Indicators of the Relative Importance of Patents to Developing Countries

By Sanjaya Lall

A fair amount of uncertainty remains on the economic impact of the TRIPs Agreement in developing countries, and the new round of WTO negotiations adds considerable interest to this controversy. It is widely accepted that the effects of TRIPs on industry and technology will vary according to countries' levels of economic development. The need for, and benefits of, stronger patent protection seem to rise with incomes and technological sophistication.

In theory, society reaps *four kinds of benefits* from granting temporary monopoly rights to innovators through patents. These are: (i) the stimulation of private innovation; (ii) the use of the new knowledge in productive activity; (iii) the dissemination of new knowledge; and (iv) the stimulation of innovation by other enterprises. But the importance of patents fluctuates considerably according to two variables: the technological nature of the activity, and the nature of the economy.

Taking the first of these variables, the role of patents in stimulating research and development (R&D) depends on the activity. In industries where it is relatively easy to copy new products – fine chemicals and pharmaceuticals are the best examples – patents are vital for sustaining the large and risky R&D expenditures needed for product innovation. In industries where copying is very difficult and expensive (these industries account for the bulk of manufacturing in most countries), patents *per se* are not important for appropriating the benefits from innovation.

Turning to the second, the significance of patents varies by the level of development. The main beneficiaries of TRIPs are the advanced countries. There are few benefits in terms of stimulating local innovation in developing countries. Technological activity in the latter consists mainly of learning to use imported technologies efficiently rather than to innovate on the technological frontier. Weak patents can help local firms in early stages to build technological capabilities by permitting imitation and reverse engineering. This is certainly borne out by the experience of the Asian 'tigers', such as like Korea and Taiwan, that developed strong indigenous firms in an array of sophisticated industries.

The available historical and cross-section evidence supports the presumption that the need for patents varies with the level of development. Many rich countries used weak patent protection in their early stages of industrialisation, increasing protection as they approached the leaders. Econometric cross-section evidence suggests an inverted-U shaped relationship between the strength of patents and income levels. The intensity of patenting first falls with rising incomes, as countries slacken patents to build local capabilities by copying, then rises as they engage in more innovative effort. The turning point is $7,750 per capita in 1985 prices, a fairly high income level for the developing world.

In short, assessing the impact of TRIPs in the developing world requires one to distinguish between levels of development. There is no clear case that most developing countries below the newly-industrialising economy stage will gain in net terms from TRIPs; the least-developed ones are most likely to lose. The gains that might accrue through increased technological inflows are likely to be realised over the long term, while the costs will accrue immediately. In present value terms, therefore, one can expect a significant net loss. Indisputably, a differentiated approach to intellectual property rights is called for.

Classification of Countries by IPR Relevance

For the ICTSD-UNCTAD capacity-building project on intellectual property rights,[1] we sought to identify indicators of the relative importance of patents for developing countries. This work involved categorising countries according to different schema, based on *technological activity*, *industrial performance* and *technology imports*.

The classification based on national technological activity was derived from two variables: *reseach and development financed by productive enterprises* and the *number of patents taken out in the United States*, both deflated by population to adjust for economic size. The two variables were standardised and averaged to yield an index of 'technological intensity'. We derived four groups from the index values.

- The world *technological leaders,* with intense technological activity and considerable innovative capabilities as shown by international patenting.
- Countries with *moderate technological activity*. These countries conduct some R&D, have medium levels of industrial development and are likely on balance to benefit from stronger patents. However, some countries in this group may bear significant adjustment costs in changing patent regimes.
- Countries with *low technological activity*. These countries are likely to have both significant costs and potential long-term benefits from stricter patents, depending on the level of domestic technological capabilities and their reliance on formal technology inflows. Those that are building their innovation systems on the basis of local firms copying foreign technology and importing technologies at arm's length would gain less than those with a strong transnational corporation (TNC) presence.
- The fourth level comprises countries with *no significant technological activity*. These – the least-industrialised countries with the simplest technological structures – are likely to gain least, and lose most, from strict patent rules. They will tend to pay the costs (higher prices for protected products and technologies) but gain little by way of technology development or transfer.

Average technology effort/country by technology groups, 1997-98

Technology groups	R&D per capita (US$)	Total R&D (US$ b)	Patents/1000 people	Total Patents
High	293.25	14.93	0.99	6,803
Moderate	14.01	0.41	0.02	50
Low	0.24	0.08	0.00	11
Negligible	0.00	0.00	0.00	0

Source: Calculated from UNESCO, Statistical Yearbook; OECD, Science, Technology and Industry Scoreboard 1999; Iberoamerican Network of Science and Technology Indicators; various national statistical sources.

Note: R&D is only that financed by productive enterprises. Patents are those taken out in the US. Total R&D and patents are average for each country.

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We considered technological effort at the national level based on the data we generated for productive enterprise R&D and international patents. The 87 countries were surveyed could be subdivided as follows: 22 industrialised economies, seven economies in transition, and 58 developing economies. The data revealed the existence of four groups of countries as follows:

Group 1: This group has most industrialised countries, but there are interesting inclusions and exclusions. Perhaps the most important for the present discussion is the presence of the four mature Asian Tigers, Taiwan, Korea, Singapore and Hong Kong. These technological newcomers have followed different strategies to build up their capabilities. Weak IPRs played a vital role in the technological development of Korea and Taiwan, the two leading Tigers. They are the best recent examples of the use of copying and reverse engineering to build competitive *and innovative* technology-intensive industrial sectors. However, unlike many other developing countries with weak IPRs, they were able to use the opportunities offered because of investments in skill development, strong export orientation, ample inflows of foreign capital goods, and strong government incentives for R&D.

Group 2: This group of moderate technology performers includes the European economies in transition such as Russia, Poland and Hungary. From the developing world it has the main Latin American economies: Brazil, Argentina, Chile and Mexico.

Group 3: The group of low technology performers is very diverse. It has large countries with heavy industrial sectors like China, India and Egypt, along with dynamic export oriented economies like Thailand and Indonesia. But it also has countries with small industrial sectors and weak industrial exporters. In this group, the implications of stronger IPRs are likely vary.

Economies with significant technological effort and/or strong local enterprises (e.g. India, China or Thailand) are likely to benefit from slack IPRs in some aspects and gain from strong IPRs in others. Those with little 'real' innovative capabilities or competitive enterprises may not be able to utilise slack IPRs to build up local technology, and may gain from FDI inflows by strengthening IPRs. At the same time, TRIPs may lead to net costs for some countries with no corresponding benefits. At this stage it is difficult to discern the net outcome.

Group 4: This group has no meaningful technological activity by either measure (and the countries are not ranked individually). It contains all the least-developed countries in the sample, and developing countries like Pakistan, Albania and El Salvador.

Industrial Performance

As expected, there generally is a strong relationship between the technology and industrial performance indices. Technological effort is intimately related to levels of industrialisation, success in export activity, and the sophistication of the production and export structures.

There is clearly a positive correlation between patents, industrial performance and technological effort. This does not mean, however, that patents are *causally* related to growth and development: each rises with development levels. Moreover, there is probably a strong *non-linearity* involved. Strong patents are probably beneficial *beyond a certain level* of industrial sophistication, while *below* this level their benefits for development are unclear.

In addition, the further down one goes in the scale the less evident the benefits become. In terms of the performance index, the 'very low' and 'low' performance groups are, on average, unlikely to benefit from TRIPs. In both 'medium' groups there is probably a mixture of beneficial and non-beneficial effects depending on the country, with a case for strengthening IPRs in the medium term. In the 'high' performance group the benefits are clearer.

There is one important factor here that may have a bearing on IPRs: the growth of *'international production systems'*. While transnational corporations (TNCs) have had export platforms in developing countries, the emerging trend has been for them to locate (tightly linked) processes in different countries to serve global or regional markets.

This trend is particularly marked in high-tech activities, led by electronics. The emergence of international production systems has enabled countries to move up the production, export and technological complexity ladder rapidly without first building a domestic technology base. Again, the East Asian economies bear this out. With the exception of Korea, Taiwan and Singapore, none has a strong domestic technology base in electronics. The electronics production system, however, only encompasses a limited number of developing countries.

Does the promise of integrated systems mean that developing countries should adopt stronger IPRs in the hope of attracting export-oriented TNCs?

The short term answer is probably 'no'. Most TNC assembly activity has been attracted to developing countries without changing the national patent regime by isolating export-processing zones from the rest of the economy. China is a good example. For the longer term, however, the answer is likely to be 'yes' – at least for those countries seeking to attract high-tech production systems. Inducing TNCs to invest in such activities when competitors are offering stronger IPRs would force all aspirants to also have equally strong protection. Moreover, countries that already have high-tech assembly operations would need to strengthen IPRs to induce TNCs to deepen their operations into more advanced technologies and functions like R&D and design. At the highest end of TNC activity, where developing countries compete directly with advanced industrial countries, the IPR regime would have to match the strongest one in the developed world.

However, as integrated systems are highly concentrated geographically, these considerations may not apply to many developing countries. Countries far from centres of activity, and with low technological capabilities, may continue to be marginalised from most TNC activities. The strengthening of IPRs may actually reinforce the tendency to concentrate high-value functions in a few efficient, well-located sites, implying that these other countries would, as a result of TRIPs, have fewer tools to build local capabilities in the future.

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Technology Imports

The lack of correlation between technology effort and technology imports is not surprising. There is no *a priori* reason to expect that countries that do more R&D would also receive larger amounts of FDI relative to their economic size or spend more on foreign technology than other countries. In some cases, there is good reason to expect the opposite – a strong technology base may lead to more outward rather than inward FDI relative to GNP and to greater royalty receipts than payments. In other cases, strong FDI inflows and royalty payments may go with a weak local technology base.

There is no *a priori* reason to expect that countries that do more R&D would also receive larger amounts of foreign investment.

This reinforces the conclusion that countries will face different outcomes from strengthening IPRs, not just at different levels of development but even at similar levels of income, depending on their pattern of technology development and imports. It may, of course, be argued that *all* countries should in the future be more receptive to FDI and licensing and that stronger IPRs will promote both. In fact, countries with exceptionally low levels of technology inflows should make special efforts to raise them. More evidence is needed, however, before we can say with certainty that FDI and licensing respond positively to intellectual property rights.

When we consider technology imports in the form of capital goods, we find that the pattern is very similar to other forms of technology imports: group averages change in line with the technology index, but with large variations between individual countries. Much of the variation has to do with the size of the economy (apart, obviously, from the level of development), with larger countries less dependent on imported equipment than smaller ones.

Food for Thought

This review illustrates the significant differences both between rich and poor countries and within the developing world itself in the variables that may affect the technological impact of TRIPs: domestic technical effort, industrial performance, and foreign technology imports. It has sought to put empirical flesh and bones on the intuition that different countries may face different outcomes by strengthening their patent regimes, without trying to measure what the costs and benefits might be.

A word of caution: it is impossible to pick the countries that will lose or gain from TRIPs from indices generated from the indicators identified. Their use lies mainly in illustrating just how wide the differences are between developing countries in practically every aspect of technological and industrial performance.

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ENDNOTES

[1] For more information on the ICTSD-UNCTAD project on Building Capacity on Intellectual Property Rights, launched in August 2001, see http://www.ictsd.org/unctad-ictsd/

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However, it bears notice that violation of the terms of many existing investment treaties also typically triggers demands for compensation – this time in cold hard cash, usually running into the tens or even hundreds of millions of dollars, to be paid by the host state directly to the affected investor. This does not represent, needless to say, a particularly feasible avenue for poorer nations seeking to modify earlier commitments.

While the discussion here does not purport to be a comprehensive comparison of the GATS and investment treaties, it should be clear that many bilateral investment treaties can provide rights and commitments which are co-extensive – and sometimes far in excess – of those which can be had under the GATS (where states are typically far more parsimonious and guarded in their liberalization commitments).

Thanks to the long-standing obscurity of these bilateral investment treaties, coupled with the assiduous attention paid by most to the GATS, investors have had a free ride – using these treaties with remarkably little public scrutiny. For instance, there has been no real media coverage or public notice of the proliferation of disputes lodged by foreign investors against the debt-wracked Argentina.

Of course, investors are also abetted in their desire for secrecy by the traditional features of international commercial arbitration. The rules of the World Bank's ICSID allow arbitrations to proceed *in camera*, with only a minimal disclosure of the names of the parties involved and a terse indication of the subject matter. Worse, the other major set of rules used for purposes of investor-state arbitration, i.e. those of the UN Commission on International Trade Law (UNCITRAL), require no public disclosure whatsoever!

In other words, investors can mount multi-million dollar challenges to host state regulations – in any number of sensitive sectors – without having to make any public disclosure of their legal arguments, the damages sought, nor even the dispute's existence.

In the coming months we shall see vigorous efforts to multi-lateralize the investment regime, through negotiations of a multi-lateral agreement on investment which could be launched in 2003.

Such negotiations could represent either an opportunity to reform and replace those existing investment agreements which are proving problematic, or a further extension of what appears to be a flawed, imbalanced network of bilateral treaties. The sustainable development community needs to do far more to apprise itself of the constellation of existing investment agreements, as well as to monitor those investor-state disputes which are now proliferating under these treaties. Should this not happen, it seems unlikely that any forthcoming multilateral agreement on investment would be an improvement upon the status quo.

Already, there are more than 2000 bilateral investment treaties worldwide. Astonishingly, the number of these treaties quintupled worldwide during the 1990s, with next to no scrutiny. There is every indication that investors are waking up to the existence and utility of these long-overlooked treaties. While critics have long had the GATS fixed firmly in their sights, they must ensure that the agreement's more worrying objectives are not being pursued quietly through other channels: notably, through the existing investment treaty regime.

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