The Globalization of Intellectual Property Rights[1]

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TO BE PUBLISHED IN DANIELE ARCHIBUGI AND ANDREA FILIPPETTI,

***The Global Handbook of Science, Technology and Innovation*, Wiley Oxford, 2015, forthcoming**

ABSTRACT

There is a heated debated – in academia and in policy circles – about the usefulness of a stronger global regime of intellectual property rights (IPRs). Supporters of strong IPRs argue that they will increase investments in R&D and innovation and disseminating it across countries. Detractors respond that this would imply another burden on developing countries, making slower and more difficult their catching up. The introduction of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) in 1994 has even further polarized these positions. We argue that the relevance of IPRs in facilitating or obstructing technology transfer has largely been exaggerated. Innovation-based development is neither hampered nor facilitated by strong or weak IPRs, but rather by the willingness to invest resources in R&D, education, and infrastructures. While TRIPS have effectively represented an attempt to generate a global regime of IPRs, its economic effectiveness has been rather limited since enforcement and policing of IPRs infractions are still firmly in the hands of national authorities.

KEYWORDS: Innovation, Intellectual Property Rights, Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), technological appropriation, patents, copyright, technology transfer.

[1] This research has been supported by a Marie Curie Intra-European Fellowship project FP7-PEOPLE-2011-IEF-298167-REGIO_SPIN, under the EC Grant Agreement No: PIEF-GA-2011-298167 and from a Grant of the School of Business, Economics and Informatics, Birkbeck College, University of London. Parts of the chapter are based on a note in Mayer et al. (2014).

Introduction

The international economic landscape is periodically rattled by controversies concerning intellectual property rights (IPRs). To secure market shares, companies introduce new products and processes and this often leads to controversies for the real or supposed violations of patents, copyrights and trademarks. Very often, the companies involved in these battles are based in different countries. The so-called smart phones war (Filippetti, 2012; Graham and Vishnubhakat, 2013) has recently captured the attention of public opinion because the product at stake is in the hands of top managers and leading politicians as well as in those of teen-agers.

On some occasions, companies complain because supposedly some governments do not adequately protect their intellectual property, the most dramatic example represented by the coalition of large multinationals in the pharmaceutical industry, the so-called 'big pharma', against the South African governments for infringement of their IPRs on anti-HIV drugs (Fisher and Rigamonti, 2005). In other occasions, the controversies do not directly involve competing companies, but rather the national governments themselves. This is, for example, the case with current controversies debated at the World Trade Organization (WTO) under the Trade Related Aspects of Intellectual Property Rights (TRIPS) agreement.

These controversies reflect the fact that in the current global economy, knowledge and intangibles have become increasingly important both as production factors and as consumption goods. While most of the international controversies of the past were associated to trade in physical merchandise, today there is an increase in litigation associated to IPRs.[2] Companies should bear greater investments in Research and Development (R&D) and design in order to generate and bring to the market new products and services, but very often these core competitive assets can be imitated and replicated at costs that are substantially lower than the original cost. This is at the root of traditional tensions between innovators and imitators, a tension that for a long period mainly occurred within nations and that now has taken on a global dimension. On the other hand, the growth in international trade and foreign direct investment, associated to the rise of emerging markets, has thus increased the propensity of companies to search for profits related to their innovations at the global level. In addition, the rise of countries characterized by cheap labour costs has increased the number of potential imitators.

IPRs holders are highly concentrated in a restricted number of gigantic multinational corporations.[3] The same companies are also responsible for a corresponding amount of expenditure in R&D, industrial design and investment in intangibles (Archibugi and Iammarino, 2002; Archibugi and Pietrobelli, 2003; Filippetti and Peyrache, 2011). These companies have managed to assure that basic IPRs are protected in their home country as well as with their most important economic partners, namely in the areas where they concentrate the bulk of their sales. So far, however, they have not managed to get an equally effective protection in emerging and developing countries. These markets have grown in importance over the last decades and are more and more becoming part of their core business. This has led Western companies to demand greater international protection for their IPRs against unfair foreign imitators (Ryan, 1998; Sell, 2003).

The requests of multinational corporations to get stronger IRPs has generated passionate protests in developing countries since most inventions with commercial potential come from companies based

[2] See among others: Archibugi and Filippetti (2010); Drahos and Mayne (2002); Henry and Stiglitz (2010); Maskus (2000).

[3] The concentration of patents in a few hundred multinational corporations has been analysed by Patel and Pavitt (1997) and Cantwell and Iammarino (2003).

in North America, Europe, and Japan. The full payment of IPRs would be, they argue, a net transfer of resources from developing to developed countries, which retards growth in developing countries along with pushing up prices. Critics of strong IPRs have also pointed out that, in some cases, large companies apply for IPRs to obtain exclusive rights on ancient forms of knowledge; in these cases the advantages of the legal protection are not provided to those that invest in fresh research, but rather to those who have the best attorneys and the most greedy managers (Shiva, 2001, Farah, 2015).

From the perspective of international political economy, this is an excellent case to explore the interplay of competition across companies *and* across states - an issue that Susan Strange and her followers address with great energy (see Strange, 1988; Stopford and Sell, 1991). There are two forms of adjudicating controversies on IPRs:
i) When controversies relate to companies' interests they can be addressed in national courts. In spite of the presumption of impartiality, national courts are often suspected to be biased and to favour the interests of their own country and of home-based firms.
ii) When controversies relate to rules and legislation in vigour in countries, since 1995 the WTO is in charge. But since its members are governments only, it can examine and dispute controversies that are brought in by them only. Complaints of the business sector and of civil society can be discussed and taken into account at the WTO provided there is a government willing to receive them, under the assumption that their advocacies are part of their national interest.

This leads to the key question: what is the architecture of the emerging global IPR regime? Can IPR policy alone really regulate the generation and diffusion of knowledge and innovation across the world? And, ultimately, is a global regime of IPRs viable in practice? The aim of this chapter is to reframe the debate regarding the globalization of IPRs to place it into the right context. As students of innovation, we have learnt that the generation, transmission and diffusion of knowledge is a complex phenomenon and that what IP can do and what they cannot do to reward inventors and innovators and to prevent imitators is limited. Both supporters and detractors of IPRs often tend to exaggerate the effects that they have in economy and society. The chapter is organized as follows. The next section outlines the general debate surrounding IPRs. We follow by describing the role of the US in promoting IPRs and how this has gathered ideational strength. We then discuss the attempt to generate a global IP regime through TRIPS. We then present two ideal typical models for and against IPRs and discuss their limitations. We continue discussing a few of the stages of a genuine global IPRs regime, showing that it still lacks some important components. The last section reports the policy implications.

What are Intellectual Property Rights

Intellectual Property Rights are legal instruments designed to provide the holder of this right the exclusive use over certain creative activities. They include patents, copyrights, trade-marks, utility models, geographic indications and others. Each of these rights has a specific legislation and therefore covers a different domain. These IPRs have a distinct economic and social impact and can be more or less relevant according to the nature of the industry, of the technology and of the geographical area. For example, patents are crucial for a few manufacturing industries, including pharmaceuticals, chemicals and electronics; copyright is the core instrument to protect audiovisual and literary products; trade-marks are relevant in the industries where brands represent an important competitive advantage; geographic indications are important for food and beverages (such as wine appellation). Often, companies use a combination of IPR instruments to increase the protection of

their activities. For example, companies defend their software through a mixture of copyright and patents while drugs combine patents with trade-marks.

Table 1 - Intellectual Property Rights

Form of Intellectual Property Rights	***Description***	***Scientific, technological and innovative content***
Patents	Exclusive rights granted for a limited period of time for the disclosure of an invention. The invention should be original and nonobvious.	Very high. Used especially by high-tech manufacturing companies. Key instrument in industries such as Drugs, Chemicals, Electronics and Mechanical Engineering
Copyright	Legal right granted to the creator of an original work, usually for a limited period of time.	Medium. Originally designed to protect literary work, music and audio-visuals, is now used also for software
Utility Model (or petty patent)	Very similar to the patent, but usually has a shorter term (often 6 to 15 years) and less stringent patentability requirements.	Low-medium compared to patents
Industrial design rights	Property rights that protects visual designs. Easier to get and cheaper than patents.	Scientific and technological content is rather low. It may have a greater impact in innovation, especially in products where the aesthetic dimension is important.
Trademarks	A word, phrase, symbol, and/or design that identifies and distinguishes the source of the goods of one party from those of others.	Low
Geographical indication	Name or sign associated to specific origin (town, region or country)	Very low

Source: Authors' elaboration.

The relevance of IPRs for science, technology and innovation is also highly different. Patents are directly associated to invention and innovation since they are aimed to protect ideas that, by requirement, should be both original and useful. A wealth of empirical literature has investigated the similarities and differences between scientific academic literature and patents, showing that the two are increasingly interconnected (Mayer, 2000). Copyright was connected with the arts and less directly associated to the generation of new knowledge but it has become crucial for a leading knowledge-intensive industry of our age, namely software. Utility models are similar to patents, but are generally intended to protect inventions and innovations that have lower knowledge intensity, and where the design component is relevant. Trade-marks and geographic indications are less directly associated to knowledge developments. This chapter will deal with IPRs that are relevant for innovation and scientific and technological knowledge, i.e. principally patents and copyright.

The rules of the system co-evolved differently in each country. As shown by the country case studies reported in Odagiri et al. (2011), national institutions have evolved differently, and often they have tried to protect national industries through a variety of legal, institutional and customary

devices. Through complicated and long diplomatic negotiations – including the diffusion of experiences and attempts of companies and other economic agents to reach similar standards across countries - IPRs national legislation and practices have converged (for an analysis of the patent offices in the new global context, see Drahos, 2010). The number of countries that joined the international conventions on IPRs has steadily increased and the legal norms are certainly less different across countries than they were 100, 50 or even 25 years ago. If we look at the expansion of the IPR system, it is clear that in the beginning it involved countries at a comparable level of economic development. Progressively, the IPR regime has incorporated countries at the periphery and, consequently, the members of the world IPRs system have become more heterogeneous.

One of the core principles of existing international conventions is to guarantee that public institutions in each country do not discriminate against foreigners. For many years, it has been acceptable that some countries had longer or shorter validity for patents or copyright, stronger or weaker protection, but the various conventions tried to establish the principle that home and foreign inventors, authors and companies should be treated equally. The formal principle, however, is not easily enforced in practice. It is up to the police to identify if counterfeited CDs and DVDs are sold in an open market, it is a national patent examiner who should decide if the application for an invention is genuinely original, and it is the remit of national courts to settle business controversies. In spite of all the principles stated in the various conventions, treaties and national legislation related to non-discrimination, there have always been allegations that national institutions tend to favor national interests and that the police, patents and trademarks offices and courts are inherently biased. The fact that recently Apple took Samsung in a Californian court, while Samsung responded taking Apple in a Korean court seem to be consistent with this view (Filippetti, 2012).

As can be expected, countries that had more inventions and products to protect were keen to push the international system towards stronger protection. These countries saw IPRs as a method to increase their revenues and to strengthen the bargaining position of their national companies in host countries. Countries that relied more on knowledge and products generated elsewhere were keener to have a permissive IPR system. Catching up countries interpreted a rigid IPR system as a further burden on their economy and their development strategy.[4]

This has continuously put developing countries in front of a dilemma: in order to acquire and benefit from the knowledge generated elsewhere, is it better to introduce IPRs legislation and practice similar to the most developed economies or not? It can be questioned whether it is advantageous for developing and catching-up countries to implement the IPR system as designed by developed countries (see, for example, the analysis of Drahos, 2010). It has also been argued that weak economies have also bad negotiators or have underestimated the costs associated to IPRs agreements (May, 2002; Sell, 2003; Heller, 2008). Others, on the contrary, have argued that countries with Western-like IPR systems have facilitated industrial development (Branstetter et al., 2010), induced foreign investment by multinational corporations (Dinopoulos and Segerstrom, 2010) and induced technology transfers (Mansfield, 1994; 1995). In the next sections, we will discuss how the situation has changed over the last two decades and if such a change has obtained its desired outcome.

The Rise of a Global IPRs Regime

The Silent IPR Revolution in the United States

[4] The issue is certainly not new and it was already addressed by Edith Penrose (1950; 1973).

The United States has always been the country where violations of IPRs have been more vocally denounced. For the whole 20th century the most spectacular controversies about intellectual property have occurred in the American theatre and the 21st century looks largely the same. It is difficult to explain why the United States economy, society and legal system are so keen to consider somebody a villain when they use another's intellectual property without authorization. In Europe and Japan there are daily controversies on IPRs infringements, but intellectual property is not surrounded by the aura that it has in the United States. The unauthorized download of a song, the cracking of software, the replication of a patented product are much less disapproved in Europe than in the United States. Even more, in developing countries hackers and imitators are often admired as sorts of modern Robin Hoods that takes knowledge from those who have it providing those that do not have it (for a contemporary praise of the hacker, see Himanen, 2001).

The reason why intellectual property in the United States is much more appreciated than in other countries has both material and ideological foundations. The United States is the largest R&D spender and patent generator in the world, its companies have invested massively in trademarks and brands and it hosts the largest number of large multinationals with operations across the five continents. Old companies, such as General Motors, Disney and IBM, and new companies, such as Microsoft, Google and Amazon, have business lines heavily dependent on IP protection. Moreover, the United States government has also the economic, political and diplomatic muscle to protect the property rights of its companies both at home and abroad, instruments that are often lacking for other countries.

But there are perhaps also other cultural reasons that make the US society praise and reward individual creativity rather than the societal context in which knowledge is generated. The Anglo-American ideology strongly supports individual values and freedom even when they are at the expenses of the public interest. In continental Europe, on the contrary, the public interest generally prevails over individual rights. This US vision spans across a variety of property rights and it extends to *intellectual* property rights. European societies are generally keen to consider limits to property and to intellectual property especially. It is therefore understandable that obtaining strong protection of IPRs has been a lesser priority in Europe than in the United States. The Asian vision is even more likely to praise collective effort over individual enterprise. In most of the Asian countries, the introduction of IP legislation has been directed more by the need to please the United States and the other Western parties rather than by a genuine endogenous sentiment to reward individual creativity and company investment in immaterial goods.

It is true that Asian countries such as Japan and China have also been *catching up* countries, the former in the 1950s and 1960s and the second since the 1990s. As catching up countries, they had a clear interest to adopt technologies developer abroad and weak IPRs system could serve such a purpose. But it is also true that since the 1980s Japanese companies started to be major producers of innovation and yet they have still been reluctant to use IPRs as principal instrument to seize the return of their innovations.

The attempt to strengthen the IPRs regime and to obtain greater enforcement started in the United States more than thirty years ago. A "silent revolution" (Jaffe and Lerner, 2004) took place in the form of four interconnected changes. The first was the Bayh-Dole Act, which allowed Universities and other research centres to commercialize and profit from the innovations generated with public money - a legal transformation that has been later imitated by several OECD countries (Grimaldi et al., 2011). Second, the scope of the patent system has progressively grown, allowing patenting in new areas, such as software, which were previously covered by other forms of intellectual property or not covered at all. Third, the US Patent and Trademarks Office (USPTO) started to be funded through a fee charged on applicants rather than by the government. This apparently innocuous

change made the USPTO keen to grant patents to as many applications as possible, even when the novelty and utility is not self-evident and when the invention is in areas traditionally excluded from the range of patents. Fourth, the courts have become increasingly tougher with violators of IPRs (see also Coriat and Orsi, 2002).

The effects of the silent revolution in the United States are controversial and many critics argue that this has been harmful to the US economy since it has reduced the rate of innovation (Heller, 2008; Heller and Eisenberg, 1998; Jaffe and Lerner, 2004), it has generated excessive litigation and increased costs (Bessen and Meurer, 2008) and it has increased monopoly power (Boldrin and Levine, 2008). So, within the United States there have been many voices that have argued that the "silent revolution" has discouraged innovation and distorted resources from innovation to patent protection. On 4th July 2013, President Barack Obama himself expressed concern that there are too much patents in the USA that do not reflect genuine inventive activity, introducing appropriate legislation to reduce "frivolous litigations" (White House, 2013). But the hegemonic country moved in the opposite direction after having urged and pressed other countries to go in the opposite direction. The attempt to create a stronger regime of IPRs already obtained significant international impact.

From the Silent Revolution to the Vociferous Global Scene

We have described above the "silent revolution" that considerably increased the strength of IPRs within the United States, and has been able to better protect US companies within their own internal market against foreign competitors. However, in a globalizing economy, this was only part of what US corporations desired, because supposed and real IPRs infringements continued to occur outside the United States. The problem was that US companies had the possibility to use legal devices to block violations in their own country but had little possibility to retaliate when violations occurred elsewhere. The traditional legislation on intellectual property inaugurated in the 19th century required individual states to prevent discrimination and to protect foreign intellectual property rights through legislation and, above all, enforcement. As with many other international covenants, there was no guarantee that states actually introduced homogeneous legislation and, even when they did, national institutions were obliged to enforce it. Many governments had little interest to use their authority to protect the IPRs of foreign companies.

Since the end of the Second World War, the United States has been a generous supplier of knowledge, technology and technical assistance to its allies. But at the end of the 1970s, US corporations and their government started to take a different turn. The undisputed technological leadership of the US started to be eroded by its economic partners, productivity gaps narrowed and competing countries continuously improved their innovative potential (see Nelson and Wright, 1992; Pianta, 1988). Japan constantly increased its export share in high-technology products and Europe was progressively performing better. The US trade deficit was no longer associated to the import of raw materials and traditional products, but also to high technology products, and this was enough to shock a public which for most of the 20th century was proud of its leadership in science, technology and innovation. A growing concern emerged in the United States and the culprit was easy to be found: Japanese companies (and, to a lower extent, European companies) had better performance because they were exploiting commercially the knowledge generated in the United States, often infringing their IPRs. Less attention was devoted to look at how companies based in Japan, Germany, Switzerland, Sweden and other countries were investing massively in R&D and design, and even less to the fact that these companies generated an increasing number of inventions and innovations for which they claimed patent protection not only in their national patent offices, but also in the United States.

The stories heard in the 1980s soon re-emerged with reference to the Asian tigers. These countries followed patterns very similar to those of Japan. Comparable catching up processes have occurred for more than a decade in China, a country with a population size much higher than Japan and the other East Asian tigers. The widespread feeling in the United States continued and still continues to be that the national investment in knowledge and in other intangible assets is not adequately rewarded and that its competitors in the international market also make unauthorised use of technologies, design and other intangible assets generated by US corporations. This position holds that, as long as the international market would not provide adequate remuneration for its innovations and intangibles, and institutions do not punish infringements, the United States would continue to be penalized.

It took a while for the US corporations to find a method that was able to better guarantee their IP outside the United States. The retaliations available ranged from diplomatic reproach to sanctions; none of them was particularly effective to protect companies' economic interests. As is well documented by Susan Sells (2003) and Michael Ryan (1998), a group of Chief Executive Officers of leading corporations joined forces through the creation of the Intellectual Property Committee (IPC) and the International Intellectual Property Alliance (IIPA). The IPC explored the available opportunities and eventually agreed that the most effective and perhaps sole way to penalize countries not adequately protecting IPRs was retaliating on trade. Since negotiations to reduce trade barriers were already on the agenda, the United States government effectively pushed with all its political, diplomatic and economic muscle to make IPRs a crucial pillar of the GATTs replacement - the new World Trade Organization (WTO) – which is where the Trade Related Aspects of Intellectual Property Rights (TRIPS) were born.

Some commentators were surprised that so many countries signed TRIPS: after all, if these countries were using knowledge and intangibles without paying a proper remuneration they should not have an interest to sign an agreement that implied greater transfer of resources from the imitators to the innovators (Wade, 2003). Developing countries had an interest to liberalize the international trade in textile apparel – the Multifiber Agenda - and agricultural products. And the US market, along with the European market, was the most attractive for them. If the price to be paid to access the American and European markets was to promise to introduce a tougher IPRs legislation, it seemed that this was an acceptable deal. TRIPS was born as a bargain: developing countries accepted the risk of retaliation if they were not able to introduce adequate legislation for IPRs in their own country in exchange for the opportunity to enter into the American and European markets. The powerless conventions of the 20th century were therefore integrated with a potentially vigorous tool: trade retaliations.

Two Models on IPRs

Since the beginning, IP had enthusiastic supporters and fierce enemies (May and Sell, 2006, trace the genealogy of these arguments). Yet, much has changed in the generation, imitation and diffusion of invention and creativity over the last several centuries, but the arguments in favour and against IPs have somehow been repeated. It is possible to identify two opposite models in the contemporary debate, the first that recommend a strong regime of IPRs for economic development, and a second that argues that a weak regime or even the absence of IPRs is conducive to the diffusion of knowledge.

In praise of strong IPRs

The model that supports strong protection of IPRs at the national level argues that in the long-term IPRs will not only be beneficial for the producers of knowledge but also for users and therefore for society at large. This model applies the same logic at the international level, assuming that IPRs will benefit developing as much as developed countries. The pro-IPRs model stresses that incentives and rewards to inventive and innovative activity are crucial to generate further investment. It is not denied that *statically* the existence of IPRs may reduce the diffusion of innovations to those that cannot afford to pay its price, but *dynamically* this will be an incentive to invest more in the future. This is supported by four main arguments:

- Invention, innovation and more generally creativity area all costly activities, especially since they involve a great degree of uncertainty about the outcome. But the outcome of these activities, when valuable, can be imitated or replicated at substantially lower costs. The absence of protection discourages profit-seeking agents to invest in these activities.
- IPRs protection encourages full disclosure of inventions that eventually became part of the public domain. In absence of disclosure, knowledge may be kept secret and this reduces its dissemination.
- The revenues generated by inventions are one of the core resources to finance further projects. It is therefore relevant that the current inventive activities are able to generate profits to keep the system going.
- New entrants have to face the alternative of imitating existing devices or investing in generating fresh solutions and strong IPRs induces them to opt for the latter strategy that sparks inventiveness.

These reasons are used to justify IPRs within nations with the awareness that they provide advantages for individuals and companies that generate knowledge and disadvantages for consumers or supplier-dominated companies. But it is assumed that the advantages for the economic system are greater than the disadvantages and well-tuned legislation could balance the interests of both producers and users of knowledge (for example by regulating the length and scope of IPRs and even by using compulsory licensing in cases of palpable public interest).

The pro-IPRs model advances additional reasons to suggest that developing countries also benefit from a global IRPs regime. It is a fact that the distribution of scientific and technological capabilities is extremely polarized across the globe (see Castellacci and Natera, 2015). This means that the net recipients of IPRs royalties and fees are based in the North and the net payers are based in the South. The advocates of IPRs argue that Southern countries with a strong regime of IPRs benefit from greater inflows of technology transfer. Companies in the North may be reluctant to establish production facilities, to build R&D labs, to licence knowhow and to engage in strategic technology agreements in countries that do not properly guarantee IPRs. On the contrary, if IPRs are secure, companies may be willing not only to licence the knowledge generated in their home country, but they may also decentralize in emerging and developing countries by moving some of their R&D and innovative facilities and to collaborate with local companies on common projects. In a world where developing and emerging countries still need to acquire the knowledge generated in the North, a well functioning IPR system is the best guarantee that Southern companies would not be excluded.

This view has particularly emphasized the role of multinational firms and foreign direct investment. For instance, Dinopoulos and Segerstrom (2010) developed a model of North-South trade and find that stronger IPR protection in the South leads to: i) a permanent increase in the rate of technology transfer to the South within multinational firms and ii) a permanent increase in R&D employment by Southern affiliates of Northern multinationals. Along similar lines it has been shown that

improvements in IPR protection has led US based multinational firms to increase technology transfer to their affiliates and to shift toward more technologically based products abroad (Branstetter *et al.*, 2004 and 2010). Other scholars point to the indirect benefits for the countries hosting multinational firms, in terms of growth of local suppliers (Javorcik, 2004a), and transfer of advanced knowledge and skills to the local workforce (Görg and Strobl, 2005; Poole, 2013). Also, the establishment of reliable and harmonized IPRs systems lead to the creation of "markets for technology" that facilitate and encourage knowledge diffusion trough formal transactions of technology (Arora *et al.*, 2001; Athreye and Cantwell, 2007).

Against IRPs

The pro-IPR model has been contrasted with fierce arguments. The first argument against IPRs is that they are harmful because, by creating a legal monopoly, they obstruct and reduce the diffusion of knowledge (Andersen, 2006; Boldrin and Levine, 2008). Since knowledge drives the generation of further knowledge, IPRs may create a vicious circle that stops inventive activity. This is particularly true within industries in which innovation activity is based on sequential inventions and complementary technologies. In these cases, imitation may promote further innovations, while strong patents might actually inhibit it (Bessen and Maskin, 2009; Merges and Nelson, 1990). By becoming tighter, IPRs increase legal costs more than investment in innovation, leading to a scientific and technological system based on litigation rather than on research (Bessen and Meurer, 2008). Eventually, lawyers are the main beneficiaries of a strong system of IPRs. Second, IPRs may also distort the investment for knowledge since this is likely to be directed towards the areas that promise greater profits or that can be better protected rather than towards those that are more likely to generate socially useful results or where there are more technological opportunities. For instance it has been shown that the type and strength of the patent regime influences not only the rate of innovation activity but also the direction of technical change (Moser, 2005). It is therefore not in the public interest to get a strong IPRs system (Macmillan, 2006). Thirdly, it has been argued that too much patenting in some industries are hampering innovation rather than encouraging it (Heller, 2008).

These beliefs are reinforced when the needs of developing countries are taken into account. In these nations, knowledge generating institutions are still in their infancy and they are the most affected by a strong international regime where there is a price to be paid for any technology transfer. In a North-South perspective, the IPR regime may hamper or impede catching up (Chang, 2002). It has been claimed that transferring the IPR practices of the developed world to developing countries leads to reduced knowledge flows, lower imitation and increased prices (Helpman, 1993; Lai, 1998; Parello, 2008). Thus, a system prior to TRIPS, with a strong IPR regime in developed countries and a weaker one in developing countries, is more congenial so as to allow the lower to middle income countries to catch up by benefitting from the knowledge developed elsewhere. The consequence of TRIPS is therefore damaging development and it will make it more difficult to allow emerging and developing countries to build solid innovation systems. Moreover, it will extract resources from developing to developed economies and this will delay further catching up.

From a historical perspective, it is often pointed out that most countries managed to catch up through copying and imitating from more developed countries (Boldrin and Levine, 2008). Only at a later stage IPRs regimes were established *as an effect* of the development of the country (Lerner, 2002; Mokyr, 2002. For a detailed list of national case studies, see Odagiri et al., 2011). By making international technology transfers more onerous through a strong regime of IPRs, developed countries "kick the ladder away" and make it more difficult for laggard countries to catch up (Chang, 2002).

Some critics of IPRs also focus on selected key products protected by IPRs (see, for example, Correa, 2000; Shiva, 2001). A paradigmatic case is the anti-retroviral drugs patented by leading US and European pharmaceutical corporations (the so-called 'Big Pharma'), but marketed in South Africa through locally owned generic and un-authorized manufacturers. This led to a legal battle between Big Pharma and the South African government. The government argued that the vast majority of South Africans affected by HIV could not afford to pay the price charged by Big Pharma (Fisher and Rigamonti, 2005). The campaign was sufficiently powerful to induce Big Pharma to withdraw from the case. In this domain, intellectual criticism overlaps with social and political activism. Due to the public good related to certain products, new social movements have started to contest the pro-IPR policies carried out by multinational corporations, national governments and the World Trade Organization. Big Pharma, Microsoft and other companies have become the frequent targets of many campaigns against intellectual monopoly.

A Different View: How Powerful IPRs Are?

The arguments of those who are for and against IPR describe real aspects of the generation, transmission and diffusion of innovation. But, surprisingly, both models are based on a common textbook assumption: *they assume that the legal system of IPRs is much more powerful than it actually is*. Both of them take for granted that strong IPRs can guarantee the protection of invention, innovation and intangibles and that weak IPR, on the contrary, allow imitators to acquire the related knowledge. This is not the case and there is old and new empirical evidence that illustrates that IPRs are much less effective than generally assumed by both models.

From the perspective of the producer of invention, innovation and intangibles, it should be clarified that its main economic interest is not to secure IP per se but rather to profit from it. In order to appropriate the returns from their inventions, innovations and intangibles, companies have to develop complex strategies that include R&D, design, lead-time, ability to deliver products to market, and to combine effectively industrial secrecy with IPRs. IPRs are just one element in this strategy and certainly not the most important one. Surveys carried out for US and European manufacturing companies have consistently indicated that patents and other legal methods are, in fact, the two least important appropriability factors, while companies have ranked as more important lead time, industrial secrecy, complementary manufacturing and complementarily sales and services (Cohen et al., 2000; Arundel, 2001).

From the perspective of potential users, would-be imitators cannot manage to acquire knowledge for production facilities just by getting knowledge unprotected by IPRs. The use of knowledge for production is associated with a much larger variety of factors. IPRs may, at most, report and protect some codified knowledge, but there is an equally important component represented by tacit knowledge that is not, nor can be, reported in patents, handbooks, software, blueprints, and other codes (Pavitt, 1987; Nelson, 1992).[5] Imitators will need to acquire this knowledge to properly use it. A musical score and a violin are not sufficient to play Beethoven's violin concert, likewise the free use of relevant patents does not immediately result in a company manufacturing a good car. Patent rights last for not more than 20 years: after this period, the knowledge protected by patents is publicly available. It is, however, difficult to imagine that, if the protection accorded by patents will be immediately abolished worldwide, developing countries will be able to assimilate and put into practice the knowledge of the most developed countries. And the reason is very simple: the acquisition of knowledge is not mainly blocked by legal devices but rather by the lack of

[5] The distinction between codified and tacit knowledge is, of course, due to Michael Polanyi (1967).

competences of prospective imitators and complementary assets. In a nutshell, IPRs are less important than assumed for both generators and users of knowledge.

Of course, it is difficult to make generalizations regarding a complex economy where there are many products and industries with radically different characteristics. In fact, the available empirical research has shown that industries and products are affected differently by IPRs. Within the manufacturing industry, pharmaceuticals and, to a much smaller degree, chemicals are heavily dependent on patents. According to companies' respondents, as many as two thirds of innovation in pharmaceuticals, and one third in chemicals, would not have been introduced in the absence of patent protection (Mansfield, 1986). Likewise, copyright is a crucial factor for the audiovisual and software industries where the final consumers have the possibility to copy the products directly.[6] In most other high-tech industries, including computers, electronics, aerospace, automobiles, mechanical engineering, IPRs are overwhelmed and/or complemented by other methods of appropriation of innovation.

The fact that IPRs are effective only in a few industries is reflected in the composition of foreign direct investment. It has been shown that the importance of IPR protection varies between industries (Mansfield, 1994, 1995) and that weak IPR discourages investors only in sensitive sectors (Javorcik, 2004b). In a study examining the drivers of the surge of patents in China, it is shown that foreign direct investment is mostly limited to electric machinery, transportation equipment, and chemical industries (Hu and Jefferson, 2009). Also, it has been argued that far from being automatic, adoption of foreign technologies from developing countries is contingent on the development of an adequate level of skills and technological capabilities (Benhabib and Spiegel, 2005; Parello, 2008). Other research that has tried to explain how Western companies have increased their patent applications in countries with weak appropriability regimes, have found that preventing imitation or securing royalties are partial reasons (Keupp et al. 2012).

Innovating companies know well that in developing countries they cannot sell their products for the same price as they sell it for in developed countries. Many products have a substantial difference between the average and the marginal cost, and in products such as drugs, software and audiovisuals the difference is enormous. Companies apply price discrimination in order to maximise the revenues from the same product innovation across different markets. What these companies are most worried about is the possibility that the same products are re-imported in the Western markets. For example, one main concern of the Big Pharma when they sued the South African government for its unwillingness to stop the diffusion of generic versions of the retro-viral drugs against HIV/AIDs was the concern that the generic version could also reach the much more lucrative Western markets (Muzaka, 2011).

Most of the ancient and contemporary debate has focussed on the pharmaceutical industry (see Scherer, 2015). This confirms the importance of IPRs, and patents especially, to the pharmaceutical industry. Media, social movements and public officers have also been keen to take position when crucial drugs are fenced by IPRs given their substantial and often immediate impact in health. On a moral level, there have been convincing claims that every citizen should have a right to medications she needs regardless her income and in order to live a minimally decent life (Brown and Paremoer, 2014). However, it is difficult to believe that, should TRIPS be abolished tomorrow, the pharmaceutical industry would suddenly become the engine of technological advances and growth in developing countries. Thus one has to make a distinction between the two problems related to IPRs in the pharmaceutical sector. The first concerns the right of access to drugs, while the second regards the capacity of economic and technological development in low and middle income

[6] If products such as CDs, DVDs and software could not be technically copied, they would not even need to rely on *intellectual* property rights since the standard property rights will be more than sufficient to protect the producer.

countries. Our conviction is that TRIPS is affecting the delivery of drugs in low income countries, but it is not impeding their economic and technological development.

To sum up, IPRs on their own cannot guarantee or reduce returns to invention, innovation and intangibles. Profits for innovations are obtained through a variety of channels and, if companies are asked, most of them rank patents to prevent imitators and patents to secure royalties as subordinate methods to appropriate returns from innovation. This leads to a logical question: *if IPRs have so little relevance, how come companies, governments, lobbies and social movements are so concerned about them?* A first tentative answer is to suggest that IPRs are somehow readily visible and can be more easily modified by institutions. But what they represent – the system of incentives to generate, transmit and diffuse knowledge and creativity – are much more complex and often less visible. As a result the debate is seemingly concentrating on the finger rather than on the moon it is pointing to. A second tentative answer is the current situation in patenting is the (inefficient) result of a game in which for each actor the optimal strategy is that of patenting as much as possible in order to prevent being treated by competitors. In this context, companies are encouraged to build a large patent portfolio, regardless the value they attribute to patents, not to protect themselves from potential imitators, but from real competitors.

Is a global IPRs regime possible?

In a planet of independent and interconnected states, it is not an easy task to build a global regime of IPRs. We can outline four different stages for its construction:

- *Harmonization*. Countries agree to have comparable, if not identical, legislation guaranteeing that there is no discrimination against foreigners. Harmonization allows differences in the regime of each country, but within each national system domestic and foreign citizens and companies should be on par.
- *Standardization*. When harmonization evolves into standardization, individual countries are not any longer autonomous to decide which rules they can apply domestically. Through appropriate discussions, agreements and treaties, rules and standards are collectively established. For example, treaties may require to members to introduce legislation protecting IPRs, that patents should be of a certain length, and that the legal system should contemplate penalties for infringements.
- *Control and dispute settlement*. The standards in vigour in each country are not exclusively under national sovereignty, but they are also assessed by multilateral institutions. This assessment should guarantee standardization. It also contemplates that countries that do not comply are requested to remedy or are exposed to sanctions.
- *Implementation with enforcement.* Procedures applied within countries are not left to national authorities only, but are submitted for evaluation to global institutions that have the mandate and the authority to assess them. Enforcement is not left to national authorities only, but is also provided by international authorities.

The existence of all the four stages distinguishes a strong global regime. Where are we in the case of IPRs? Table 2 reports the paradigmatic sources for each of these four stages.

Table 2 – The three stages of a global IPRs regime

Harmonization	• Paris Convention for the Protection of Industrial Property (1883) • Berne Convention for the Protection of Literary and Artistic Works (1886) • Institution of the World Intellectual Property Organization (1967)
Standardization	• World Trade Organization through TRIPS Agreement (1994)
Control and dispute settlement	• TRIPS Agreement (1994). Coercion works through the WTO Dispute Settlement Process
Implementation and enforcement	• National legislative institutions to implement remedies requested by WTO Dispute Settlement Body • National police enforcement • National courts in adjudicating IPRs controversies

Source: Authors' elaboration.

The *harmonization* process started more than one century ago, with the Paris Convention for the Protection of Industrial Property, signed in 1883 and the Berne Convention for the Protection of Literary and Artistic Works, signed in 1886. The Conventions established the non-discrimination principle as it stated that the application for a patent, trademark or copyright of a foreigner citizen should receive the same treatment of a national citizen. These were important attempts to reach a uniform legislation, although they co-existed with the desire of each nation to get the IPR system congenial to its own economic and social advantage (Odagiri et al., 2011, shows how this has worked in practice in several countries). If we read the evolution of IPRs in each country, we can appreciate that the process of harmonization has not prevented governments to shape the system according to national economic and social needs. Some industries, and specifically drugs, have been excluded from patent protection, the life-span of patents has sometimes been reduced, and transition periods have been granted to facilitate the introduction of new rules. In spite of countries patterns and strategies, national IPRs regimes have strongly converged towards similar models over more than a century. Today, IPRs system speaks comparable language across the largest number of countries.

When, with the institution of the World Trade Organization, IPRs started to be one of the fundamental pillars of the organization through TRIPS, a very important change has been introduced (Drahos, 2010). In order to be part of the WTO, and to benefit from the advantages of free trade, countries were requested to have not only a IPRs system, but also to conform it to specific standards already operating in Western countries. As said above, the deal offered by developed to developing countries was clear: we open up our markets to your merchandise, but you should guarantee our IPs in your countries. TRIPS moved an important step from harmonization to standardization.

But this was not the only change introduced by TRIPS. Perhaps more importantly, for the first time it introduced a form of multilateral control and dispute settlement previously absent. Control was, in the intention of the TRIPS architects, meant to be particularly effective because trade retaliations against those governments who did not comply with the Agreement were a credible treat. Arguably, this is one of the main reasons why the global regime of IPRs has been brought into the WTO instead into the World Intellectual Property Organization (WIPO). The newly instituted Dispute Settlement Body was precisely designed as a procedure for trade quarrels and enlarging it to IP quarrels was a major step towards the generation of a genuine global IPRs regime. The institution of WTO worked at the same time for standardization (as a pre-condition to WTO membership) and control and dispute settlement (through the Dispute Settlement Mechanism - DSM). The fourth stage, namely implementation and enforcement, is totally left in the hands of national authorities. And it could have difficult to be otherwise: there are no cases of international organizations that manage to override governments in policing and judicial power.

More than 15 years have passed since TRIPS has been introduced. It is perhaps possible to make an assessment of its role. The WTO, through TRIPS, has been rather successful in achieving standardisation and now all WTO member countries have IP legislation in line with Western tradition. But if we look at the effectiveness of the Dispute Settlement Body (DSB) there are few reasons to assume that control and dispute settlement has been effective. In practice, the disputes brought at the WTO concerning IPRs are not many. From 1995 to 2011, the WTO Dispute Settlement Process (DSP) machinery has been activated 29 times for IRPs related issues (Lee, 2010-2011). In 17 of these cases the United States is the complainant country, i.e. the economic dominant country. But only 7 of these complaints are directed toward developing countries, while 10 are directed towards other OECD countries. Of course, this does not imply that the most serious infringements of IP occur in the OECD area, but rather that real and perceivable economic damages largely occur in OECD countries. The US government, the most active in using the WTO machinery, did not bother to use the DSP when the markets in which violations take place are not particularly attractive. Moreover, the DSP has some clear limitations:

i) The DSP can be activated against unfair legislation but much less against the lack of effective enforcement of IPRs, which continues to be the prerogative of national governments. So far, the stage "Implementation and enforcement" continues to be firmly in the hands of national authorities.
ii) The DSP process is lengthy (it takes up to three years) and the remedies that a country agrees to implement may take up to a couple of years. In areas of rapid technological change, a DSP decision may be taken when it is no longer relevant.
iii) The DSB may require individual countries to put into practice "remedies" and to change legislation, but cannot dictate the specific aspects of them. Often losing countries do introduce changes, but not necessarily to the extent that the winning party is satisfied.
iv) The parties to the WTO and its DSP are states and not companies. Governments often act to pursue the interests of the companies based in their own country, and governments are often solicited by the companies themselves. But when dealing with multinational corporations, the national interests are more difficult to assess and governmental take-up will be weighed alongside other strategic interests.
v) Trade retaliations have so far seldom been authorized.

The achievement of a global IPRs regime is not limited to legislation only. It should also be based on implementation and enforcement. When the globalization of IPRs is discussed, it is crucial to keep in mind that the fourth stage is not under the control of an international organization, since we are dealing with legal and policing practices that are predominantly national in scope. While the legislation on IPRs can be made accountable to the WTO through the DSB, national enforcement is under the exclusive responsibility of national authorities. National police can be tougher or softer against violators and national courts take the final decision in controversies, often with different rulings according to the country where they are based and of the nationality of the companies they are assessing. It is therefore not surprising that at least with reference to patents it is not visible a clear trend towards stronger protection in developing countries (Allred and Park, 2007; Park, 2008).

There is huge anecdotal evidence that in most emerging and developing countries, intellectual property is far from being strongly persecuted and enforced by national authorities. The reasons can be different. In some occasions, it could be the results of a specific political orientation of governments that are trying to favour domestic rather than foreign companies. The governments could allow a weak IPRs enforcement even when there is more rigid legislation in place. On other occasions, it could be simply a matter of a lack of resources and institutions. An effective enforcement of intellectual property, in fact, requires a considerable amount of resources, including

policing and courts availability. Despite the large adoption of the TRIPS, IPRs enforcement in several countries is currently occurring more on the paper than in the reality.

In sum, there is not yet a global regime of IPRs in practise. This is something well-known to practitioners who reported to us that it is basically worthless to suit Chinese companies for patent infringement in China, simply because it would be a waste of time and money. The main reason why currently a global IPRs regime is not viable is because of the four stages necessary to make it work, the last one is still under the control of national governments and institutions, and often they have either a strong incentive in maintaining a weak IPRs system, or a lack of resources to make it stronger. While states might retaliate against each other at the WTO, there is neither a global police nor a global court that can enforce the implementation of the TRIPS provisions within each State. It is certainly telling that Apple and Samsung, two companies that with their smart phone war has inflamed the IPRs debate, have eventually agreed to give up legal cases against each other outside the USA (Jin and Levine, 2014). The unpredictability of rulings and soaring legal costs have perhaps convinced these corporations that it is better investing in R&D than in attorneys.

What is the Future of IPRs in a Global Economy?

There has been a consistent attempt to create a stronger global IPRs regime led by US top corporations. TRIPS has been the main outcome of this attempt. This has generated heated debates in academia and outside it. Supporters of IPRs have argued that without them there is the risk that companies and other private investors will not find sufficient incentives to invest in R&D and innovation. Critics of IPRs, on the contrary, have argued that making IPRs stronger will make for developing countries more onerous and more difficult their catching up.

Both these views, in spite of the very opposite policy conclusions that reach, share a similar view, namely that IPRs can really make a difference in the economy and in the society. We have, on the contrary, argued that IPRs *per se* do not change significantly the process of technology transfer and acquisition. The transfer of knowledge is hampered by other things and, in particular, by the absorptive capacity of recipient subjects. In the absence of investment in R&D, education, and infrastructures, developing countries are unlikely to benefit from the knowledge developed elsewhere. IPRs, either strong or weak, would be basically irrelevant.

In a changing economic environment, economic players are also able to adjust their behaviour according to the price they have to pay for innovations. If the costs to acquire innovations and knowledge intensive products rise, new players are ready to take it as an opportunity to enter into profitable markets. Strong IPRs enforcement may induce their holders to raise prices rather than to upgrade products: when software started to be policed more seriously, many companies were forced to get rid of cracked programmes and this was certainly beneficial for Microsoft and other software producing companies. But when prices started to rise, consumers searched for other viable alternatives. This led to an unexpected diffusion of open source software and alternative operating systems such as Linux. In turn, this reduced the sales of copyrighted programs. When the United States complained against the illegal distribution of Hollywood films in India and obtained greater protection, this provided an impetus to scale-up new Bollywood productions, an industry that is now a potential treat to Hollywood itself not only in India, but in many other markets (Sunder, 2011). Companies are often aware that the best way to profit from their inventions and innovations is to leave IPRs relatively flexible since this helps the diffusion of their products. This was the policy carried out by Microsoft in the 1980s.

It is often argued that Western countries should make a net profit from stronger IPRs. But, again, this conclusion is not substantiated by evidence. Or, more precisely, greater profits for the IPRs-holding companies are not necessarily a gain for the home-country of the very same companies. As already indicated by the Lieberman Report (Lieberman, 2004), the main aim of multinational corporations in obtaining a stronger global IPRs regime was to off-shore production facilities and knowledge-intensive jobs in countries with lower wages. This can hardly be called an advantage for the United States and other advanced economies. In fact, it opens up questions about whether the US government has actually pursued the interests of its citizens or whether it pursued the interests of MNCs in pushing a harmonized global IPRs regime.

Finally, we have argued that we are far from having an effective global IPRs regime. While Western countries have – through their power in international organizations – successfully managed to reach an unprecedented level of harmonization of intellectual property rules, states still exert a great deal of control on the implementation and enforcement of TRIPS provisions within their borders. We have also shown that the Dispute Settlement Process has some clear limitations and has been used in a rather limited way. A strong global IPRs regime does not exist and it does not seem that it will be available in the short run.

Should the IPRs regime be fixed? The economic practice is very different from what is often suggested as the institutional ideal. So far, even the advocates of TRIPS recognize that the agreement did not have much impact, either positive or negative, on the least developed countries (Hold and Mercurio, 2012). There are clearly contesting forces at work, with net knowledge producers trying to appropriate the returns of their investments. But neither strong nor weak IPRs can guarantee technology transfer. What is needed for a successful strategy of technology transfer and innovation-based growth is an overall strategy of developing countries to assimilate, apply, transform and improve the knowledge generated elsewhere. IPRs may block imitators in some specific areas, or they can make it more onerous, but in general IPRs cannot impede the use of knowledge to those that have the competences to use it. Once again, we are in the classical situation in which the main policy implication is “if it ain’t broke, don’t fix it” (Winter, 1989).

References

Andersen, Birgitte, ed. 2006. *Intellectual Property Rights. Innovation, Governance and the Institutional Environment.* Cheltenham: Edward Elgar.

Archibugi, Daniele and Andrea Filippetti. 2010. "The Globalization of Intellectual Property Rights. Four Learned Lessons and Four Thesis."' *Journal of Global Policy*, 1: 137-49.

Archibugi, Daniele and Simona Iammarino. 2002. "The Globalization of Technological Innovation. Definition and Evidence." *Review of International Political Economy,* 9: 98-122.

Archibugi, Daniele and Carlo Pietrobelli. 2003. "The Globalisation of Technology and Its Implications for Developing Countries. Windows of Opportunity or Further Burden?" *Technological Forecasting and Social Change,* 70: 861-84.

Arora, Ashish, Andrea Fosfuri and Alfonso Gambardella. 2001. *Markets for Technology. The Economics of Innovation and Corporate Strategy.* Cambridge, MA: The MIT Press.

Arundel, Anthony. 2001. "The Relative Effectiveness of Patents and Secrecy for Appropriation." *Research Policy*, 30: 611-624.

Athreye, Suma and John Cantwell. 2007. "Creating Competition? Globalisation and The Emergence of New Technology Producers." *Research Policy*, 36: 209-26.

Benhabib, Jess and Mark Spiegel. 2005. "Human Capital and Technology Diffusion." In *Handbook of Economic Growth*, edited by Philippe Aghion, and Steven N. Durlauf. 935-966. Amsterdam: North-Holland.

Bessen, James, and Eric Maskin. 2009. "Sequential Innovation, Patents, and Imitation." *The RAND Journal of Economics*, 40: 611-35. DOI: 10.1111/j.1756-2171.2009.00081.x

Bessen, James, and Michael J. Meurer. 2008. *Patent Failure. How Judges, Bureaucrats, and Lawyers Put Innovators at Risk.* Princeton: Princeton University Press.

Blind, Knut, Jakob Edler, Rainer Frietsch, and Ulrich Schmoch. 2006. "Motives to Patent. Empirical Evidence from Germany." *Research Policy*, 35: 655-72. DOI: 10.1016/j.respol.2006.03.002

Boldrin, Michele, and David K. Levine. 2008. *Against Intellectual Monopoly*. Cambridge: Cambridge University Press.

Branstetter, Lee, Ray Fisman, R., Fritz C. Foley, and Karmal Saggi. 2010. "Does Intellectual Property Rights Reform spur Industrial Development?" *Journal of International Economics*, 83: 27-36.

Branstetter, Lee, Ray Fishman, and Fritz C. Foley. 2004. "Do Stronger Intellectual Property Rights Increase International Technology Transfer? Empirical Evidence from U.S. Firm-Level Panel Data." *Quarterly Journal of Economics*, 121: 321-49.

Brent B. Allred and Walter G. Park. 2007. "Patent Rights and Innovative Activity. Evidence from National and Firm-level Data." *Journal of International Business Studies*, 38: 878–900. DOI:10.1057/palgrave.jibs.8400306

Brown, Garrett W. and Lauren Paremoer. 2014. "Global Justice and The Right to Health." In *Global Health Policy*, edited by Garrett W. Brown, Gavin Yamey and Sarah Wamala. Oxford: Wily-Blackwell.

Cantwell, John and Simona Iammarino. 2003. *Multinational Enterprises and European Regional Systems of Innovation.* London: Routledge.

Castellacci, Fulvio and José M. Natera. 2015. "The Global Distribution of Technology and Innovation." In *Global Science, Technology and Innovation*, edited by Daniele Archibugi and Andrea Filippetti. Oxford: Wily-Blackwell.

Chang, Ha-Joon. 2002. *Kicking Away the Ladder. How the Economic and Intellectual Histories of Capitalism Have Been Re-Written to Justify Neo-Liberal Capitalism*. London: Anthem Press.

Cohen, Wesley M., Richard R. Nelson, and John P. Walsh. 2000. *Protecting their Intellectual Assets. Appropriability Conditions and Why US Manufacturing Firms Patent (or not)*. Boston: *NBER Working Paper 7552.*

Coriat, Benjamin, and Fabienne Orsi. 2002. "Establishing a New Intellectual Property Rights Regime in the United States. Origins, Content and Problems." *Research Policy,* 31: 1491–1507. DOI: 10.1016/S0048-7333(02)00078-1.

Correa, Carlos. M. (2000), *Intellectual Property Rights, the WTO and Developing Countries. The TRIPS Agreement and Policy Options*, London: Zed Books.

Dinopoulos, Elias and Segerstrom, Paul. (2010) 'Intellectual property rights, multinational firms and economic growth', *Journal of Development Economics*, 92: 13-27.

Drahos, Peter. 2010. *The Global Governance of Knowledge. Patent Offices and their Clients.* Cambridge: Cambridge University Press.

Drahos, Peter and Ruth Mayne. 2002. *Global Intellectual Property Rights. Knowledge, Access and Development*, New York: Palgrave Macmillan.

Farah, Paolo. 2015. "Intangible Cultural Rights and Information Society: At the Crossroads of IPRs and Innovation. " In *Global Science, Technology and Innovation*, edited by Daniele Archibugi and Andrea Filippetti. Oxford: Wily-Blackwell.

Filippetti, Andrea. 2012. 'Apple vs. Samsung. Something Doesn't Quite Fit!', *Open Democracy, 18 September 2012*, http://www.opendemocracy.net/openeconomy/andrea-filippetti/apple-vs-samsung-something-doesn%E2%80%99t-quite-fit

Filippetti, Andrea and Antonio Peyrache. 2011. "The Patterns of Technological Capabilities of Countries. A Dual Approach Using Composite Indicator and Data Envelopment Analysis." *World Development*, 39: 1108–1121.

Fisher, William W., and Cyrill P. Rigamonti. 2005. *The South Africa AIDS Controversy. A Case Study in Patent Law and Policy*. Cambridge, MA: Harvard Law School The Law and Business of Patents [available at: http://cyber.law.harvard.edu/people/tfisher/South%20Africa.pdf].

Görg, Holger and Eric Strobl. 2005. "Spillovers from Foreign Firms through Worker Mobility. An Empirical Investigation." *Scandinavian Journal of Economics*, 107: 693-709.

Grimaldi, Rosa, Martin Kenneyb, Donald S. Siegeld, and Mike Wright. 2011. "30 Years After Bayh–Dole. Reassessing Academic Entrepreneurship." *Research Policy*, 40: 1045–1057. DOI: 10.1016/j.respol.2011.04.005.

Graham, Stuart, and Saurabh Vishnubhakat. 2013. "Of Smart Phone Wars and Software Patents." *Journal of Economic Perspectives*, 27: 67–86. DOI: 10.1257/jep.27.1.67.

Heller, Michael M. 2008. *The Gridlock Economy. How Too Much Ownership Wreck Markets, Stops Innovation, and Costs Live.*, New York: Basic Books.

Heller, Michael A. and Eisenberg, Rebecca S. (1998) 'Can Patents Deter Innovation? The Anticommons in Biomedical Research', *Science*, 280: 698-701.

Helpman, Elhanan. 1993. "Innovation, Imitation, and Intellectual Property Rights." *Econometrica*, 61: 1247-80.

Henry, Claude. and Joseph Stiglitz. 2010. "Intellectual Property, Dissemination of Innovation and Sustainable Development." *Journal of Global Policy*, DOI:1:237-51.10.1111/j.1758-5899.2010.00048.x

Himanen, Pekka. 2001. *The Hacker Ethic and the Spirit of the Information Age*. New York: Random House.

Hold, Arno and Bryan C. Mercurio. 2012. *Transitioning to Intellectual Property. How Can the WTO Integrate Least-Developed Countries into TRIPS?*, NCCR Working Paper 2012/37, at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2169352

Hu, Albert G. and Gary H. Jefferson. 2009. "A Great Wall of Patents. What is behind China's Recent Patent Explosion?"' *Journal of Development Economics*, 90:57–68. DOI: 10.1016/j.jdeveco.2008.11.004

Jaffe, Adam B., and Josh Lerner. 2004. *Innovation and Its Discontents. How our Broken Patent System Is Endangering Innovation and Progress, and What To Do About It.* Princeton: Princeton University Press.

Javorcik, Beata S. 2004a. "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages." *The American Economic Review*, 94: 605-27.

Javorcik, Beata S. 2004b. "The Composition of Foreign Direct Investment and Protection of Intellectual Property Rights. Evidence from Transition Economies." *European Economic Review*, 48: 39-62.

Jin, Hyunjoo, and Dan Levine. 2014. “Samsung Electronics, Apple Call end to Patents War Outside U.S.” *Reuters*, Accessed Wed Aug 6, http://uk.reuters.com/article/2014/08/06/us-samsung-elec-apple-idUKKBN0G605920140806

Keupp, Marcus M., Sascha Friesike, Maximilian von Zedtwitz. 2012). “How do foreign firms patent in emerging economies with weak appropriability regimes? Archetypes and motives.” *Research Policy*, 41: 1422-1439. DOI: 10.1016/j.respol.2012.03.019.

Lai, Edwin. 1998. “International Property Right Protection and the Rate of Product Innovation.” *Journal of Development Economics*, 55: 133-53. DOI: 10.1016/S0304-3878(97)00059-X.

Lee, Edward 2010-2011. “Measuring TRIPS Compliance and Defiance. The WTO Compliance Scorecard.” *Journal of Intellectual Property Law*, 18: 414-445.

Lerner, Josh. 2002. “150 Years of Patent Protection.” *American Economic Review. Papers and Proceeding*, 92: 221-25.

Lieberman, Joseph I. 2004. *Offshore Outsourcing and America Competitive Edge*. Washington, D.C.: United States Senate.

Macmillan, Fiona. 2006. “Public Interest and the Public Domain in an Era of Corporate Dominance.” In *Intellectual Property Rights. Innovation, Governance and the Institutional Environment*, edited by Birgitte Andersen, 46-69.Cheltenham: Edward Elgar.

Mansfield, Edwin. 1986. “Patents and Innovation: An Empirical Study.” *Management Science*, 32: 173-81.

Mansfield, Edwin. 1994. *Intellectual Property Protection, Foreign Direct Investment, and Technology Transfer*. Washington, D.C.: World Bank Discussion Paper n. 19.

Mansfield, Edwin. 1995. *Intellectual Property Protection, Foreign Direct Investment, and Technology Transfer. Germany, Japan and the United States*. Washington, D.C.: World Bank Discussion Paper n. 27.

Maskus, Keith E. 2000. *Intellectual Property Rights in the Global Economy*. Washington, DC: Institute for International Economics.

May, C. (2002) *A Global Political Economy of Intellectual Property Rights*, London: Routledge.

May, Christopher, and Susan Sell. 2006. *Intellectual Property Rights. A Critical History*, London: Lynne Rienner Publisher.

Mayer, Martin. 2000. “Does Science Push Technology? Patents Citing Scientific Literature.” *Research Policy*, 29: 409–434.

Mayer, Maximilian, Mariana Carpes, and Ruth Knoblich, eds. 2014. *The Global Politics of Science and Technology*. Berlin and Heidelberg: Springer-Verlag. DOI 10.1007/978-3-642-55007-2_8,

Merges, Robert P. and Richard R. Nelson. 1990. “On the Complex Economy of Patent Scope.”, *Columbia Law Review*, 90: 839-916.

Mokyr, Joel. 2002. *The Gifts of Athena. Historical Origins of the Knowledge Economy*. Princeton: Princeton University Press.

Moser, Petra. 2005. "How Do Patent Laws Influence Innovation? Evidence from Nineteenth-Century World's Fairs." *The American Economic Review,* 95: 1214-36.

Muzaka, Valbona. 2011. *The Politics of Intellectual Property Rights and Access to Medicines,* Basingstoke: Palgrave Macmillan.

Nelson, Richard R. 1992. "What is 'Commercial' and What is 'Public'" About Technology, and What Should Be?" In: *Technology and the Wealth of Nations*, edited by Nathan Rosenberg, Ralph Landau and David C. Mowery, 57-71. Stanford: Stanford University Press.

Nelson, Richard R., and Gavin Wright. 1992. "The Rise and Fall of American Technological Leadership. The Post-War Era in an Historical Perspective." *Journal of Economic Literature,* 30: 1931-1964.

Odagiri, Hiroyuki, Akira Goto, Atsushi Sunami, and Richard R. Nelson, eds. 2011. *Intellectual Property Rights, Development and Catch-up. An International Comparative Study*. Oxford: Oxford University Press.

Parello, Carmelo P. 2008. "A North-South Model of Intellectual Property Rights Protection and Skill Accumulation." *Journal of Development Economics,* 85: 253-81. DOI: 10.1016/j.jdeveco.2006.08.001.

Park, Walter G. 2008. "International Patent Protection: 1960–2005." *Research Policy* 37:761–766. Doi:10.1016/j.respol.2008.01.006

Patel, Pari, and Keith Pavitt. 1997. "The Technological Competences of the World's Largest Firms. Complex and Path-dependent, but not much Variety". *Research Policy,* 26: 141-56.

Pavitt, Keith. 1987. "On the Nature of Technology". Reprinted in: *Technology, Management, and Systems of Innovation*, by Keith Pavitt. Cheltenham: Edward Elgar, 1999.

Penrose, Edith. 1950. *The Economics of the International Patent System*. Baltimore: Johns Hopkins Press.

Penrose, Edith. 1973. "Patenting and the Less-Developed Countries." *Economic Journal,* 83: 768-786.

Pianta, Mario. 1988. *New Technologies Across the Atlantic*. Hemel Hempstead: Harvester & Wheatsheaf.

Polanyi, Michael. 1967. *The Tacit Dimension*. London: Routledge & K. Paul.

Poole, Jennifer P. 2013. "Knowledge Transfer from Multinational to Domestic Firms. Evidence from Worker Mobility." Review of Economics and Statistics, 95: 393-406. DOI: 10.1162/REST_a_00258.

Ryan, Michael R. 1998. *Knowledge Diplomacy. Global Competition and the Politics of Intellectual Property*. Washington D.C.: Brooking Institution Press.

Scherer, Frederick M., 2015. "Patents, Monopoly Power, and the Pricing of Pharmaceuticals in Low-income Nations. " In *Global Science, Technology and Innovation*, edited by Daniele Archibugi and Andrea Filippetti. Oxford: Wily-Blackwell.

Sell, Susan K. 2003. *Private Power, Public Law. The Globalization of Intellectual Property Rights.* Cambridge: Cambridge University Press.

Shapiro, Carl. 2001. " Navigating the Patent Thicket. Cross Licenses, Patent Pools, and Standard-Setting". In *Innovation Policy and the Economy, Volume I.* edited by Adam Jaffe, 119 - 150. Cambridge, MA: MIT Press.

Shiva, Vandana. 2001. *Protect or Plunder? Understanding Intellectual Property Right.*, London: Zed Books.
Strange, Susan. 1988. *States and Markets*. London: Pinter Publishers.

Stopford, John, and Susan Strange. 1991. *Rival States, Rival Firms*. Cambridge: Cambridge University Press.

Sunder, Madhavi. 2011. "Bollywood/Hollywood." *Theoretical Inquiries in Law*, 12: 275–308.

Wade, Robert. 2003. "What Strategies Are Viable for Developing Countries Today? The World Trade Organization and the Shrinking of Development Space." *Review of International Political Economy*, 10: 621-644.

Wikepedia (2014) Entries *Smartphone Wars* and *Apple Inc. v. Samsung Electronics Co., Ltd.*, consulted on 27 August.

Winter, Sydney. 1989. Patents in a Complex Context. In *Owning Scientific and Technical Information*, edited by Vivian Weil and John Snapper. 41-60. New Brunswick: Rutgers University Press.

White House. 2013. *Fact Sheet. White House Tasks Force on High-Tech Patent Issues*, Released on June 4th, at http://www.whitehouse.gov/the-press-office/2013/06/04/fact-sheet-white-house-task-force-high-tech-patent-issues

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