1. Introduction

Sunil Mani and Richard R. Nelson

1. CONTROVERSIES REGARDING TRIPS

This book is a report on the effects of the worldwide adoption of TRIPS on the economic development being experienced in four countries presently behind the technological and economic frontier and struggling to catch up. The countries are Brazil, India, Thailand, and China.

The discussions leading to the establishment in 1995 of the requirement that countries adhere to the principles written down in TRIPS (Trade Related Aspects of Intellectual Property Rights) in order to be members of the WTO (World Trade Organization) often were heated. In particular, a number of economists disputed the argument, put forth by advocates of TRIPS, that less developed countries would develop more rapidly and widely if they had in place the kind of strong intellectual property rights law that TRIPS codified.

The advocates of TRIPS proposed that there were two kinds of gains that would accrue to developing countries that signed on. First of all, the incentives for R&D and invention of their indigenous companies and potential inventors more generally would be strengthened. Second, companies and patent holders more generally, residing in the advanced industrial countries, would be more likely to invest in developing countries, or facilitate technology transfer to them, if those countries respected their intellectual property rights. But many economists who had studied technological advance, and the roles played by intellectual property in the process, questioned both of these proposals.

Partly their argument was based on a series of empirical studies that had explored the importance of patent protection as an incentive for R&D and inventive activity, and found that in most industries patents were not very important. The findings of these studies invariably were that, while patents were essential for inventors to gain significant returns from their inventions in pharmaceuticals and a few other industries, in most industries, including many where technological advance was rapid, the principal mechanisms through which inventors were able to reap profits from the
new products their work enabled were the advantages of head start, particularly where learning curves were relatively steep, and through building strong service capabilities to attract and hold buyers to their products. And keeping knowledge of the production process private, rather than patents, was the principal vehicle used by companies to protect their process technologies. The economists studying technological advance also pointed out that the development of a number of important technologies had been stymied for a while by legal action, or the threat of it, by agents who held patents and were trying to make money through this vehicle.

At the time of the discussions that led up to TRIPS, there had been little detailed study of the role of intellectual property rights in the earlier catching up experiences of countries like Japan, Korea, and Taiwan, but scholars of economic development held the general impression that the role had not been significant. The impression was that the prospect of gaining an internal patent had not been an important part of the incentives for the indigenous entrepreneurs who drove the catching up process. And it was believed that only rarely did foreign companies try to use their intellectual property rights to prevent indigenous companies from developing their production capabilities, and indeed in many cases assisted in the process.

These beliefs were largely supported by an empirical study published in 2010, focused on just these issues, titled *Intellectual Property Rights, Development, and Catch-up: An International Comparative Study* (Odagiri et al., 2010). That study examined the catching up experience of a number of different countries, and found that, while there were some exceptional cases, and these seemed to be more frequent in recent years, there was little evidence that intellectual property played an important role in the processes involved. The present study should be regarded as a natural follow up to the earlier one, and looks at experience in recent years as TRIPS came into force.

There are a number of reasons why past experience may not be a good indication of what is going on under TRIPS. An important one is that years ago, for example in the earlier stages of Japan’s development as a manufacturing power, the leading companies in countries at the economic frontier did not worry about companies in the developing countries rapidly becoming competitors in world markets, much less in their home markets. In recent years, however, this has become a real concern. Indeed, the study reported above found that in recent years there had been an increase in litigation against companies in developing countries whom the patent holders in frontier countries clearly regarded as potential threats. Second, and more generally, the last quarter century has seen companies in the United States, and to some extent in Europe and Japan, paying more attention to intellectual property rights than they used to, and a
noticeable increase in patent litigation. And third, over this same period policy makers in developing countries have become much more oriented to building up the scientific and technological capabilities of their countries, and following the development paths of Korea and Taiwan, than used to be the case.

And of course TRIPS is new. Until recently many less developed countries had intellectual property regimes that were quite loose. TRIPS has resulted in a significant tightening up of IP law in these countries.

Two broad questions are explored in this study. One is whether strengthened indigenous intellectual property rights seem to have drawn forth an increase in indigenous investments in R&D and efforts at innovation more generally. We note, however, that the increased vigor of policies to support innovation that one sees in many developing countries, including all of those reported on here, makes it difficult to sort out the effects of a strengthened IP regime from other factors. The other is whether companies at the technological frontier have responded to stronger IP protection in developing countries by increasing their investments there, and their assistance to indigenous catching up through expanding their licensing and associated technology transfer to domestic companies, or whether they have used stronger IP laws to try to hinder foreign companies from catching up. Again, it is not easy to tease out how much difference TRIPS has made on these fronts, given the increased zeal in protecting their intellectual property that IP holders have shown more generally. The authors of the empirical country studies presented in this book were aware of these analytical difficulties, and have tried to deal with them.

In undertaking their empirical studies, most of the economists contributing to this book were of two different minds, somewhat at odds with each other. One was that it facilitated economic development if the IP regimes in countries aiming to catch up were relatively weak, and that it was particularly important not to give foreign companies a strong legal handle to discourage indigenous companies from acquiring modern technology, or to enable them to require high royalty and other payments from companies they could accuse of using their patented technologies. From this perception, TRIPS could well interfere with the ability of countries behind the frontier to catch up. But the other belief was that in most cases IP didn’t matter much, and that in fact TRIPS would not have much of an effect.

However, there was one important sector where there was general agreement that TRIPS could matter significantly. An important particular recent development has been, on the one hand, the efforts of a number of developing countries to establish an indigenous pharmaceuticals industry, and on the other hand the increased aggressiveness of
pharmaceuticals companies in the United States and Europe to enforce their intellectual property rights. Prior to TRIPS many third world countries (as some high income countries) did not grant product patents on pharmaceuticals. In many cases the rationale was that patents on pharmaceuticals increased the cost of medical care and, in particular, handicapped public health programs. In some developing countries this policy also was associated with a desire to foster the development of an indigenous pharmaceuticals industry, serving not only domestic but world demands. As we will note later, in India this effort was quite successful; in Brazil less so.

Big pharma was very active in the campaign to establish TRIPS. Lobbyists from a few other high-tech industries, like electronics, also were active, but played a much less powerful role than did those representing pharmaceuticals.

Thus issues of medical care costs are an important part of the debate about whether or not TRIPS is a good policy, and about whether pharmaceuticals ought to be treated as a special case. These arguments and policies play an important role in the developments that have occurred in several of the countries in our sample.

2. TRIPS FLEXIBILITIES

Concerns about the possible detrimental effects of TRIPS, held by participants in the treaty writing process, from both developing and frontier countries, led to the building into the treaty of a number of different kinds of flexibility. These included prominently, (i) a transition period before which a country had to get its IP system to meet TRIPS standards, (ii) provisions that permitted compulsory licensing of patents under certain circumstances, (iii) the ability of governments to use patented technologies for certain public purposes without explicitly licensing them, (iv) ability under certain circumstances to import patented items from other countries, (v) exceptions, and (vi) exemptions, giving some flexibility regarding just what can be patented and what not.

(i) The Compliance Period

TRIPS came into existence in 1995, but most developing countries were given time until 2005 to get their systems aligned with requirements, and especially poor countries until 2016. During the transition period, starting in 1995, countries were required to accept patent applications and keep them in a ‘patent pending’ mailbox, which would be opened when the
Introduction

country became TRIPS compliant, and evaluated then according to the patent law the country had put in place. This provision was particularly important for pharmaceuticals, because it meant that, for a country that delayed putting a TRIPS compliant patent law in place, generics could be used and produced.

(ii) Compulsory Licensing

A compulsory license (CL) is an authorization which is granted by the government without the permission of the patent holder. This is one of the most frequently encountered flexibilities that has actually been used. It means that the government of a country under certain grounds may issue a compulsory license to a domestic manufacturer for producing the generic version of a patented drug. Most countries have provisions for compulsory licenses, either under their patent law or, as in the US, through anti-trust legislation. There are many different grounds for issuing CLs; these can include public health reasons. Other grounds are, for instance, emergency situations, epidemics, public non-commercial use, to remedy anti-competitive practices or to protect the environment; it is entirely up to the national law to decide which are the grounds and so there is a fair amount of flexibility. A CL limits the rights of the patent holder, but does not take those rights away. TRIPS therefore specifies the conditions that need to be applied when countries want to grant a compulsory license. An important condition is that each case shall be considered individually. Also, in general, efforts should first be made to obtain a license from the patent holder (a so-called voluntary license). One of the important conditions that are attached to the issuance of a compulsory license is that the patent holder is remunerated through the grant of a royalty. The size of the royalty (usually denoted as a percentage of the price of the product manufactured under CL) is decided by the governmental authority that grants the CL in the first place. The other two conditions are that the decision to issue a CL is subject to a review and the CL is predominantly for the supply of the domestic market. It was generally believed that the Doha declaration on public health would precipitate a number of CLs to be issued. However, a recent study by Beall and Kuhn (2012) identified 24 CLs that were issued mostly between 2003 and 2005, involved drugs for HIV/AIDS, and occurred in upper-middle-income countries. Aside from HIV/AIDS, few CL episodes involved communicable disease, and none occurred in least-developed or low-income countries (Table 1.1). It is interesting to note that over a third of the CLs have been issued by two of the four countries in our sample, namely Brazil and Thailand.
TRIPS compliance, national patent regimes and innovation

Table 1.1 Compulsory licensing episodes by year and country

<table>
<thead>
<tr>
<th>Year</th>
<th>Nation</th>
<th>Disease</th>
<th>Total products</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>Brazil</td>
<td>HIV/AIDS</td>
<td>1</td>
<td>Discount</td>
</tr>
<tr>
<td>2001</td>
<td>Canada</td>
<td>Anthrax</td>
<td>1</td>
<td>Discount</td>
</tr>
<tr>
<td>2001–03</td>
<td>South Africa</td>
<td>HIV/AIDS</td>
<td>8</td>
<td>VL/discount/none</td>
</tr>
<tr>
<td>2001</td>
<td>United States</td>
<td>Anthrax</td>
<td>1</td>
<td>Discount</td>
</tr>
<tr>
<td>2002</td>
<td>Egypt</td>
<td>Erectile dysfunction</td>
<td>1</td>
<td>CL</td>
</tr>
<tr>
<td>2003–04</td>
<td>Malaysia</td>
<td>HIV/AIDS</td>
<td>3</td>
<td>CL</td>
</tr>
<tr>
<td>2003–07</td>
<td>Brazil</td>
<td>HIV/AIDS</td>
<td>1</td>
<td>Discount</td>
</tr>
<tr>
<td>2003</td>
<td>Zimbabwe</td>
<td>HIV/AIDS</td>
<td>All</td>
<td>CL</td>
</tr>
<tr>
<td>2004</td>
<td>Mozambique</td>
<td>HIV/AIDS</td>
<td>3</td>
<td>CL</td>
</tr>
<tr>
<td>2004</td>
<td>Zambia</td>
<td>HIV/AIDS</td>
<td>3</td>
<td>CL</td>
</tr>
<tr>
<td>2005–06</td>
<td>Argentina</td>
<td>Pandemic flu</td>
<td>1</td>
<td>VL</td>
</tr>
<tr>
<td>2005–07</td>
<td>Brazil</td>
<td>HIV/AIDS</td>
<td>1</td>
<td>Discount</td>
</tr>
<tr>
<td>2005–09</td>
<td>Brazil</td>
<td>HIV/AIDS</td>
<td>1</td>
<td>Discount</td>
</tr>
<tr>
<td>2005</td>
<td>Ghana</td>
<td>HIV/AIDS</td>
<td>All</td>
<td>CL</td>
</tr>
<tr>
<td>2005</td>
<td>Indonesia</td>
<td>HIV/AIDS</td>
<td>2</td>
<td>CL</td>
</tr>
<tr>
<td>2005</td>
<td>Taiwan</td>
<td>Pandemic flu</td>
<td>1</td>
<td>VL</td>
</tr>
<tr>
<td>2006–07</td>
<td>India</td>
<td>Cancer</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>2007</td>
<td>Rwanda</td>
<td>HIV/AIDS</td>
<td>1</td>
<td>CL</td>
</tr>
<tr>
<td>2007–08</td>
<td>Thailand</td>
<td>Cancer</td>
<td>1</td>
<td>Discount</td>
</tr>
<tr>
<td>2007–08</td>
<td>Thailand</td>
<td>Cancer</td>
<td>3</td>
<td>CL</td>
</tr>
<tr>
<td>2010</td>
<td>Ecuador</td>
<td>HIV/AIDS</td>
<td>1</td>
<td>CL</td>
</tr>
</tbody>
</table>

Source: Beall and Kuhn (2012).

(iii) Public, Non-commercial Use of a Patent

The right of the state to use a patent without the consent of the patent holder for public health purposes is recognized to be an important public health safeguard by many countries. Although Article 31 of the TRIPS Agreement sets out the conditions governing both government use of patents and compulsory licenses, one important difference is that government use of patents may be ‘fast-tracked’ because of the waiver requirement for prior negotiations with patent holders.
(iv) Parallel Importation

Parallel importation refers to the importation, without authorization of the patent holder, into a country of a product from a third country, where this product has been marketed by the patent holder or in another legitimate manner. It is mainly used when the price in the third country is considerably lower than the price the patent holder charges in the country concerned. TRIPS explicitly states that it does not address the issue of parallel import, thereby leaving countries free to determine their own policy in this respect especially if they are currently or potentially producers of generic drugs.

(v) Exceptions to Patent Rights

Article 30 of the TRIPS Agreement does not define the scope or nature of the permissible exceptions and the result is that countries have considerable freedom in this area. One of the exceptions is the so-called Bolar provision. This provision or exemption enables the manufacturer of a generic drug to use a patented invention to obtain marketing approval without the patent owner’s permission before the patent expires. The generic drug maker can then market his or her own version of the patented drug as soon as the patent expires. This exemption has important implications for those developing countries that are manufacturers of generic drugs.

(vi) Exemptions from Patentability

The TRIPS agreement requires patents to be granted only for inventions that are new, involve an inventive step and are capable of industrial application. A mere discovery of a new form of a known substance which does not result in the enhancement of the known efficacy of that substance or the mere discovery of any new property or new use for a known substance or of the mere new use of a known process, machine or apparatus unless such known process results in a new product or employs at least one new reactant does not have to be granted a patent. In fact, countries have invoked this flexibility in thwarting attempts by drug companies to seek new patents on existing drugs by simply claiming improvements in their efficacy.

Of these six TRIPS flexibilities, the only one that has attracted much attention is the one on CL. There are no cross-country data on whether and how much of the remaining flexibilities have been inserted into national patent regimes.

In the above, we discussed the notion of TRIPS compliance and the
various flexibilities that have been provided in the Agreement. It was believed that all these go toward having a minimum standard for IPR protection across countries. Having this minimum standard of IPR protection is expected to confer two kinds of benefits to firms in developing countries. First, it will encourage them to commit more resources to innovative activity, as a strong IPR regime will reduce considerably, if not plug completely, any possibility of leakages of technology. Second, MNCs will be encouraged to transfer disembodied technologies to unaffiliated firms in the south as these unaffiliated firms, given the existence of a stricter IPR regime, will be discouraged from reverse-engineering the transferred technology and will develop local capabilities. These two ‘benefits’ were believed to be a product of TRIPS compliance. Although much has been written about TRIPS compliance, its actual effects on spurring these two benefits to developing countries have not attracted any attention. The present study seeks to fill in this gap. And it does so by discussing in detail the cases of four developing countries, Brazil, China, India and Thailand. All these four, as mentioned earlier, have made their IPR regimes TRIPS compliant, have provided for TRIPS flexibilities, and have manufacturing capacities for a range of industries including in pharmaceutical products. Further, moving to a TRIPS compliant regime would have also precipitated a number of changes in a nation’s innovation system. We seek to document these changes both at the macro level and at the micro level, at the level of specific industries such as pharmaceuticals, agrochemicals and the automotive industry across the four countries that we have selected for in-depth examination. At this juncture, it is important to raise the fact that the period we consider for our study, the two decades from the beginning of the 1990s, saw extensive economic liberalization and indeed globalization, to which the economies of all the countries were subjected. So some of the changes that we observe, for example an increase in innovative activity, may actually result from the competitive pressures imposed by liberalization measures. Therefore it may be difficult to attribute the observed results to just TRIPS compliance alone. Methodologically, it is almost impossible to separate out the differential impact of various differing measures.

### 3. MAIN HYPOTHESES EXAMINED IN THE BOOK

From our discussion it is clear that through a stricter IPR regime, TRIPS is supposed to confer a number of advantages to firms in both developing and developed countries. One of the main advantages is that a stricter IPR regime will encourage firms in general and those in the pharmaceutical
industry in particular to commit more resources to innovative activity. This is because of the increased possibility of firms being able to appropriate the full returns to their own innovative efforts emanating from a strong patent regime which has severe legal sanctions against those indulging in copying and imitation. More innovation will pave the way for increasing the availability of a range of drugs, including those dealing with the so-called ‘neglected tropical diseases’ (NTDs) such as malaria, filariasis, leishmaniasis, tuberculosis etc. So the first hypothesis we examine is whether there has been an increase in innovative efforts in general and specifically in the pharmaceutical industry consequent to TRIPS compliance. The second hypothesis, which is actually a corollary of the first, is that TRIPS compliance will increase the attention to research on NTDs. A second advantage that is discussed is that a stricter patent regime will encourage MNCs to license their proprietary technologies of various sorts to unaffiliated firms in developing countries. The increased impetus for this comes from a stricter patent regime reducing considerably the scope of reverse engineering, once again plugging the possibility of technology leaking out. This would be a big boon to firms in emerging economies such as Brazil, China and India, which have traditionally depended on licensing of disembodied technologies as a way of developing their local capability. TRIPS compliance was thought of as a way of encouraging the licensing of technologies by MNCs. So the third hypothesis that we take up for empirical examination is the relationship between TRIPS compliance and technology licensing. In very specific terms, through our country case studies, we seek to find out whether TRIPS compliance is leading to increased technology licensing between MNCs and unaffiliated companies in developing countries. A fourth hypothesis is that TRIPS compliance, by emphasizing the importance of having patents, would bring in some much needed clarity on patenting of traditional knowledge and microorganisms. Wrong issuance of patents for inventions based on traditional knowledge residing with indigenous communities such as tribal peoples was rampant during the pre-TRIPS compliance period. Certain firms were profiting from ‘inventing’ for the first time curative properties of certain plants and trees, which were already known in traditional knowledge. But patent examiners in far off jurisdictions, being unaware of the existence of such traditional knowledge, more often than not issued patents to companies which claimed to have found this out for the first time. The emphasis on patenting would have encouraged national governments to put in place institutional mechanisms for dealing with such issues. Finally, TRIPS compliance would also have reformed patent offices by increasing both the quality and quantity of patent examiners, by automating them through increased usage of information and communication technologies (ICTs).
All these go towards improving the transparency of patent examination, and effecting significant reductions in the time lag between submission of a patent application and the final decision on whether or not to grant it. We seek to verify these five hypotheses through the country case studies. Within the country cases we also have a verification of these hypotheses across specific industries as well.

4. ORGANIZATION OF THE BOOK

The book is organized into six chapters, which includes the present one. The next four chapters correspond to the four country cases. In each of the country cases we first discuss the processes through which TRIPS compliance was reached in the respective country. In all the countries this was achieved through amendments to the national patent regime and in some cases, for instance in India, this was preceded by a fierce debate which took place both inside and outside the parliament of the country. Thereafter we survey the more proximate and distant changes to innovative activity in general and the pharmaceutical industry in particular. In the case of India, in addition to the discussion on the pharmaceutical industry, we have a discussion on the agrochemical industry – another important industry that would have been affected by TRIPS. Further, in the case of Thailand we consider the automotive industry, as that industry is very important for the country. So, between the macro and micro discussions, we have a fair idea of the impacts of TRIPS. Before we go on to discuss the details of each of the four country cases, it is important to state that the effects, both positive and negative, of TRIPS are vastly exaggerated. The country case studies have observed that some of the positive benefits that were expected of TRIPS were not forthcoming. For instance, the belief that a stricter patent regime would result in easier licensing of disembodied technologies between MNCs and unaffiliated companies in developing countries does not seem to have been fulfilled. On the other hand, the concern that innovative performance, especially of generic drugs manufacturers, would be negatively affected as a result of TRIPS also does not seem to have been justified.

In the following we attempt a chapter-wide summary of what we have found. For the details, the reader is advised to dip into the specific cases.

In Chapter 2, Caliari, Mazzoleni, and Póvoa discuss the Brazilian case, and present arguments that the TRIPS compliance by the Brazilian patent law in 1996 did not cause significant changes in the innovative behavior of Brazilian industry as a whole. However, it induced some changes that seem to be small today, but have potential to become important in the future.
Since the new patent law there was a significant increase in the share of non-resident patent applications at the Brazilian patent office, the INPI, as well as a change in the profile of patent applications made by non-residents in Brazil. Foreign patents dominate important technological areas, such as chemistry, pharmaceuticals, biotechnology and ICTs. This may represent a strong barrier to the technological development of domestic firms in the future.

The faster and most important changes induced by the TRIPS compliance were related to the new role of universities in the Brazilian system of innovation and to the importance of innovation – and patents as an indicator – in the government policies. First, Brazilian universities are now exploring their potential to generate patentable technologies and become important actors in innovation issues, especially regarding technology transfer. Second, innovation became an essential part of the industrial policy. New laws and plans are designed to enable partnerships between firms and universities and to incentivize innovation in the productive sector. But the government is not yet concerned about the potential barriers patents may represent to technological developments in the future.

Probably one of the sectors that will feel most the impact of TRIPS compliance in the future is the national pharmaceutical industry. So far, it is not possible to say that there has been a negative impact. The start of production of generic medicines in the Brazilian market helped to smooth the expected negative impacts by causing a shift in favor of domestic industry, which has been passing through a period of technological learning and strengthening of its brands. These national companies will enjoy the intense learning acquired with the production of generic products if they try to innovate in a next step. It is then that the negative effects of TRIPS compliance may appear.

In Chapter 3, Mani, Chaudhuri, Unni, Pray and Nagarajan discuss the Indian case. The chapter discusses both the macro implications of TRIPS compliance and its micro implications in the case of two specific industries, pharmaceuticals and agrochemicals.

India’s patent regime was made TRIPS compliant in 2005 after a series of three amendments and an intense debate which involved a number of stakeholders. The major facet of the TRIPS compliant patent regime is the recognition of product patents in pharmaceuticals, agrochemicals and food industries. In this chapter the authors analyze in depth the implications of this change in governance rule for innovative activity in India as a whole and the pharmaceutical and agrochemical industries in particular. Of the various flexibilities provided in TRIPS, India has invoked only one, namely the one on compulsory licensing, and that too in the very recent period. The authors find that although patenting has increased from India,
most of these patents are secured by foreign firms located in the country. An interesting finding was that the leading information technology firms have started filing for patents at the United States Patent and Trade Mark Office (USPTO) where software patenting is allowed. During this time India has become a contracting party to the Patent Cooperation Treaty, thus enabling Indian inventors to patent their inventions in a large number of jurisdictions. The government has also initiated steps to bring utility models within the ambit of its IPR regime so that incremental innovations by small and medium enterprises can be protected. Creation of the Traditional Knowledge Library has enabled India to successfully oppose the granting of patents to inventions based on India’s traditional knowledge in other jurisdictions. The expert committee that was appointed to see if microorganisms should be patented has reached the conclusion that they should. There is also some limited evidence to show that research in NTDs has increased in India although this appears to be confined to public research institutes and the research is leading to more publications rather than new drugs. Also, it is less clear whether the domestic pharmaceutical industry is involving itself in this area. Tightening up of the patent regime through TRIPS compliance has not resulted in unaffiliated Indian firms being able to secure foreign technical collaboration agreements on a large scale. However, continued reform of the patent office has made the whole process of patenting more transparent and less time consuming, although the time taken for examination of applications is still high when compared to best practices. TRIPS have allowed pre- and especially post-grant opposition, and patent litigation has shown an increase. More striking are instances of domestic companies litigating against each other and that too in non-pharmaceutical industries.

Their analysis of the post-TRIPS R&D strategies of domestic pharmaceutical firms shows that little has changed to dispute the conventional wisdom that the developing countries should not grant products patent protection. They are already paying the cost of high prices of patent protected products. But the technological benefits claimed have not yet taken place. While R&D activities have diversified, Indian pharmaceutical firms are yet to prove their competence in innovating new products. No ‘new chemical entity’ (NCE) has yet been developed for marketing. There have been several setbacks and the partnership model has not always worked properly. What Indian companies have really demonstrated is the ability to develop generics – an ability which they acquired and improved during the pre-TRIPS period. Contrary to what was claimed during the TRIPS negotiations, the product patent regime has not prompted Indian companies to devote more resources to developing drugs for neglected diseases that exclusively or predominantly affect developing countries.
There is of course some evidence to show that public agencies in India have started devoting more attention to research on drugs for NTDs. The large Indian pharmaceutical companies, which are the major R&D spenders in the country, have been focusing on the larger and the more lucrative developed-country markets, particularly that of the US. In that regard, the primary incentive to invest in R&D, whether for NCEs, for modifications, or for the development of generics, has not been the new TRIPS-compliant product patent regime in India but the product patent regime in developed countries that was in place well before TRIPS. TRIPS may have accelerated the trend toward such R&D because of the anticipated shrinkage of domestic opportunities. But in the absence of TRIPS, such R&D activities would still have been undertaken. With the larger domestic operations, Indian companies, in fact, would have had access to larger resources and would have been better placed to undertake such R&D.

Another industry considered for in-depth examination is the agrochemicals industry, of which pesticides is an important component. The evidence presented by the authors suggests that compliance with TRIPS has had some positive impact on R&D and innovation in the pesticide industries. Some growth in these indicators would have taken place anyway, driven by liberalization of industrial policy, increased demand for pesticides in India and the increase in pesticide exports, but discussions with industry leaders and the evidence on IPRs, R&D and innovation indicate that stronger IPRs have also had an impact. The impact seems to have been greatest on the MNCs, which have made the most use of pesticide and biotech patents. These companies are investing in major laboratories that are part of their global R&D networks, but they are also building their R&D programs to develop innovations for the Indian market. The changes in patenting and the investments by multinationals also appear to have stimulated more research and innovation by Indian pesticide companies.

Finally, it is seen that most of the alleged positive benefits of TRIPS are exaggerated, while at the same time its negative effects on some fronts are also equally exaggerated. The truth lies in between the two.

In Chapter 4, Intarakumnerd and Charoenporn discuss the Thai case. Their analysis explored the co-evolution of the IPR regime and technological capability of automotive firms in the country. The ensuing analysis showed that there is only a small extent of co-evolution. Other government policies and changes in TNCs’ strategies and the market in general are much more important factors shaping technological capability development of firms in the sector. Specifically, they discovered the following. Firstly, there have been some atmospheric changes in terms of an increasing awareness of the importance of patents in the industry after
the patent regime became stronger. Secondly, the stronger patent regime has slight impacts on the extent and nature of knowledge transfer between transnational corporations and local part suppliers. It has no obvious impacts on the extent and nature of knowledge transfer between universities and public research institutes on the one hand and firms on the other. Last but not least, the stronger patent regime has impacts on firms climbing up technological ladders from production to more sophisticated activities. To be able to climb up the technological ladders, local latecomer firms need to develop their own ‘independent’ effort based on active learning in the building up of indigenous technological capabilities and leveraging external sources of knowledge besides their existing production networks, in order to circumvent difficulties partly generated by the stronger patent regime.

In Chapter 5, Song Hong discusses the Chinese case. China made its IPR regime TRIPS compliant in 2000, as it was a precondition for its admittance to the WTO which it joined in 2001. It is interesting to note that China is the only country in our sample that has hardly used any of the TRIPS flexibilities (Table 1.1). By taking the specific case of the Chinese automotive industry, Song Hong shows that TRIPS compliance has actually brought to the fore the importance of patenting among Chinese companies. The result has been a dramatic spurt in patenting, both within China and abroad by Chinese inventors.

Finally, in Chapter 6, we conclude the book by summarizing the main findings from the country case studies. Different facets of TRIPS compliance are drawn from the cases, and they point to the fact that effects of TRIPS are vastly exaggerated. Neither extreme positive nor extreme negative implications of TRIPS have been found. In very specific terms the concluding chapter deals with three issues. The first is how the countries have (or have not) employed the flexibilities in TRIPS, and also other relevant policies they have put in place. This is followed by a discussion of effects on the litigation front. Thereafter we conclude with a section on what has happened to innovation in these countries, and our assessment of the extent to which TRIPS mattered.

NOTES

1. These number about 40.
2. Producers of films, books, and other products protected by copyright, who argued that their work was being copied and sold internationally by infringers in less developed countries, were also active. But in this book we focus on patents and manufacturing.
REFERENCES

Beall, R. and R. Kuhn (2012), ‘Trends in compulsory licensing of pharmaceuti-
www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.1001154 (accessed
March 5, 2013).

Odagiri, Hiroyuki, Akira Goto, Atsushi Sunami and Richard R. Nelson (eds)
Comparative Study*, New York: Oxford University Press.