramanian 1990). Additionally, this price-making behavior is seen in the empirical fact that prescription drug prices have continued to rise at rates substantially greater than the general level of prices in industrialized countries (Richards 2004).

Finally, the unequal distribution of the burdens and benefits of enforcing pharmaceutical IPRs among industrialized and lesser developed countries is another concern. The large majority of pharmaceutical firms are located in industrialized countries, since these are the countries that have the human and physical capital needed to conduct essential R&D (Helpman 1993). The result is that industrialized countries account for over 96% of all pharmaceutical R&D expenditures (Correa 2000), and the US

holds 57.32 percent of the pharmaceutical patents filed world-wide between 1974 and 2003. Ownership of the remaining patents is shared among the countries of Western Europe, Canada, and Japan (Schweitzer 2007). The dominance of industrialized countries in the ownership of pharmaceutical patents has created a dependence of the lesser developed world on the supply of medicines flowing from the industrialized countries. This dependence specifically implies that the losses of enforcing IPRs will be born disproportionately by lesser developed countries, while the gains will accrue to the industrialized world (Correa 2000).

Estimating the Effects of the TRIPS Agreement on Pharmaceuticals in India

I chose India to serve as an example of the effects of implementing TRIPS on pharmaceuticals in the developing world because India's consumers are typical of consumers of drugs in other developing and less developed countries, so that the effects predicted for India can be generalized to consumers in the less developed world in general. For example, like that of most less developed and developing countries, India's consumer market for pharmaceuticals consists of a large number of poor households who, because health insurance coverage is non-existent, must pay their medical costs out-of-pocket. The medical needs of India's consumers are also similar to those of other developing countries, and significantly different from those of industrialized countries. For instance, anti-infectives account for 23% of the market share of pharmaceuticals in India, compared to only 9% of the global pharmaceutical market (Chaudhuri, Goldberg, and Jia 2003).

However, India is also a stand-out case among developing countries because it has one of the best developed domestic markets for generic drugs in the world. This fact made India one of the countries with the highest stakes in the Uruguay Rounds, and also one of the most adamant opposers to the TRIPS Agreement. At the time the agreement was signed, India had virtually no intellectual property protection in the pharmaceutical industry. India's Patents Act of 1970 purposely excluded pharmaceutical patents and only allowed process patents for seven years with the stated goal of developing a domestic pharmaceutical industry (Fink). As a result, India's domestic pharmaceutical industry thrived: the production of drug formulas grew at an average annual rate of 14.4% between 1980 and 1993, and the number of domestic suppliers increased from 2,237 licensed drug manufacturers in 1970 to over 16,000 producers in 1993. At the same time, there was a decline in the market share of multinational firms relative to domestic firms, and by 1993, Indian firms held a majority share of 61% (Fink). Moreover, in 1992, India became the largest producer of generic drugs world-wide, and drug prices fell to some of the lowest in the world. In some cases, Indian prices for specific drugs were up to 41 times less than prices in countries with patent protection (Correa 2000).

Since much of the success of India's generic pharmaceutical industry has been attributed to the absence of patent protection, the Indian government's opposition to the TRIPS agreement was not unexpected. However, the Indian government's opposition stemmed not only from the fear of elimination of the domestic industry, but also from a perceived fear of a large loss of consumer welfare from increased prices due to a monopolization of the market by foreign firms. Multinational pharmaceutical firms argued that the existence of adequate therapeutic substitutes, which are exempt from the

standards set by TRIPS, would prevent this feared price increase (Chaudhuri, Goldberg, and Jia 2003).

However, several studies on the possible welfare effects of the TRIPS agreement in India support the reservations of the Indian government. The loss in consumer welfare due to monopoly pricing is dependent on the elasticity of demand and the availability of therapeutic substitutes (allowed under TRIPS) for each individual drug affected by patents. Estimated losses for Indian consumers vary greatly depending on the assumptions about these two elements. A study by Subramanian (1990) estimates annual welfare losses for India of between $162 million to $1,261 million, while Watal (2000) estimates a range of losses between $50 million, assuming a linear demand function, to $141 million, assuming a constant-elasticity-type demand function.

It is also necessary to calculate the possible gains to foreign multinationals in order to evaluate the overall welfare effects. The gains to foreign producers also depend on the type of demand function assumed. Watal (2000) gives a range of gains for multinational pharmaceutical firms of $40 to $66 million per year on aggregate, which comes out to only about $2 to $3 million when shared among about twenty firms as a result of implementing TRIPS on pharmaceuticals in India (Watal 2000). Subramanian (1990) is more optimistic in the range of profits for foreign firms, and estimates these gains as $101 million to $839 million, or somewhere between $5 million and $40 million when shared by twenty firms. In any case, these estimates represent a relatively small profit when compared to the half a billion dollars required to develop and bring a new drug to the world market (Richards 2004), and neither of the estimates are sufficient to

cover the losses to the Indian consumers. The net effect is a reduction in overall world welfare.

Chaudhuri, Goldberg, and Jia (2003) study a narrower aspect of the issue of pharmaceutical IPRs in India by evaluating the potential effects of TRIPS on only the market for quinolones, a certain kind of anti-biotic. Unlike Watal (2000), this study not only estimates the losses from monopoly pricing, but also includes the potential losses from a reduction in product variety as domestic producers of generic drugs disappear, and cross-price effects among potentially substitutable drugs. The consumer welfare effects are dependent on elasticities of demand, as in Watal (2000), which are all found to be negative and highly statistic, indicating that Indian consumers are quite price-sensitive. Additionally, cross-price elasticities of demand are computed and found to be large, positive, and significant, meaning that domestic drugs that contain different molecules are actually considered closer substitutes than domestic and foreign drugs containing the same molecule (Chaudhuri, Goldberg, and Jia 2003). The impact of this finding is significant because it implies that the elimination of all domestic producers of a certain type of drug, which is the most likely scenario under the TRIPS agreement, will have a larger negative effect on consumer welfare than the sum of the separate eliminations of each producer (Chaudhuri, Goldberg, and Jia 2003).

Keeping these effects in mind, the authors estimate the total losses to Indian consumers and producers to be around $450 million per year in the absence of price controls, or $305 million per year under the more realistic condition that price regulation will prevent upward price adjustments as a result of product withdrawals. Only about $50 million would be from domestic producer losses, while the overwhelming majority losses

are derived from lost consumer welfare due to decreased product variety and increased prices of new drugs. The total profit gains to foreign producers are estimated as $53 million per year without price controls, or only $19.6 million per year with price controls, which is not nearly enough to cover the estimated losses to the Indian economy (Chaudhuri, Goldberg, and Jia 2003).

Options for Developing Countries

From the studies and examples I have provided, it is clear that developing and less developed countries will face substantial obstacles and burdens in the implementation of TRIPS. A number of possible actions can be taken to minimize the losses to these countries. One option available for developing countries under TRIPS is the issuance of compulsory licenses. A government may issue a compulsory license to an applicant allowing the firm to produce a patented good without the authorization of the title owner. TRIPS allows for this practice only after the applicant has tried, and failed, to obtain authorization from the patent holder directly, although this provision can be waived in the context of a national emergency. The applicant is restricted to using the license to produce predominantly for the domestic market, and must supply adequate remuneration to the patent holder (Scherer and Watal 2002).

The effectiveness of compulsory licensing in reducing welfare losses from monopoly pricing depends on the royalties rate that must be paid to the patent owner, and the timing of entry for the licensing firm. The lower the royalties rate and the faster a licensing firm is able to enter the market, the greater its market share, and the greater its impact on reducing welfare losses will be (Watal 2000). Scherer and Watal (2002) note

that rates of remuneration in the past have ranged from around 4 percent of sales in Canada to around 18 percent of sales in the UK, but have always been well below the estimate for the amount of profits actually lost by the patent-owning firm. However, even with low rates, it would be necessary for the WTO license-issuing procedure to be expedient in order for licensing firms to capture any market share in their domestic economies (Watal 2000).

However, for compulsory licensing to even be a plausible option for a developing country, the applying country must have the resources needed to manufacture the licensed drugs domestically. This is simply not feasible for many less developed countries. The least developed countries lack the infrastructure and technical capabilities to build a domestic pharmaceutical industry, and thus, cannot take advantage of compulsory licensing (Scherer and Watal 2002). Negotiations have recently begun that aim to allow the least developed countries to opt-out of Article 31 by permitting them to import, rather than domestically produce, certain drugs when licenses are obtained; however, there has not yet been an agreed-upon resolution to these negotiations (Roffe, Spennemann and von Braun 2006).

An alternative path to reducing welfare losses for developing countries is through the encouragement of drug donations. When consumers in a particular country have too little income to purchase a drug, pharmaceutical companies sometimes provide it through donations. For example, in 1987, US pharmaceutical company Merck set an example by announcing its donation of its Ivermectin drug, an effective protectant against the worms that cause river blindness, for use in poor countries. In the year following this announcement, almost 25 million people were treated with the drug. Over the years 1970

to 1999, Merck reported total drug donations valued at over $235 million (Scherer and Watal 2002). These donations can either be made individually by firms, or through private-public partnerships. Partnerships are often based around long-term agreements to donate or provide drugs at discounted prices, or in some cases, they involve agreements for technology transfer (Widdus 2006). However, when donations are made unilaterally, as in Merck's case, under the tax laws of the US, these donations entail little or no out-of-pocket cost. For any charitable donation, a firm can deduct the total accounting cost of that donation from their net income as a tax write-off. Additionally, if the donation is used solely for the care of the ill, the needy, or infants, the donor can take a tax deduction equal to the accounting cost of the donation plus one-half of the difference between its market value and its accounting cost (Scherer and Watal 2002). It is possible for tax law to be manipulated in such a way as to impose no net cost to pharmaceutical companies of donating drugs to developing countries in great need. Although such policies would impose a burden on the enforcing governments in industrialized countries, there would also be positive externalities from the elimination of global diseases that may justify these losses. Encouraging industrialized countries to implement tax incentives similar to those in the US or creating public-private partnerships, then, are ways that the developed world can help lessen the blow of the TRIPS Agreement on less developed countries.

Conclusion

Most studies predict that in the short-run, implementing intellectual property rights will raise prices in developing countries, and in the case of the pharmaceutical market, will cause large losses in consumer welfare. Implications of stronger IPRs on

economic growth in the long-run are more complex. Whether stronger IPRs are followed by increased FDI and technology transfer depends on many elements of a country's economy, and thus, varies on a case-by-case basis.

I have also mentioned several options that can be employed legally under TRIPS in order to limit the welfare losses to less developed countries. These suggestions include compulsory licensing and drug donations from developed countries. Overall, however, it is essential to realize that the countries with the strongest institutions, most well-developed infrastructure, and cheapest supplies of factor inputs will likely fare the best under the new system of IPRs. These countries will be able to take advantage of the flexible clauses of the agreement, and will be able to defend their citizens from monopoly pricing through judicial channels. These countries will also be the most likely to benefit from future FDI since once IPRs are universalized, their other strengths will make them more attractive to investors than poorer countries with less stable economies and institutions.

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