THE GLOBALIZATION OF INTELLECTUAL PROPERTY RIGHTS: FOUR LEARNT LESSONS AND FOUR THESES

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Abstract

Intellectual Property Rights have become ubiquitous in the current debate and have emerged as the key issue of global innovation policy. The 'Trade Related Aspects of Intellectual Property Rights agreement' (TRIPS), signed on 1994 as a founding element of the World Trade Organization, represents the most important attempt to establish a global harmonization of Intellectual Property protection. The aim of this paper is to critically re-examine what has become common wisdom regarding IPRs, TRIPS and their effects. We argue that supporters of IPRs in Western corporations and governments as well as detractors in global movements and developing countries have both over-estimated their importance in the process of the generation and diffusion of knowledge and innovation. On the basis of some key lessons learnt regarding the nature of innovation and technological change, we assess four theses about TRIPS and their impact on the global generation and distribution of knowledge. Lastly, the policy implications concerning international organizations and technological transfer are discussed.

1. INTRODUCTION[1]

Intellectual Property Rights (IPRs) have become ubiquitous in the economic debate: the front pages of newspapers are constantly reporting major controversies among corporations, governments and advocacy groups. News such as the copyright issue regarding the Google Books project and the power of the Big Pharma's patents over key drugs and vaccines have generated growing alarm and heated dispute. Some books, including Naomi Klein's *No Logo* and Vandana Shiva's *Patents: Myth and Reality,* have become best-sellers. Science fiction has been quick to report on these concerns, as is shown by Michael Crichton's *Next*. National Parliaments, the European Union (EU) and the North Atlantic Free Trade Association (NAFTA) are repeatedly addressing the issue. A brand new Pirate Party, whose main political goal is to get free access to software and copyrighted products, has even managed to elect its own deputies to the European Parliament. Above all, IPRs have become one of the core businesses of the World Trade Organization (WTO). In a word, IPRs have emerged as the key issue of global innovation policy.

The Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement, signed on 1994, is a founding element of the WTO. TRIPS are the most important attempt to establish a global harmonization of Intellectual Property (IP) protection and enforcement putting international standards for the protection of patents, copyrights, trademarks, and design. They also provide an outline dispute settlement and establish enforcement procedures at the intergovernmental level. Not surprisingly, TRIPS have been vigorously debated by political scientists (May, 2002a; Ryan, 1998; Sell, 2003) and economists (Maskus, 2000; Maskus and Reichman, 2005 among others). But TRIPS have been debated also outside academe and have been strongly opposed by non-governmental organizations and global movements (Drahos and Mayne, 2002).

The aim of this paper is to critically re-examine what has become common wisdom regarding IPRs, TRIPS and their effects. We argue that there has been an overestimation of the importance of IPRs in the process of generation and diffusion of knowledge and innovation. For both developed and developing countries, the key issue should be an active innovation and learning policy rather one of protection through IPRs of already available knowledge. The debate has instead been diverted on to IPRs as such rather than on to knowledge generation and diffusion also because some key learnt lessons on the nature of innovation and technological change have not been duly taken into account. On the basis of these learnt lessons, we will assert four theses about TRIPS.

This article will focus mainly on patents, while it will deal less with copyright and other IPRs (for a comprehensive collection of essays on this issue see Hess and Ostrom, 2006; see also Macmillan, 2006 for a focus on copyrights). In the next section we state the rationale behind the establishment of the IPR systems across modern societies. Section three presents four learnt lessons which emerge from the literature of the economics of innovation and technological change. In section four, we present four main theses on the globalization of the IPRs and their effects on the global generation and distribution of knowledge. The last section discusses policy implications.

2. THE FAUSTIAN BARGAIN AND THE RATIONALE FOR INTELLECTUAL PROPERTY RIGHTS

The modern patent system, based on an objective assessment of the inventions, was introduced by the Venetian Republic in 1474 (May, 2002b). The two requirements indicated by the Venetian Republic - the usefulness and the novelty of the invention - are still in force today in all states. As in a Faustian bargain, the inventor and the government undertake a long term pact: the inventor commits himself to disclosing all information of his invention, while the government guarantees that it will provide legal protection and grant exclusive rights to the economic returns on the invention (for a history of IPRs, see May and Sell, 2006).[2]

While IPRs have evolved substantially over the centuries, the Faustian bargain has remained unchanged. By providing *intellectual* property rights, the government assures the inventor the right to exclude others from using the outcome of his creative activities without his authorization. Thus the government gives the inventor a legal monopoly to exploit his invention and enjoy exclusive economic benefits for a limited period of time. Legislation is far from uniform: for copyright the disclosure is complete the moment you publish a book or a film, while inventions generally have to pass a merit exam before being granted a patent. As happens with many deals, also this one is practically never implemented and the inventor often tries to hide as much as possible about his invention, while the government is not in a position to assure the return on the invention can be fully secured.

Through this deal, the government discloses information on the already generated knowledge, and perhaps more importantly to provide an incentive to individuals to invest their time and resources in creative activities. Creative activities are in fact time-consuming and costly and it is always uncertain if they will produce anything that generates an economic return. Once the inventor has discovered a new device or a musician written a new symphony, it becomes easy for others to

exploit their outcomes at a very low cost. Without legal protection, inventors and authors are not in a position to fully exploit their works and secure the economic returns. As a result, in the absence of public regulation, there is deemed to be under-investment in creative activities with respect to a socially desirable level.

An IPR regime can be defined as the written and customary rules that apply within a specific political community. In some countries, the government enforces strong protection of IPRs and the holders are guaranteed that any infringements will be prosecuted and compensation will be obtained. These are the strong IPR regimes. In other countries, the IPR regime is much weaker and there is much less public interest in enforcing IPRs. The policing of violations is much more relaxed and courts are slow and/or permissive in the case of infringements.

3. WHAT WE HAVE LEARNED ABOUT KNOWLEDGE AND INNOVATION: FOUR LEARNT LESSONS

Scholars in the field of innovation have been largely exploring the mechanism which lies at the heart of the creation and the diffusion of knowledge and innovation, as well as the mechanism of technological change. In this section we will briefly outline four learnt lessons (see box 1) deriving from this body of literature which are relevant to the assessment of the current IPR controversy.

Lesson 1: Knowledge is not information. Successful knowledge transfer is not only a matter of transferring information, but also requires learning through the acquisition of a wide range of competencies, skills and tacit knowledge.

There is a basic distinction between *information* and *knowledge*. Information is a good which is costly to produce but as soon as it becomes public can be appropriated and transmitted at a very low cost. Since all the costs are borne by the producers of information and none by the users, lack of institutional protection would likely lead to under-investment in these activities (Arrow, 1962). But can the outcomes of the creative and innovative activities for which intellectual property is requested be considered information? The Schumpeterian tradition argues that creative and innovative activities are the product of human knowledge, which cannot be transferred to potential users unless they are willing to invest time and effort in learning. Knowledge is therefore rather

Box 1 – What has the economics of innovation to say about knowledge and Intellectual Property Rights?

Lesson 1: To consider knowledge as information, as often done in the debate on IPRs, leads to wrong analyses and policies. The acquisition of knowledge requires that both the teacher and the learner are willing to devote time, resources and efforts to acquire it. This makes the mechanisms of knowledge transmission more complex than those related to information.

Lesson 2: Any innovative process is based also on creative imitation and copying. There is no country that has managed to catch up without relying on the knowledge base of other and more developed countries. A conceptual separation between "innovators" and "imitators" is therefore wrong since good innovators builds up on the state of the art and good imitators need to improve to imitate and adopt others' innovations

Lesson 3: To take advantage from foreign technologies, developing countries should put in place explicit policies to create adequate absorptive capacity in terms of endogenous competences, skills, and infrastructures.

Lesson 4: IPRs are just one of the channels used by companies to appropriate the returns from their innovations. There are cross-industry variations in the effectiveness of IPRs and while Pharmaceuticals is heavy dependent on patents and Children's films are heavily dependent on copyrights, in the majority of industries IPRs are of moderate importance. Moreover, IPRs are much more effective if combined with wider companies' strategies which include continuous innovation.

different from information since no user will be in a position to gain economic advantages from it without an active learning effort and creative adaptive processes (Nelson and Winter, 1982; Pavitt, 1987).

But this is not the full story. There is another important aspect that makes the transfer of knowledge difficult to achieve: not all knowledge can be properly codified. An important component of knowledge is *tacit* (Polanyi, 1966) and not even those who have generated it are able to properly articulate it in manuals, blueprints, patents or other 'codes'. A good cook is not necessarily able to transfer all his knowledge in a book of recipes. It is a case of tacit knowledge when 'we know more than what we can tell' (Polanyi, 1967). In order to transfer tacit knowledge to an apprentice, the coded component should be supplemented with experimentation and training. A key characteristic of IPRs is that they are able to protect the codified knowledge but not the tacit form.

The picture is therefore more complex than it appears at first sight. On the one hand, the producers of knowledge have a wider battery of instruments for gaining profit from it, ranging from selling the codified component through the IPR system to transferring it through direct contact (for example

through teaching programmes, technical cooperation, and so on). On the other hand, those willing to acquire knowledge should also invest their resources not just in buying IPRs, but also in procuring the infrastructures and skills that make it possible to actually use knowledge for economic purposes.

Lesson 2: Without imitating it is impossible to learn and innovate. The development of emerging economies is linked to creative imitation and absorption.

Once Pablo Picasso stated that 'good artists copy, great artists steal'. This also applies to knowledge generation: innovation cannot be created in a vacuum but rather is bred in an environment of creative imitation. In the 19th century, Germany and the United States benefited from knowledge developed in the United Kingdom. In the second half of the 20th century, all countries that successfully managed to catch up, including Japan, South Korea, Singapore and Taiwan, underwent a process of continuous adoption and imitation of technologies developed abroad. Today, China, India and Brazil, among others, are acquiring the knowledge developed in the OECD countries. Every 'emerging economy' at some point in its history has relied on the adoption of foreign technologies.[3] Technology transfer is a multidimensional phenomenon and in order to be effective it needs to give consideration to the features of the host countries, including their stage of development, their economic and industrial base, the characteristics of their institutions and, last but not least their IPR regime.

No single channel can guarantee successful technology and knowledge transfer. On the contrary, each knowledge domain demands the activation of a variety of interconnected channels, including: i. Foreign direct investments, since the branches of multinational corporations in host countries often provide the most straightforward way to assimilate the production methods of other countries; ii. Joint-ventures and strategic alliances, which allow companies from different countries to pool their skills, resources and expertise; iii. Technology licensing, which includes not just the acquisition of IPRs but also technical assistance and training; iv. Technology embodied in imports, especially in the case of capital goods and equipment.

Lesson 3: Knowledge is not a matter of plug-and-play. To adopt foreign technology is a costly activity requiring a substantial and deliberate domestic effort.

The availability of scientific knowledge and technology from abroad is only part of the story, but it is not as such sufficient to foster development driven by technological change. The other part of the

story is the endogenous effort that catching up countries must be willing to undertake. In order to make sense of and exploit the spectrum of knowledge, skills and technologies coming from abroad, each country needs to develop an 'absorptive capacity', i.e. the endogenous capacity to learn from these opportunities and to exploit them economically (Cohen and Levinthal, 1990; 1989). This reminds us that learning is not a wholly passive process. Countries need to monitor the advances made abroad, to create internal competencies able to adopt foreign technologies and put in place specific measures to encourage their diffusion in the whole economy.

Creating such an environment requires a comprehensive effort ranging from public policies, education and human resources, a reliable legislative system and institutions, incentives and trade policies, sometimes referred to as *Developmental state* (Wong, 2004; Woo-Cumings, 1999).[4] In the second half of the XX century, Western technology was available in equal measure to Latin American and to East Asian countries, but only the latter countries managed to acquire it up to the point to be able to compete on a par, mostly because of the active learning policies implemented.

National R&D investment to absorb foreign technology was a crucial enabling factor for the US economic growth during the 1900-1946 period (Mowery and Rosenberg, 1989) and for the Japanese reconstruction during the post war period (Morishima, 1982). This is often associated with the activities carried out by both the business and the public sectors. Firms in the catching up countries need to invest in R&D, capital goods, equipment and infrastructures to develop the appropriate knowledge and capabilities required to adopt foreign knowledge (Freeman, 1987; Hou and San, 1993; Mowery and Oxley, 1997; Westphal et al., 1985). In turn governments need to implement dedicated policies to foster public R&D and education as well as to support trade and foreign direct investment (Bell and Pavitt, 1997). Countries that succeeded in catching up relied on a combination of devices to acquire foreign technology with policies aimed at building competencies and skills internally.

Lesson 4: The ways to profit from innovation are infinite. IPRs are only one of the several tools in competition among firms and are effective in a few industries only.

Innovation is one of the most heterogeneous economic activities. A pin hair and a song, a jet engine and a statistical method, a drug and a machine tool can all be innovations. The heterogeneous nature of the phenomenon is reflected also in the sources and methods employed to secure the returns provided by innovation activities. The methods for guaranteeing the returns from innovations

change considerably across industries, markets and countries, and also evolve over time. The most effective way to appropriate the returns from innovation is by combining a battery of different strategies (Teece, 1986).

The methods used by firms to appropriate returns from their innovations can be broadly divided into two large categories. The first category is represented by the economic methods, which include industrial secrecy, lead time, brand names, and market distribution. The second category comprises the legal methods associated with IPRs. The relative importance of the two categories varies considerably across technologies and industries. But a wealth of empirical studies have consistently shown that IPRs alone cannot guarantee the full appropriation of innovations (Cohen et al., 2000; Levin et al., 1987; Mansfield, 1986; Merges and Nelson, 1990; von Hippel, 1998; Winter, 1987). On the basis of in-depth statistical surveys carried out at the firm level, it emerges that patents, the most important and controversial component in the IPR family, are of fundamental importance in one industry only, pharmaceuticals, and, to a lesser extent, chemicals. But patents are not a key competitive factor in other high tech industries such as electronics, telecommunications, motor vehicles and machinery. In some high tech industries such as defence and nuclear energy, patents are not important at all since industrial secrecy is much more important. Profit-seeking firms implement other strategies to exploit innovation, including lead time, moving down the learning curve, sales and service efforts and secrecy. In the computer industry firms are increasingly relying on new forms of IPR such as the GNU General Public License (GPL) for the development of the so-called *open source* software. Contrary to traditional IPR logic, the GPL allows anyone to use and modify the software. As a result, we have witnessed over the last decade the emergence of new business models in this industry which allow firms to profit by relying on new strategies based on combinations of both 'traditional' and new forms of IPR (Chesbrough, 2003; Lerner and Tirole, 2002; Tapscott and Williams, 2006). Other significant differences emerge depending on the individual characteristics of new technologies and, as expected, patents are better able to protect product rather than process innovations.

This does not necessarily imply that firms consider patents useless: otherwise it would be difficult to explain why firms bother to file, apply and pay for several hundred thousand patents every year. But even when they have a substantial patent portfolio, firms declare that they are not able to profit from them unless they combine the legal protection with other economic instruments of appropriation.

While abundant evidence exists on the manufacturing industry and on the patent system, less is known about the appropriability system in the service industry or about copyright (for a significant exception, see Blind et al., 2003). But the available evidence suggests that manufacturing and services on the one hand, and patents and copyrights on the other hand, have several things in common. A few industries rely heavily on copyright and are harmed by copyright infringement. Cartoon films, for example, appear to rely on strong copyright systems as much as the pharmaceutical industry relies on patents. But copyright enforcement alone cannot guarantee the full appropriation of the returns unless it is combined with other economic instruments. Similarly, in the industrial design sector, firms do not rely so much on the effectiveness of the design registration as a means to protect their new products (Filippetti, 2009).

The innovator's perspective to some extent mirrors the imitator's. Strong IPR regimes make imitation slightly more costly and slower but not impossible since there is often the possibility to 'invent around', namely a set of activities through which a competitor can produce an effective functional substitute for the product protected by IPRs without infringing its legal rights. Conversely, weak IPR regimes make imitation cheaper and faster. But prospective imitators need to acquire a wide range of expertise, which demands a substantial investment in building the required knowledge base.

4. FOUR THESES ON THE GLOBALIZATION OF INTELLECTUAL PROPERTY RIGHTS

On the basis of the learnt lessons summarized above, how can we interpret the current controversy over the global regime of IPRs and, in particular, TRIPS? We set out in this section four theses (see box 2) which to some extent put in a different complexion on what has become the traditional wisdom.

First Thesis: TRIPS aim at imposing the Western and the broken IP regime on the rest of the world

The Silent Revolution in IPRs started in the United States. – Over the last few decades, the United States have introduced several institutional changes that strengthened the IPR regime. These changes have generated greater penalties for IPR infringement, have allowed also publicly funded R&D to be considered intellectual property and have enlarged the scope of patents to unexpected

Box 2 – Four Theses to Assess TRIPS

First Thesis: TRIPS aim at imposing the Western and broken IP regime to the rest of the world

The IPRs regime has become stronger in the Western world. This trend has started in the United States, where the scope of IPRs have been extended to additional areas (e.g. software) and to additional subjects (e.g. public research centres and universities). But other Western countries have imitated the same trend. Through TRIPS, the US and other Western governments are trying to expand the Western logic to all countries. This has happened in a moment in which the ability of IPRs to provide incentives to the innovators and to facilitate the diffusion of knowledge has been increasingly questioned in the West itself.

Second Thesis: TRIPS are the outcome of a non democratic process driven by a club of US corporations

TRIPS have not been debated and negotiated as a global public good. On the contrary, they have been strongly pushed by the United States. In particular, they are the outcome of the pressures made by a handful of US corporations that have asked to, and obtained from, their government to act in their behalf.

Third Thesis: TRIPS may serve the interests of Western corporations but not necessarily of the Western economies

There is no evidence that TRIPS have been advantageous for the American citizens at large. On the contrary, it seems that TRIPS have been important to allow TNCs to expand their innovative activities globally relying on stronger IP regimes abroad

Fourth Thesis: TRIPS alone will not lead to an increase of the technology gap between Western countries and emerging countries

Both supporters and detractors of TRIPS have put too much emphasis on the economic significance of legal devices regulating intellectual property. By themselves, legal devices can neither impede developing countries to catch up nor allow developed countries to preserve their dominion in technological innovation. It would be much more important to concentrate on the economic, rather than the legal conditions, that allow or impede countries to maintain or acquire their knowledge base.

areas; in a nutshell they have introduced a 'silent revolution' (Andersen, 2004; Jaffe and Lerner, 2004). Specifically:

- The establishment of a centralized appellate court for patents, the so-called 'Patent Court', in 1992. This Court represents the change towards a pro-patent era after a long period of weak patents. Data on patent litigations show that the Patent Court has adopted the stance of strengthening patent-holder rights (Gallini, 2002; Jaffe and Lerner, 2004).
- The Bayh-Dole Act approved in the United States in 1980 to facilitate the commercialization of inventions developed in the public sector, thus allowing universities and other publicly funded institutions to grant patents and exclusive licensee to the results of research contracts funded by Federal agencies. Through the Bayh-Dole Act, also publicly funded R&D has become privately

exploitable. Several other OECD countries have copied the Bayh-Dole act and introduced similar legislation (for an assessment, see Mowery and Sampat, 2004) .

- The possibility of obtaining patent protection, the most effective instrument in the family of IPRs, has been extended to activities that were not previously eligible. Often patents have been granted to inventions that do not seem to be particularly useful, such as devices for 'measuring breasts with a tape to determine bra size', or 'executing a tennis stroke while wearing a knee pad' (Gleick, 2003). But the scope of patent protection has also been allowed in key sectors such as software, business methods, statistical methods, genes, plant genetics, micro-organisms and so on. This is an implementation of what the US Supreme Court already advocated in 1980: 'anything under the sun that is made by men' should be worthy of patent protection (Jaffe and Lerner, 2004). Further, patents are now granted also for discoveries that are very close to 'life': about forty thousand DNA-related patents have been granted (Heller, 2008, p. 50).

Is the West IP system broken? - Although it has not been replicated to the same extent in Europe and Japan, the stronger regime of IPRs that has emerged in the USA has become a model for other continents. But this model is far from satisfactory. Three main types of criticism have been levelled at it.

- Growing attention has been focused on the so-called 'tragedy of the anti-commons'. Long ago, it was argued that a lack of property rights could destroy private incentives to maintain and upgrade public goods (Hardin, 1968). However, too much ownership may have the opposite effect and, in the realm of knowledge, may impede the circulation of information and stand in the way of innovation (Heller, 2008; Heller and Eisenberg, 1998). This is particularly manifest in those industries in which innovation relies on systemic technology and integrated knowledge (i.e. biotechnology, computers, and telecommunications). IPRs are increasingly moving deeper to cover data and facts which represent the basic ingredients of scientific practice and research (Boyle, 2003; David, 2000). The proprietary structure of this kind of knowledge could seriously hamper scientific advancement.
- Because of the new legislation, firms have developed a propensity to patent more in order to capture as many technologies as they can to pre-empt other firms' technological advancement and to avoid being blocked themselves (Hall and Ziedonis, 2001; Ziedonis, 2004). Rather than promoting innovation, they are restricting innovative capacity to a few incumbent firms.
- Eventually the current rules fail to provide predictable property and produce costly disputes and excessive litigation that outweigh the positive incentives and profits stemming from innovative activities (Bessen and Meurer, 2008; Jaffe and Lerner, 2004). As John Barton

argued, 'the number of intellectual property lawyers in the US is growing faster than the amount of researchers' (Barton, 2000). Instead of promoting innovation, IPRs are diverting resources from innovation.

Are TRIPS the imposition of a broken IP regime on the developing world? - TRIPS have become one of the most controversial issues not only in academe, but also in the political arena. Civil activists, NGOs and the public opinion in general have fiercely denounced TRIPS as a colonialist act imposing the Western standard of the IPR system on the rest of the world (Shiva, 2001). TRIPS are in fact the key instrument for extending the 'silent revolution' in IPRs outside the West.

The TRIPS Agreement strengthened previous standards by making enforcement mandatory for all member countries and by reforming the Dispute Settlement procedures within the WTO. Art. 4 of the TRIPS Agreement applies a cornerstone of the global trade policy, the so-called Most Favoured Nation clause, to IPRs (World Trade Organization, 2009b).[5] Article 10 allows the copyright protection of software and datasets, and sets the term of protection at no less than 50 years. Article 33 establishes that the protection of patents shall not end before 20 years. Article 35 requires Member countries to protect the layout-designs of integrated circuits in accordance with the provisions of the Treaty on Intellectual Property in Respect of Integrated Circuits, negotiated under the auspices of World International Property Organization (WIPO) in 1989. Part three of the TRIPS Agreement is dedicated to the enforcement of IPRs, and art. 61 requires that Members should provide civil as well as criminal remedies for the infringement of IPRs. This implies that all WTO members should develop or modernize their judicial systems and enforcement procedures to comply with TRIPS (World Trade Organization, 2009b).

Through TRIPS, the IP systems of the more advanced countries is therefore exported from developed to developing countries, from countries that invest massively in R&D and innovation to countries with limited resources and infrastructures, from net high tech exporters to net importers. Before TRIPS most of the developing countries did not extend protection to emerging technologies such as software, integrated circuits and electronic databases, nor did they allow IP to cover plant varieties. One of the most controversial issues has been the possibility to patent in pharmaceuticals, an industry to which TRIPS dedicate special attention (Lanoszka, 2003). India, Brazil, Argentina, Mexico and several other countries had a weak IP protection on drugs which allowed the development of a generic drug national industry that is now incompatible with TRIPS.

Regarding enforcement and dispute settlement provisions, TRIPS introduce a fundamental novelty with respect to the previous international setting. Both the Paris Convention for the protection of industrial property and the Berne Convention for the protection of artistic and literary property provided no effective procedures for settling IPR disputes. TRIPS have dramatically changed this state of affairs by linking IPRs to international trade allowing advanced countries to further increase their bargaining power in the WTO. This assures a more effective enforcement and the possibility of using trade provisions, such as tariffs and quotas, to punish the rule-breaking countries. Table 1 lists TRIPS-related disputes within the WTO. This 'who is suing who' table shows that the US have the lion's share of the disputes.

Table 1 Who is suing who? Disputes cases related to TRIPS and TRIPS enforcement

		Sued country													
		USA	EC	Argentina	Brazil	Canada	Denmark	Greece	India	Ireland	Pakistan	Portugal	Sweden	Japan	Total
Complainant	USA	n.a.	5	2	1	1	2	2	1	1	1	1	2	1	*20*
	EC	3	n.a.			1			1					1	*6*
	Australia		1												*1*
	Brazil	1			n.a.										*1*
	Canada		1			n.a.									*1*
	Total	*4*	*7*	*2*	*1*	*2*	*2*	*2*	*2*	*1*	*1*	*1*	*2*	*2*	*29*

Source: authors' elaboration of WTO data (World Trade Organization, 2009a).

The harmonisation of IPRs introduced by the TRIPS Agreement has led to a race to the top which is certainly not to the advantage of countries desirous of catching up also by acquiring the expertise, knowledge and innovations of the leaders (Chang, 2003). Moreover, for most of the WTO Members, TRIPS are an exogenous introduction of rules and standards. It is somewhat surprising that this expansion of Western standards has occurred at a time in which the usefulness of IPRs as a method for fostering innovation and knowledge development is being seriously challenged also in the West. Why did this happen? In the next section we will show how a few corporations succeeded in persuading more than 100 countries, most of them net importers of technology, to 'approve' the most important revolution in global IPRs.

Second Thesis: TRIPS are the outcome of a non democratic process driven by a club of US corporations

A club of US multinational corporations played a major role in pushing through the TRIPS Agreement providing one of the most important lessons on how business power shapes international politics (Ryan, 1998; Sell, 2003). However, this should not necessarily be seen as a sign of strength of the American economy, but rather as the consequence of the progressive erosion of US

technological hegemony. Already at the beginning of the 1980s the US supremacy in the high tech trade faced a showdown because of the impressive growth of Japan and, to a lesser extent, of Europe (Nelson and Wright, 1992; Pianta, 1988; Rosenberg and Steinmueller, 1988).

By the mid-1980s, US trade policy had undergone a major shift in response to the threat to their technological world hegemony. Beginning in the early 1980s, the annual trade deficit reached unprecedented levels. The US trade deficit topped 100 billion dollars in 1984, exceeding the record of 153 billion dollars in 1987 (US Department of Commerce, 2009). Linking the loss of market shares to IP infringement by other countries was a possible explanation for the former and a policy action for the latter. The US corporations hoped to find a remedy for their lack of competitiveness by making IPRs stronger in their markets abroad. By the mid 1980s the US administration began to encompass its pro-IPR silent revolution also in international affairs. This was justified by the feeling that free trade was no longer *fair* trade, since a substantial part of the R&D and innovative investments financed by American corporations was appropriated without payment by competing firms in other countries. As the former assistant general counsel of the United States Trade Representative (USTR) said 'Our companies find that they must compete with the unauthorized copies not only in the source country but in third countries as well' (cited in Sell, 2003, p. 81).

In a more integrated global trade regime, in which high tech industries were becoming the crucial factor of competitiveness, the fact that other countries had a more permissive regime of IP was perceived as one of the causes of the US trade deficit. As the assistant secretary of commerce argued, 'there is a widespread bipartisan agreement that the protection of intellectual property worldwide is a critically important factor in expanding trade in high technology products' (cited in Sell, 2003 p. 83). The link between trade and IPRs was formally established in 1984 in the Trade and Tariff Act in which, under Section 301, IP protection became a motive to assessing other countries' eligibility for non-reciprocal trade concession.[6]

From 1984 until the signing of the 1994 TRIPS Agreement the USTR played a major role in bringing the interests of the US corporations into the global arena. During the Uruguay Round the USTR was in close contact with the major corporations through the International Intellectual Property Alliance (IIPA) and the Intellectual Property Committee (IPC). The IIPA was created to promote the copyright industry's interests, while the IPC consisted of twelve chief executive officers representing the IPR-intensive industries. These influential business associations (Ryan, 1998) provided the USTR with several reports in which they pointed out the damage caused to US

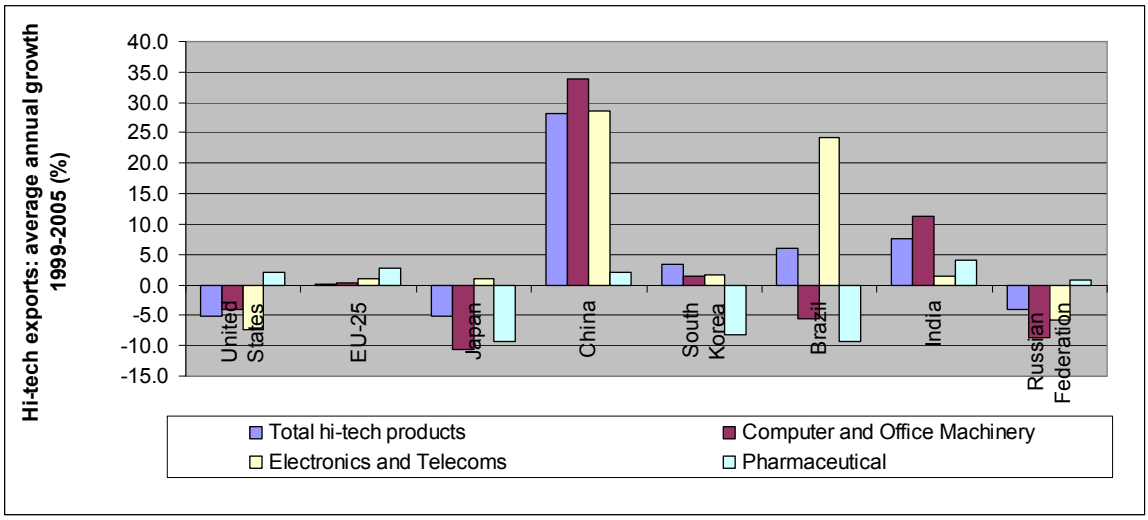
business by the IP piracy country by country. The major IPC achievement was to have involved European and Japanese industry in their policy so that the US, Europe and Japan were united as far as the inclusion of an IP code in the General Agreement on Trade and Tariffs was concerned. When the WTO eventually replaced GATT in 1994, it included the TRIPS Agreement as one of the main pillars. As Susan Sell explicitly states, 'twelve corporations made public law for the world' (Sell, 2003, p. 96). In return, developing countries obtained the liberalization of international trade in textiles and apparel through the Multifiber Agreement (see also Maskus, 2000).

Third Thesis: TRIPS may serve the interests of Western corporations but not necessarily of the Western economies

The fact that TRIPS were a Western imposition does not necessarily imply that they will succeed in serving Western interests. Ever since the introduction of the TRIPS Agreement, the trend of trade performance in the USA and other advanced countries has not changed appreciably. Emerging countries, i.e. those that TRIPS aimed to discipline for their alleged unfair IP infringements, have continued to erode the trade balance of the US, Europe and Japan. TRIPS has so far certainly served the interests of some specific corporations, but it does not seem to be able on its own to solve the problems for which it was imposed, namely the challenge to the Western primacy in knowledge-intensive industries.

In Figure 1 we report the Average Annual Growth of exports relative to the hi-tech products for some selected countries over the period 1999-2005. The two emerging giants, China and India, continue to improve their performance in the international trade of hi-tech industries against the Triad, i.e. US, Europe and Japan.

Figure 1 Average Annual Growth of exports relative to the hi-tech products for selected countries, 1999-2005



Source: authors' elaboration on data from the European Commission report 'Europe in the global research landscape' (European Commission, 2007)

This trend is confirmed also in terms of the world share of hi-tech exports reported in Table 2. In 2005 China became the top exporter of Computers and Office Machinery, reaching a world share of 28.3 per cent followed by the US (14.6) and the EU-25 (8.3), and the second world exporter in electronics and telecoms. The supremacy of the Triad is still evident in an IPR-sensitive industry such as pharmaceuticals, where Western countries still account for over 70 percent of world exports.

Table 2 Hi-tech exports: world market shares 1999-2005 (%)

	Total hi-tech products		Computer and Office Machinery		Electronics and Telecoms		Pharmaceutical	
	1999	2005	1999	2005	1999	2005	1999	2005
United States	26.4	19.3	18.9	14.6	23.4	14.7	20.2	22.8
EU-25	17.1	17.2	8.2	8.3	11.5	12.1	38.6	45.6
Japan	12	8.7	11.9	6.0	13.3	9.6	4.0	2.3
China	3.4	15.0	4.9	28.3	2.9	12.9	3.1	3.6
South Korea	4.7	5.8	4.3	4.7	7.0	7.7	0.8	0.5
Brazil	0.4	0.6	0.1	0.1	0.1	0.4	0.4	0.2
India	0.2	0.3	0.0	0.1	0.0	0.1	1.5	1.9
Russian Federation	0.3	0.3	0.0	0.0	0.1	0.1	0.2	0.2

Source: as for Figure 1

Not surprisingly, political concern over declining US competitiveness has shifted from infringement of IPRs towards offshore outsourcing and offshoring.[7] The White Paper 'Offshore Outsourcing and the America's Competitive Edge: Losing Out in the High Technology R&D and Services Sectors'

released by Senator Joe Lieberman in May 2004 illustrates a rather different concern. The White Paper focuses on the 'challenge, which potentially could affect high and R&D research jobs, *not just manufacturing and call center jobs*' (Senator Lieberman, 2004, our emphasis). The main point raised is that US corporations are moving abroad key components of their innovative activities, such as engineering, design, R&D and high-tech services. According to a survey carried out by UNCTAD (2005), Transnational Corporations (TNCs) perceive China and India as the most attractive locations, first and third, respectively, in which to invest in R&D activities. The Toyota Technical Center in Thailand, Motorola's R&D centres in China and Microsoft's sixth global research centre in Bangalore, are just a few examples illustrating the fact that TNCs are investing at the cutting edge of the technology in the emerging countries (UNCTAD, 2005) (on the globalization of technology see also Archibugi and Iammarino, 2002; Archibugi and Pietrobelli, 2003).

The TRIPS Agreement has therefore not reversed the relative performance of countries since 1994. The real beneficiaries of TRIPS are not the advanced countries, but rather the large corporations who pressed for their adoption. Empirical research has shown that multinational corporations are more likely to establish advanced and knowledge-based activities abroad if there is a strong and effective IPR regime (Mansfield, 1994; 1995; Maskus, 2000; Maskus and Reichman, 2005; UNCTAD, 2005). Multinational corporations willing to expand their scope geographically therefore need stronger IPR regimes in the host countries (UNCTAD, 2005, p. 29).

The TRIPS Agreement, by strengthening the IP regime worldwide, has basically contributed to enlarging the playing field for large corporations. The latter have perceived an opportunity in moving their knowledge-based activities abroad by exploiting human resources, technological capabilities and a more reliable IPR system. In the words of Senator Lieberman 'while the American companies may be improving their individual competitiveness in the short term, they may be collectively undermining America's and their own competitiveness for the long haul' (Senator Lieberman, 2004). It is somewhat surprising and worth reflecting upon that Western governments, first and foremost the US government, have insisted so much on introducing a new global IPR regime that might jeopardize the interests of their own citizens.

Fourth Thesis: TRIPS alone will not lead to an increase in the technology gap between Western countries and emerging countries

While many commentators argue that TRIPS alone may increase the gap between the most technologically advanced and the least technologically advanced nations (see, for example, Chang, 2003; May, 2002a), we believe that the importance of IPRs should not be overestimated. IPRs clearly favour the generators of innovations and deter the imitators. But the lack of a clear-cut division between innovators and imitators, which stems from the complexity of the mechanisms of generation and diffusion of knowledge and innovation, prevent IPRs and arrangements such as TRIPS from playing a decisive role.

National IP systems are often the outcome of production needs (Moser, 2005). Developed countries have exempted particular industries from IP protection in accordance with their needs at a particular time. Since the eighteenth century, IP policy has been conducted as an important part of trade and industrial policy (Khan, 2002). For example, Germany did not provide patent protection to food products, pharmaceutical or chemical products, but only to their production processes. The American law at the beginning provided strong protection for their citizens but weak protection for foreign inventors. The Japanese system was deliberately designed to favour the adoption and diffusion of technology (Ordover, 1991). In a similar vein, India did not allow patent protection for drugs, chemicals, optical glass and semiconductors, Thailand excluded chemical, drugs, food and agricultural machinery, and Brazil offered no protection for foodstuffs, chemicals and drugs (Ha-Joon, 2003; Khan, 2002).

If we look at how the IPR systems have evolved within nations, the well-founded suspicion arises that strong *IPRs seem to be the consequence rather than the cause of development* (Maskus, 2000; Mokyr, 2002). As the countries climb the development ladder and they become producers of innovations and technologies, the strengthening of IPRs is likely to come as a result of both industrial policy and pressure from business. However, we contend that, while recognizing that IP has played an important role in sustaining industrial policies and development, today there are several factors at work which can prevent TRIPS from widening the technological gap between Western and emerging economies.

A great deal of empirical work has been carried out in order to address a simple question: do stronger IPRs encourage transfer of technology? (Branstetter et al., 2004; Chen and Puttitanum,

2005; Lall, 2003; Mansfield, 1994; 1995; Maskus, 2000). The main findings of this body of literature can be summed up as follows: IPRs can be advantageous for countries with a certain degree of absorptive capacity and strong technological infrastructures, while they tend to increase the costs and reduce technology transfer for poorer countries. This evidence reinforces our assumption that the impact of IPRs on technology transfer has been overestimated since the magnitude of technology flows is affected by a variety of other factors, including: the size of the market, the development of appropriate capabilities, the endowment of cheap and/or skilled human resources, and the presence of a reliable institutional environment. In a nutshell, *a strong IPR regime is not in itself a sufficient condition for the transfer of technology to occur*.

Nor do IPRs have a direct role in explaining different rates of growth across countries (Park and Ginarte, 1997), and as the Word Bank recognizes, 'at different times and in different regions of the world, countries have realised high rates of growth under varying degrees of IPR protection' (World Bank, 2001, our emphasis). Within the manufacturing sector, the only industry in which IPRs seem to be particularly effective in avoiding copying is pharmaceuticals. In most manufacturing industries, the processes underpinning the adoption, adaptation and creative imitation of foreign technologies thus have ample scope for inventing around, thus avoiding IP infringements even in a stronger IPR regime.

On occasions IPRs can also make it easier to invent around protected technologies inasmuch patents and copyright force the inventors to articulate and provide the disclosure of the information.[8] The institution of IPRs provides a legal framework for contractual agreements concerning technologies, which encourage the institution of 'markets for technology', thereby facilitating international transfer of technology and its diffusion at the local level (Arora et al., 2001; Lall, 2003). New emerging phenomena, such as open source software, which make available innovative applications on a non-proprietary IPR basis and cannot be made legally excludable, offer numerous opportunities for emerging and developing countries to access crucial know-how at very low costs and to avoid IP infringements. Thus, it is the nature itself of knowledge generation and diffusion mechanisms that make the real world very different from a hypothetical one where IPRs are able to block the use of specific know-how. To conclude, we challenge the idea that TRIPS can be held responsible for the failure of developing countries to catch up since technology flows across countries are not driven by IPR regimes alone.

5. POLICY IMPLICATIONS: MUCH ADO ABOUT NOTHING?

Over the last thirty years, the United States has engaged in a race to increase the proprietary nature of knowledge, and at various stages it has managed to get the support of other Western countries. This privatization of knowledge had also an international dimension with TRIPS, an agreement promoted strongly by a small number of Western multinational corporations and aimed at imposing on the entire world a regime of IPRs dominant in the West and showing evident signs of crisis. The strengthening of IPRs and TRIPS, however, have not and could not change the nature of knowledge and the ways in which this can be transferred among economic agents. As we have reiterated in this article, to achieve a successful transfer of know-how between economic agents, both of them must be willing to devote time, resources and efforts to teach and to learn. For these reasons, we have argued that the importance of IPRs has been grossly overestimated: per se they can neither allow knowledge transfer nor obstruct it. On the one hand, IPRs cannot impede prospective imitators from acquiring knowledge but just make it a bit longer and a bit more costly. On the other hand, even in the absence of IPRs, potential imitators will not be able to master knowledge unless they invest time and resources. In spite of the often heated tone of the debate, the IPRs controversy seems to be a '*much ado about nothing'* controversy.

True, some key industries rely strongly on IPRs both at home and internationally. It is well known that pharmaceutical products are well protected by patents and that developing countries that cannot pay the full price for these drugs will not find themselves in the position to offer to their citizens the deserved medications. The judicial case of a few US pharmaceutical companies (the so-called Big Pharma) against the South African government over the use of drugs to combat HIV infection has been the most spectacular case precisely because concentrated economic interests were at stake on the one hand and a life-saving drug on the other. But can we generalize from this case? There are not many life-saving drugs around (unfortunately!) and several of them are no longer protected by IPRs. And we should not forget Pharmaceuticals is just one of the several industries comprising the economy.

It is also true that other key sectors of the information society are strongly dependent on other IPRs. In spite of the massive investment made by companies in the industry to make it difficult to copy software, software revenues strongly benefit from the legal protection guaranteed by copyright. It is also true that audiovisual products rely strongly on IPRs. These are the typical products which are costly to produce but that can be copied at virtually zero cost. Software and audiovisual

entertainment are increasingly important industries but, again, they do not represent the total economy. It is difficult to justify the belief that the economic development of emerging countries is hampered by the copyright on CDs and DVDs. And it is even more difficult to argue that pop singers, film stars and software companies are ruined by IP infringements. Moreover, stronger protection of IPRs may generate unexpected new entrants, as it happened with Linux in the case of software and Bollywood in the case of audiovisuals.

Those Western-based Corporations that have pressed so vigorously for stronger IPRs have not realized that IPRs codify the positions of the past, not those of the future. To remain attached to the defence of IPRs is the typical position of losers, i.e. those who want to maintain their market share solely by relying on monopoly positions achieved through the innovations of the past. Winners, on the contrary, would be much less worried about defending the innovations of the past through IPRs since they are confident that they can maintain and enlarge their market positions through continuous innovation. The literature on appropriability has clearly shown that IPRs are just one of the methods, and not even the most effective, for securing returns on companies' innovations.

But our analysis also has some important implications for public policies. We have argued that governments that have made IPRs stronger at home and in the world have not done a good service to their citizens. In fact, they have to a certain extent diverted attention from the problem of the offshoring of knowledge intensive jobs providing an advantage to their major corporations without realizing that also their workers may pay a price for it. A better service to citizens would have been to ensure greater international cooperation in science and technology, involving both public and business players in large-scale research projects. These projects could provide new technological opportunities that companies could then exploit competitively.

We have already pointed out that developing countries should not have accepted TRIPS. In a way these countries were confident that it would have been too difficult to enforce TRIPS and that, after all, the WTO devices were too slow and too complex to lead to sanctions of last resort. To some extent this is what has happened: the number of controversies continues to be rather small. But opposing TRIPS will certainly not be enough in itself to allow developing countries to bridge the technology gap. Developing countries need much more demanding active policies in order to acquire knowledge. Some of them have indeed managed to move from "developing" to "emerging" and even "developed" countries. The active learning policies of these countries, such as the East Asian tigers, involved the realization that there are strong complementarities between domestic

education, acquisition of knowledge from abroad, hosting foreign investment, and endogenous innovation (for a discussion, see Archibugi and Pietrobelli, 2003). The policies of these countries should be a source of inspiration for those countries that are still lagging behind.

References

Andersen, B. (2004) 'If 'Intellectual Property Right is the answer', what is the question? Revisiting the patent controversies', *Economics of Innovation and New Technology,,* 13 (5), 417-42.

Archibugi, D. and Iammarino, S. (2002) 'The Globalization of Technological Innovation: Definition and Evidence', *Review of International Political Economy,* 9 (1), 98-122.

Archibugi, D. and Pietrobelli, C. (2003) 'The Globalisation of Technology and Its Implications for Developing Countries. Windows of Opportunity or Further Burden?' *Technological Forecasting and Social Change,* 70 (9), 861-84.

Arora, A., Fosfuri, A. and Gambardella, A. (2001) *Markets for Technology: The Economics of Innovation and Corporate Strategy.* Cambridge, MA: The MIT Press.

Arrow, K. (1962) 'Economic Welfare and the Allocation of Resources for Invention', in Nelson, R. R. (ed.), *Economic Welfare and the Allocation of Resources for Invention.* Princeton: Princeton University Press.

Barton, J. H. (2000) 'Reforming the Patent System', *Science,* 287 (5460), 1933-34.

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

Blind, K., Edler, J., Schmoch, U., Anderson, B., Howells, J., Miles, I., Roberts, J., Green, L., Evangelista, R., Hipp, C. and Herstatt, C. (2003) *Patents in the service industries*, Fraunhofer - Institute System and Innovation Research.

Boyle, J. (2003) 'The Second Enclosures Movement and the Construction of the Public Domain', *Law and contemporary problems,* 66 (1/2), 33-74.

Branstetter, L. G., Fishman, R. and Foley, C. F. (2004) 'Do Stronger Intellectual Property Rights Increase International Technology Transfer? Empirical Evidence from U.S. Firm-Level Panel Data', *Quarterly Journal of Economics,* 121 (1), 321-49.

Chang, H. (2003) *Kicking Away the Ladder: Policies and Institutions for Economic Development in Historical Perspective.* London: Anthem Press.

Chen, Y. and Puttitanum, T. (2005) 'Intellectual Property Rights and Innovation in Developing Countries', *Journal of Development Economics,* 78 (2), 474-93.

Chesbrough, H. W. (2003) *Open Innovation: the New Imperative for Creating and Profiting from Technology.* Boston: Harvard Business School Press.

Cohen, W. M. and Levinthal, D. A. (1990) 'Absorptive Capacity: a New Perspective on Learning and Innovation', *Administrative Science Quarterly,* 35 128-52.

Cohen, W. M. and Levinthal, D. A. (1989) 'Innovation and Learning: the Two Faces of R&D', *Economic Journal,* 99 (397), 569-96.

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

David, P. (2000) 'A Tragedy of the Public Knowledge "Commons"', *Working Paper.*

Drahos, P. (1995) 'Global Property Rights in Information: The Story of TRIPS and the GATT', *Prometheus,* 11 (1), 6-19.

Drahos, P. and Mayne, R. (2002) *Global Intellectual Property Rights. Knowledge, Access and Development.* New York: Palgrave MacMillan.

European Commission (2007) *Europe in the Global Research Landscape.* Brussels: European Commission.

Filippetti, A. (2009) 'Managing Design Innovation: Technology, Technique and Materials', *CNR Working Paper.*

Freeman, C. (1987) *Technology Policy and Economic Performance: Lessons from Japan.* London Pinter.

Gallini, N. (2002) 'The Economics of Patents. Lessons from the Recent U.S. Patent Reform', *Journal of Economic Perspective,* 16 (2), 131-54.

Gleick, J. (2003) 'The Crisis in the U.S. Patent Office', *New York Times Magazine,* 29 July.

Ha-Joon, C. (2003) *Kicking Away the Ladder: Policies and Institutions for Economic Development in Historical Perspective.* London: Anthem Press.

Hall, B. and Ziedonis, R. H. (2001) 'The Patent Paradox Revisited: an Empirical Study of Patenting in the U.S. Semiconductor Industry', *RAND Journal of Economics,* 32 (1), 101-28.

Hardin, G. (1968) 'The Tragedy of the Commons', *Science,* 162 (3859), 1243-48.

Heller, M. (2008) *The Gridlock Economy. How Too Much Ownership Wrecks Markets, Stops Innovation, and Costs Lives.* New York: Basic Books.

Heller, M. A. and Eisenberg, R. S. (1998) 'Can Patents Deter Innovation? The Anticommons in Biomedical Research', *Science,* 280 (5364), 698-701.

Hess, C. and Ostrom, E. (2006) *Understanding Knowledge as a Commons: From Theory to Practice.* Cambridge MA: The Mit Press.

Hou, C. and San, G. (1993) 'Nation systems supporting technical advance in industry - the case of Taiwan', in Nelson, R. R. (ed.), *Nation systems supporting technical advance in industry - the case of Taiwan.* New York: Oxford University Press.

Jaffe, A. B. and Lerner, J. (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.

Khan, Z. (2002) 'Intellectual Property and Economic Development: Lessons from American and European Industry', *Commission on Intellectual Property Rights. Study Paper 1a.*

Lall, S. (2003) 'Indicators of The Relative Importance of IPRs in Developing Countries', *Research Policy,* 32 (9), 1657-80.

Lanoszka, A. (2003) 'The Global Politics of Intellectual Property Right and Pharmaceutical Drug Policies in Developing Countries', *International Political Science Review,* 24 (2), 181-97.

Lerner, J. and Tirole, J. (2002) 'Some Simple Economics of Open Source', *The Journal of Industrial Economy,* 50 (2), 197-234.

Levin, R. C., Klevorick, A. K., Nelson, R. and Winter, S. (1987) 'Appropriating the Returns from Industrial Research and Development', *Brookings Paper on Economic Activity,* 3 783-381.

Macmillan, F. (2006) 'Public Interest and the Public Domain in an Era of Corporate Dominance', in Andersen, B. (ed.), *Public Interest and the Public Domain in an Era of Corporate Dominance.* Cheltenhman: Edward Elgar.

Mansfield, E. (1994) 'Intellectual Property Protection, Foreign Direct Investment, and Technology Trasfer', *World Bank Discussion Paper n. 19.*

Mansfield, E. (1995) 'Intellectual Property Protection, Foreign Direct Investment, and Technology Trasfer. Germany, Japan and the United States', *World Bank Discussion Paper n. 27.*

Mansfield, E. (1986) 'Patents and Innovation: An Empirical Study', *Management Science,* 32 (2), 173-81.

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

Maskus, K. E. and Reichman, J. H. (2005) *International Public Goods and Transfer of Technology.* Cambridge: Cambridge University Press.

May, C. (2002a) *The Information Society: A Sceptical View.* Cambridge: Polity Press.

May, C. (2002b) 'The Venetian Moment: New Technologies, Legal Innovation and the Institutional Origins of Intellectual Property', *Prometheus,* 20 (2), 159-79.

May, C. and Sell, S. (2006) *Intellectual Property Rights: A Critical History.* London: Lynne Rienner Publisher.

Merges, R. P. and Nelson, R. (1990) 'On the Complex Economy of Patent Scope', *Columbia Law Review,* 90 (4), 839-916.

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

Morishima, M. (1982) *Why has Japan 'succeeded'?: Western Technology and the Japanese Ethos* Cambridge Cambridge University Press.

Moser, P. (2005) 'How Do Patent Laws Influence Innovation? Evidence from Nineteenth-Century World's Fairs', *The American Economic Review,* 95 (4), 1214-36.

Mowery, D. and Oxley, J. (1997) 'Inward technology transfer and competitiveness: the role of national innovation system', in Archibugi, D. and Michie, J. (ed.), *Inward technology transfer and competitiveness: the role of national innovation system.* Cambridge: Cambridge University Press.

Mowery, D. C. and Rosenberg, N. (1989) *Technology and the Pursuit of Economic Growth.* Cambridge: Cambridge University Press.

Mowery, D. C. and Sampat, B. N. (2004) 'The Bayh-Dole Act of 1980 and University–Industry Technology Transfer: A Model for Other OECD Governments?' *The Journal of Technology Transfer,* 30 (1-2), 115-27.

Nelson, R. and Winter, S. (1982) *An Evolutionary Theory of Economic Change.* Cambridge, MA: Harvard University Press.

Nelson, R. and Wright, G. (1992) 'The Rise and Fall of American Technological Leadership: The Postwar Era in Historical Perspective', *Journal of Economic Literature,* 30 (4), 1931–64.

Ordover, J. A. (1991) 'A Patent System for Both Diffusion and Exclusion', *The Journal of Economic Perspectives,* 5 (1), 43-60.

Park, W. G. and Ginarte, J. C. (1997) 'Intellectual Property Rights and Economic Growth', *Contemporary Economic Policy* 15 51-61.

Pavitt, K. (1987) 'The Objectives of Technology Policy', *Science and Public Policy,* 14 182-88.

Pianta, M. (1988) *New Technologies Across the Atlantic. US leadership or European autonomy.* Hemel Hempstead: Harvester and Wheatsheaf.

Polanyi, M. (1966) *The Tacit Dimension.* New York: Doubleday.

Rosenberg, N. and Steinmueller, E. (1988) 'Why are Americans Such Poor Imitators?' *The American Economic Review,* 78 (2), 229-34.

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

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

Senator Lieberman, J. I. (2004) *Offshore Outsourcing and America's?? Competitive Edge*, United States Senate.

Shiva, V. (2001) *Protect or Plunder?: Understanding Intellectual Property Rights.* London: Zed Books Ltd.

Tapscott, D. and Williams, A. (2006) *Wikinomics: How Mass Collaboration Changes Everything.* Lodon: Atlantic Books.

Teece, D. J. (1986) 'Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy', *Research Policy,* 15 (6), 285-305.

UNCTAD (2005) *World Investment Report 2005. Transnational Corporations and the Internationalization of R&D*, UNCTAD.

US Department of Commerce (2009) Bureau of Economic Analysis. Available from: http://www.bea.gov [accessed 14 July 2009].

von Hippel, E. (1998) *The Sources of Innovation.* New York: Oxford University Press.

Westphal, L. E., Kim, L. and Dahlam, C. (1985) 'Reflections on the Republic of Korea's acquisition of technological capability', in Rosenberg, N. and Frischtak (ed.), *Reflections on the Republic of Korea's acquisition of technological capability.* New York: Praeger.

Winter, S. (1987) 'Knowledge and competencies as strategic assets', in Teece, D. A. (ed.), *Knowledge and competencies as strategic assets.* Cambridge MA: Ballinger.

Wong, J. (2004) 'The adaptive developmental state in East Asia', *Journal of East Asian Studies,* 4 345-62.

Woo-Cumings, M. (1999) *The Developmental State* New York: Cornell University Press.

World Bank (2001) *Intellectual property: balancing incentives with competitive access* World Bank.

World Trade Organization (2009a) Dispute Settlement. Available from: http://www.wto.org [accessed 14 July 2009].

Zhao, L. and Reddy, N. (1990) 'International Technology Transfer: a Review', *Research Policy,* 19 (4), 285-307.

Ziedonis, R. H. (2004) 'Don't Fence Me In: Fragmented Markets for Technology and the Patent Acquisition Strategies of Firms', *Management Science,* 50 (6), 804-20.

[1] We wish to thank Eva Nag for comments on a previous version.

[2] According to the legend, Doctor Faustus, an earnest alchemist, trades his soul to Mephistopheles to obtain 24 years of unrestrained creativity.

[3] For a review, see Maskus and Reichman, 2005; Mowery and Oxley, 1997; UNCTAD, 2005; Zhao and Reddy, 1990.

[4] Developmental state is a term used by international political economy scholars to refer to the phenomenon of state-led macroeconomic planning in East Asia in the late twentieth century. A development state is characterized by having strong state intervention, as well as extensive regulation and planning.

[5] The Most Favoured Nation clause establishes that whatever more favourable treatment is agreed upon between two or more countries is automatically extended to all the other nations. In this case to all the TRIPS signatories. Article 4 states that 'With regards to the protection of intellectual property, any advantage, favour, privilege or immunity granted by a Member to the nationals of any other country, shall be accorded immediately and unconditionally to the nationals of all other Members'.

[6] For a more comprehensive explanation of the role of Section 301 and bilateral policies see Drahos, 1995; Ryan, 1998; Sell, 2003.

[7] Offshore outsourcing is the contracting of some business functions to companies usually in lower-cost countries. Offshoring is instead used to describe multinational corporations relocating work from their domestic sites to foreign locations.

[8] Despite the legal requirement of disclosure, business' patent lawyers try to avoid the disclosure of strategic information at the base of the functioning of a technology (Bessen and Meurer, 2008).