

# The Globalisation of Intellectual Property Rights: Four Learned Lessons and Four Theses

Daniele Archibugi

*Italian National Research Council and University of London*

Andrea Filippetti

*University 'La Sapienza' of Rome, Italian National Research Council and University of London*

## Abstract

Intellectual Property Rights (IPRs) 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' (TRIPS) Agreement, signed in 1994 as a founding element of the World Trade Organisation, represents the most important attempt to establish a global harmonisation of Intellectual Property protection. The aim of this article is to re-examine critically what has become the common wisdom around 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 overestimated their importance in the process of generation and diffusion of knowledge and innovation. On the basis of some key learned lessons on the nature of innovation and technological change, we assess four theses about TRIPS and its impact on the global generation and distribution of knowledge. Finally, the policy implications concerning international organisations and technological transfer are discussed.

## Policy Implications

- Intellectual Property Rights (IPRs) have emerged as the key issue of global innovation policy: through the 'Trade Related Aspects of Intellectual Property Rights' (TRIPS) Agreement, there is an attempt to impose worldwide a western system of IPRs.
- Western governments and large corporations claim that strong IPRs are needed to maintain investment in innovation. This position is contrasted by new political and social movements, which assert that muscular IPRs enforcement hampers

economic growth and welfare in developing countries. The article argues that both positions over-emphasise what IPRs can actually do to promote or obstruct innovation.

- IPRs per se do not allow companies to appropriate the returns from their innovations unless they are matched to a wide-ranging strategy that includes continuous learning and dynamic innovation.
- There are substantial cross-industry differences in the role played by IPRs: while patents are quite significant in pharmaceuticals and copyright is important in the audiovisual industry, the majority of sectors are not seriously affected by either strong or weak IPR regimes.
- In order to catch up, developing countries should put specific policies in place to nurture their absorptive capacity through the creation of appropriate infrastructure and human resources. Competence building is not hampered by IPRs. Developing countries should concentrate on active learning policies to acquire the knowledge of the most industrialised nations.
- Western nations would better protect their well-being by focusing on promoting new knowledge and creativity rather than by impeding new entrants from accessing the know-how they have already generated.

Intellectual Property Rights (IPRs) have become ubiquitous in the economic debate: the front pages of newspapers continually report major controversies among corporations, governments and advocacy groups. News such as the copyright issue of the Google Books project and the power of the Big Pharma's patents over key drugs and vaccines have generated growing alarms and heated disputes. 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 these concerns, as 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 at the European Parliament. Above all, IPRs have become one of the core businesses of the World Trade Organisation (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 in 1994, is a founding element of the WTO. TRIPS constitutes the most important attempt to establish a global harmonisation of Intellectual Property (IP) protection and enforcement, creating international standards for the protection of patents, copyrights, trademarks and design. It also provides a dispute settlement schema and establishes enforcement procedures at the intergovernmental level. Not surprisingly, TRIPS has been highly debated by political scientists (May, 2002a; Ryan, 1998; Sell, 2003) and economists (Maskus, 2000; Maskus and Reichman, 2005, among others). But TRIPS has also been debated outside academe and has been vigorously opposed by nongovernmental organisations and global movements (Drahos and Mayne, 2002).

The aim of this article is to re-examine critically what has become the common wisdom around 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 than the protection through IPRs of the already available knowledge. The debate has instead been concentrated on IPRs as such rather than on knowledge generation and diffusion because some key learned lessons on the nature of innovation and technological change have not been duly taken into account. On the basis of these learned lessons, we will assert four theses about TRIPS.

This article will mainly focus 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 provide the rationale behind the establishment of the IPRs systems across modern societies. Section 2 presents four learned lessons that emerge from the literature of the economics of innovation and technological change. In Section 3 we present four main theses on the globalisation of IPRs and their effects on the global generation and distribution of knowledge. The final section discusses policy implications.

## 1. The Faustian bargain and the rationale for intellectual property rights

The modern patent system, based on the objective assessment of inventions, was introduced by the Venetian Republic in 1474 (May, 2002b). The two requirements indicated by the Venetian Republic – the usefulness and novelty of the invention – are still in vigour today in all states. As in a Faustian bargain, the inventor and the government undertake a long-term pact: the inventor commits him/herself to disclose all information of his/her invention, while the government guarantees that it will provide legal protection to give exclusive rights on the economic returns of the invention (for a history of IPRs, see May and Sell, 2006).<sup>1</sup>

IPRs have evolved substantially over the centuries but 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/her creative activities without his/her authorisation. Thus the government gives the inventor a legal monopoly to exploit his/her invention and capture the economic benefits for a limited period of time. Legislation is far from uniform: for copyright the disclosure is complete by 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, this one is rarely fully implemented and the inventor often tries to hide as much as possible about his/her invention, while the government is not in a position to assure full appropriation of the returns of the invention.

Through this deal, the government manages to disclose information on the already generated knowledge, and perhaps more importantly it provides an incentive to individuals to invest their time and resources in creative activities. Creative activities are in fact time consuming and costly while it is always uncertain if they will produce something that will generate economic returns. Once the inventor has discovered a new device or a musician has written a new symphony, it becomes easy for others to exploit their outcomes at very low costs. Without legal protection, inventors and authors are not in a position fully to exploit their works and appropriate the economic returns. As a result, in the absence of public regulation there would be an underinvestment in creative activities that would be below 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 persecuted by the law and compensation will be obtained. These are the strong IPRs regimes. In other countries, the IPRs regime is much weaker and there is much less public interest in enforcing IPRs. Policing violation is much more relaxed and courts are slow and/or permissive towards infringement.

## 2. What we have learned about knowledge and innovation: four learned lessons

Scholars in the field of innovation have largely explored the mechanism that lies at the heart of the creation and diffusion of knowledge and innovation, as well as the mechanism of technological change. In this section we will briefly outline four learned lessons derived from this body of literature that are relevant to assessment of the current IPRs controversy.

**Lesson 1:** Knowledge is not information. Successful knowledge transfer is not only a matter of transferring information, but it requires learning through acquiring a wide range of competences, skills and tacit knowledge.

There is a basic distinction between *information* and *knowledge*. Information is a good that is costly to produce but which by the moment it becomes public can be appropriated and transmitted at very low costs. Since all the costs are on the shoulders of the producers of information and there is no cost on the users, the lack of institutional protection would likely lead to an underinvestment 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 effort and time in learning. Knowledge is therefore rather 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, p. 60; 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, 1967) and not even those who have generated it are able to articulate it properly in manuals, blueprints, patents or other 'codes'. A good cook is not necessarily able to transfer all his/her knowledge in a book of recipes. We are dealing with tacit knowledge when 'we know more than what we can tell' (Polanyi, 1967, p. 4). In order to transfer tacit knowledge to an apprentice, the coded component should be complemented with experimentation and training. A key characteristic of IPRs is that they can protect the codified knowledge but not the tacit knowledge.

The picture is therefore more complex than it may appear in the first instance. On the one hand, the producers of knowledge have a wider battery of instruments to profit from it, ranging from selling the codified component through the IPRs 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 to buy IPRs, but also to get the infrastructures and the skills that make it possible actually to use knowledge for economic purposes.

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

Pablo Picasso once 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 the 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, undertook 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 Organisation for Economic Cooperation and Development (OECD) countries. Every 'emerging economy' at some point in its history has relied on the adoption of foreign technologies.<sup>2</sup> Technology transfer is a multidimensional phenomenon and to be effective it should pay attention to the features of the host countries, including their stage of development, economic and industrial base, characteristics of the institutions and last and not least the IPRs regime.

There is not a single channel that guarantees successful technology and knowledge transfer. On the contrary, each knowledge domain requires activating a variety of interconnected channels, including: (1) foreign direct investments, since the branches of multinational corporations in host countries often provide the most straightforward way to assimilate production methods of other countries; (2) joint ventures and strategic alliances, which allow companies of different countries to combine their skills, resources and expertise; (3) technology licensing, which includes not just the acquisition of IPRs but also technical assistance and training; and (4) technology embodied in imports, especially in the case of capital goods and equipment.

**Lesson 3:** Knowledge is not about plug and play. To adopt foreign technology is a costly activity requiring a big 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 should be willing to undertake. In order to make sense and exploit the spectrum of knowledge, competences and technologies coming from abroad, each country needs to develop an 'absorptive capacity', that is, the endogenous capacity to learn from these opportunities and to exploit them economically (Cohen

and Levinthal, 1989, 1990). This reminds us that learning is not a fully passive process. Countries need to monitor the advances occurring abroad, to create internal competences 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*.<sup>3</sup> In the second half of the 20th century, western technology was equally available to Latin American and to East Asian countries, but only the latter countries have managed to acquire it to a point where they are able to compete on a par, mostly because of the active learning policies implemented (Wong, 2004; Woo-Cumings, 1999).

National R&D investment to absorb foreign technology has been a crucial enabling factor for US economic growth during the 1900–1946 period (Mowery and Rosenberg, 1989) and for Japanese reconstruction during the postwar period (Morishima, 1982). This is often associated with the activities carried out by both business and the public sectors. Firms in catching-up countries need to invest in R&D, capital goods, equipment and infrastructures to develop the appropriate knowledge and capabilities 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 have succeeded in catching up relied on a combination of devices to acquire foreign technology with policies aimed at building competences and skills internally.

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

Innovation is one of the most heterogeneous economic activities. A hairpin and a song, a jet engine and a statistical method, a drug and a machine tool could all be innovations. The heterogeneous nature of the phenomenon is equally reflected in the sources and methods employed to appropriate the returns provided by innovation activities. The methods to guarantee returns from innovations vary 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 comprises the legal methods associated with IPRs. The second category is represented by other economic methods, which include industrial secrecy, lead time, differentiation and market distribution. The relative importance of the two categories varies

considerably across technologies and industries. But a wealth of empirical studies has consistently shown that IPRs alone cannot guarantee the full appropriation of innovations.<sup>4</sup> On the grounds of in-depth statistical surveys carried out at the firm level, it emerges that patents, the most important and controversial component in the IPRs family, are very important only in the pharmaceutical industry, and, to a lesser extent, in the chemical industry. But patents are not a key competitive factor in other high-tech industries such as electronics, telecommunication, motor vehicles and machinery. In some high-tech industries such as aerospace and nuclear energy, patents are not important at all since industrial secrecy is much more relevant. 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 IPRs such as the GNU General Public Licence (GPL) for the development of so-called *open source* software. Contrary to the traditional IPRs 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 that allow firms to profit from relying on new strategies based on combinations of 'traditional' and new forms of IPRs (Chesbrough, 2003; Lerner and Tirole, 2002; Tapscott and Williams, 2006). Other significant differences emerge according to 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; it would be difficult otherwise 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 legal protection with other economic instruments of appropriation.

While there is abundant evidence on the manufacturing industry and on the patent system, there is less evidence on the appropriability system in the service industry and on the 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, have several similarities. A few industries rely strongly on copyright and are damaged 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 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 design registration as a means to protect their new products (Filippetti, 2009).

The innovator's and the imitator's perspectives are quite symmetrical. Strong regimes of IPRs make imitation slightly more costly and slower but not impossible since there is often a 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. By contrast, weak regimes of IPRs make imitation cheaper and faster. But prospective imitators need to acquire a wide range of expertise that can be achieved through a substantial investment in building the knowledge base requested.

### 3. Four theses on the globalisation of intellectual property rights

On the grounds of the learned lessons summarised above, how can we interpret the current controversy on the global regime of IPRs and, in particular, TRIPS? We affirm in this section four theses that in their respective ways place much of what has become the traditional wisdom in a different context.

#### First thesis: TRIPS aims to impose the western and broken IP regime on the rest of the world

*A silent revolution in IPRs began in the United States.* Over the last few decades, the United States has introduced several institutional changes that strengthened the IPRs regime. These changes have generated greater penalties for IPRs infringement, allowed Intellectual Property for publicly funded R&D and enlarged the scope of patents into unexpected areas: in a nutshell they have introduced a 'silent revolution' (Andersen, 2004; Jaffe and Lerner, 2004). In detail the changes are as follows.

- The establishment of a centralised 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 moved towards strengthening patent holders' rights (Gallini, 2002; Jaffe and Lerner, 2004).

- The Bayh-Dole Act approved in the United States in 1980 to facilitate the commercialisation of inventions developed in the public sector, allowing universities and other publicly funded institutions to grant patents and exclusively license the results of research contracts funded by federal agencies. Through the Bayh-Dole Act, publicly funded R&D has also become privately exploitable. Several other OECD countries have imitated the Bayh-Dole Act and introduced similar legislation (for an assessment, see Mowery and Sampat, 2004).
- The possibility to acquire the protection of patents has been broadened 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, p. 3). But the scope of patent protection has also been extended to key sectors such as software, business methods, statistical methods, genes, plant genetics, micro-organisms and so on. This is implementing 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, p. 115). Further, patents are now granted also for discoveries that are very close to 'life': about 40,000 DNA-related patents have been granted (Heller, 2008, p. 50).

*Is the western IP system broken?* Although they have not been replicated to the same extent in Europe and Japan, the stronger regime of IPRs that emerged in the USA has become a model for other continents. But this model is far from satisfactory. Three main kinds of criticisms have been made.

### What has the economics of innovation to say about knowledge and intellectual property rights?

**Lesson 1:** To consider knowledge as information, as is 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 build up the state of the art and good imitators need to improve to imitate and adopt others' innovations.

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

**Lesson 4:** IPRs are just one of the channels used by companies to appropriate the returns from their innovations. There are cross-industry differences in the effectiveness of IPRs and while pharmaceuticals are heavily 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 learning and innovation.

- Growing attention has been paid to the so-called ‘tragedy of the anti-commons’. Long ago, it was argued that a lack of property rights might 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 both the circulation of information and innovation (Hardin, 1968; 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 that 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 take hostage as many technologies as they can to hamper 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 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, p. 1933). Instead of promoting innovation, IPRs are diverting resources from innovation.

*Is TRIPS the imposition of a rotten IP regime on to the developing world?* TRIPS has become one of the most controversial issues not only in academe, but also in the political arena. Civil activists, NGOs and public opinion in general have fiercely denounced TRIPS as a colonialist act imposing the western standard of the IPRs system on the rest of the world (Shiva, 2001). In fact, TRIPS is the key instrument for the enlargement of the ‘silent revolution’ in IPRs beyond the west.

The TRIPS Agreement strengthened previous standards by mandating enforcement in all member countries and by reforming the Dispute Settlement procedures within the WTO. Article 4 of the TRIPS Agreement applies a cornerstone of the global trade policy, the so-called Most Favoured Nation clause, to the IPRs (World Trade Organisation, 2009).<sup>5</sup> Article 10 allows the copyright protection of software and data sets, and fixes 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 the World Intellectual Property Organisation (WIPO) in 1989. Part 3 of the TRIPS Agreement is dedicated to the enforcements of IPRs, and Article 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 modernise their judicial systems and enforcement procedures to comply with TRIPS (World Trade Organisation, 2009).

Through TRIPS, the IP systems of the most advanced countries are 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 the TRIPS Agreement most developing countries did not extend protection to emerging technologies such as software, integrated circuits and electronic databases, or allow IP to plant varieties. One of the most controversial issues has been the possibility of patenting in pharmaceuticals, an industry to which TRIPS dedicates special attention (Lanoszka, 2003). India, Brazil, Argentina, Mexico and several other countries had weak IP protection on drugs which allowed the development of a generic drug national industry that is now incompatible with TRIPS.

Regarding the enforcement and dispute settlement provisions, TRIPS introduces a fundamental novelty with respect to the previous international setting. Neither the Paris Convention for the Protection of Industrial Property nor the Berne Convention for the Protection of Artistic and Literary Property provided effective procedures for settling IPRs disputes. TRIPS has dramatically changed this state of affairs by linking IPRs to international trade, allowing advanced countries to increase further their bargaining power in the WTO. This ensures more effective enforcement and the possibility of using trade provisions, such as tariffs and quotas, to punish rule-breaking countries. Table 1 shows the disputes within the WTO concerning TRIPS. This ‘who is suing whom’ table shows that the US have the lion’s share of disputes.

The harmonisation of IPRs introduced by the TRIPS Agreement has led to a race to the top which is certainly not advantageous to countries wishing to catch up by acquiring the expertise, knowledge and innovations of the leaders (Chang, 2003). Moreover, for most WTO members, TRIPS is an exogenous introduction of rules and standards. It is somehow surprising that this expansion of western standards occurred at a time when the usefulness of IPRs as a method to foster innovation and knowledge development is seriously challenged also in the west. Why has this happened? 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.

**Table 1.** Who is suing whom? Disputes cases related to TRIPS and TRIPS enforcement

		Sued country													Total
		USA	EC	Argentina	Brazil	Canada	Denmark	Greece	India	Ireland	Pakistan	Portugal	Sweden	Japan	
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 on WTO data (World Trade Organisation, 2009).

### Second thesis: TRIPS is the outcome of a nondemocratic process driven by a club of US corporations

A club of US multinational corporations played a major role in getting 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 the 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 US supremacy in high-tech trade resulted in 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).

US trade policy undertook by the mid-1980s a major shift in response to threats to its technological world hegemony. Beginning in the early 1980s, its annual trade deficit reached unprecedented levels. The US trade deficit topped \$100 billion in 1984 and peaked at a record \$153 billion in 1987 (US Department of Commerce, 2009). Linking the loss of market shares to IP infringement by other countries could provide an explanation for the former and a policy action for the latter. US corporations hoped to find a remedy to their lack of competitiveness by making IPRs stronger in their markets abroad. By the mid-1980s the US administration also began to encompass international affairs in its pro-IPRs silent revolution. This was justified by the feeling that free trade was no longer *fair* trade, since a substantial part of R&D and innovative investments financed by American corporations were 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 for assessing other countries' eligibility for nonreciprocal trade concessions.<sup>6</sup>

From 1984 until the signing of the TRIPS Agreement of 1994 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 closely connected 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 interest, while the IPC consisted of 12 chief executive officers representing IPR-intensive industries. These influential business associations (Ryan, 1998) provided the USTR with several reports in which they pointed out the damages caused to US business by IP piracy country by country. The IPC's major achievement was involving European and Japanese industry in their policy so that the US, Europe and Japan were united about the inclusion of an IP code in the General Agreement on Trade and Tariffs (GATT). When eventually the WTO replaced GATT in 1994, it included the TRIPS Agreement as one of its core pillars. As Susan Sell explicitly claims, 'twelve corporations made public law for the world' (Sell, 2003, p. 96). In return, developing countries obtained the liberalisation of international trade in textiles and apparel through the Multifibre Agreement (see also Maskus, 2000).

### Third thesis: TRIPS may serve the interests of western corporations but not necessarily those of western economies

The fact that TRIPS has been a western imposition does not necessarily imply that it will manage to serve western interests. Since the introduction of the TRIPS Agreement

the trend of trade performance of the USA and other advanced countries has not changed remarkably. Emerging countries, those which TRIPS aimed to discipline for their alleged unfair IP infringement, 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 alone seem to be able to solve the problems for which it has been imposed, namely the challenge to western primacy in knowledge-intensive industries.

In Figure 1 we report the average annual growth of exports relative to high-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 high-tech industries against the triad, that is, the US, Europe and Japan. This trend is confirmed also in terms of the world share of high-tech exports reported in Table 2. In 2005 China became the largest exporter of computers and office machinery, reaching a world share equal to 28.3 per cent, followed by the US (14.6 per cent) and the EU-25 (8.3 per cent), and the second largest 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 per cent of world exports.

Not surprisingly, political concern about declining US competitiveness has shifted from infringement of IPRs towards offshore outsourcing and offshoring.<sup>7</sup> The White Paper 'Offshore Outsourcing and 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*' (Lieberman, 2004, p. 2, emphasis added). The main point raised is that US corporations are moving key components of their innovative activities abroad, 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 first and third most attractive locations, respectively, to invest in R&D activities. The Toyota Technical Centre in Thailand, Motorola's R&D centres in China and Microsoft's sixth global research centre in Bangalore are just a few examples witnessing the fact that TNCs are investing at the cutting edge of technology in emerging countries (UNCTAD, 2005) (on the globalisation of technology see also Archibugi and Iammarino, 2002; Archibugi and Pietrobelli, 2003).

The TRIPS Agreement has therefore not reversed countries' relative performance since 1994. The real winners from TRIPS are not advanced countries, but rather the large corporations that pressed for its adoption. Empirical research has shown that multinational corporations are

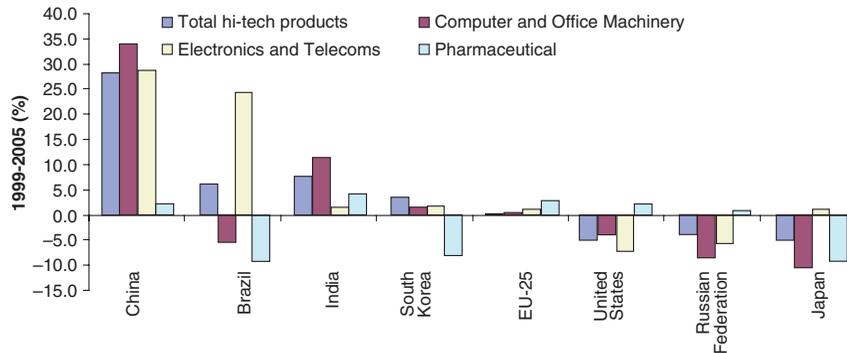
more likely to establish advanced and knowledge-based activities abroad if there is a strong and effective IPRs regime.<sup>8</sup> Multinational corporations willing to expand their scope geographically therefore need stronger IPRs regimes in the host countries (UNCTAD, 2005, p. 29).

The TRIPS Agreement, by strengthening the IP regime all over the world, has basically contributed to enlarging the playing field for large corporations. The latter have seen the opportunity to move their knowledge-based activities abroad by exploiting human resources, technological capabilities and a more reliable IPRs 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' (Lieberman, 2004, p. 3). It is somehow surprising and worth reflecting upon the fact that western governments, first and foremost that of the US, have insisted so strongly on introducing a new global regime of IPRs that might jeopardise 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 lead to an increase in 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, will not allow IPRs and arrangements such as TRIPS to play a decisive role.

National IP systems are often the consequence 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 18th 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. American law at the beginning provided strong protection for US citizens but weak protection for foreign inventors. The Japanese system was deliberately designed to favour adoption and diffusion of technology (Ordovery, 1991). In a similar vein, India did not allow patent protection for drugs, chemicals, optical glass or semiconductors, Thailand excluded chemicals, drugs, food and agricultural machinery and Brazil did not offer protection for foodstuffs, chemicals and drugs (Chang, 2003; Khan, 2002).

**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).

**Table 2.** High-tech exports: world market shares 1999–2005 (%)

	Total hi-tech products		Computer and Machinery		Office 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
China	3.4	15.0	4.9	28.3	2.9	12.9	3.1	3.6
Japan	12	8.7	11.9	6.0	13.3	9.6	4.0	2.3
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: Authors' elaboration on data from the European Commission report 'Europe in the Global Research Landscape' (European Commission, 2007).

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

A great deal of empirical work has been carried out to address a simple question: do stronger IPRs encourage transfer of technology?<sup>9</sup> The main findings of this body of literature can be synthesised as follows: IPRs can be advantageous for countries with a certain degree of absorptive capacity and strong technological infrastructures, while they tend to increase costs and reduce tech-

nology 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: size of the market, development of appropriate capabilities, 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.*

IPRs do not have a direct role in explaining different rates of growth across countries (Park and Ginarte, 1997), and as the World Bank recognises, '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, p. 142). Within the manufacturing sector, the only industry in which IPRs seem to have good efficacy in avoiding copying is pharmaceuticals. In most manufacturing industries, thus, the processes at the base of the adoption, adaptation and

creative imitation of foreign technologies have substantial scope for inventing, avoiding IP infringements even in a stronger IPRs regime.

On several occasions IPRs have also made it easier to invent around protected technologies inasmuch as patents and copyright force inventors to articulate and provide disclosure of information.<sup>10</sup> The institution of IPRs provides a legal framework for contractual agreements concerning technologies, which encourage the institution of 'markets for technology', making easier the 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 offer innovative applications on a nonproprietary IPRs basis and which cannot be made legally excludable, offer considerable opportunities for emerging and developing countries to access crucial know-how at very low costs while avoiding IP infringements. Thus, it is the nature of knowledge generation and diffusion mechanisms themselves that make the real world very different from a hypothetical one in which 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 inability of developing countries to catch up since technology flows across countries are not driven by IPRs regimes alone.

#### 4. Policy implications: much ado about nothing?

Over the last 30 years, the United States has begun a race to increase the proprietary nature of knowledge, and it has managed to obtain at various stages the support of other western countries. This privatisation of knowledge has also acquired an international dimension through TRIPS, an agreement pushed by a small number of western multina-

tional corporations which has aimed to impose 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, has 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 the successful transfer of know-how between economic agents, both of them should 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: they can neither allow knowledge transfer nor obstruct it per se. On the one hand, IPRs cannot impede prospective imitators from acquiring knowledge but just make the process a little lengthier and a little more costly. Firms, in fact, profit much more from their *economic* monopoly position built around their innovation than from the *legal* monopoly associated with their IPRs. On the other hand, even in the absence of IPRs, potential imitators will not be able to master knowledge unless they invest their time and resources. In spite of the often heated tone of the debate, the IPRs controversy seems to be one that is 'much ado about nothing'.

It is true that some key industries rely strongly on IPRs both at home and internationally. It is well known that pharmaceutical products are effectively protected by patents. Developing countries that cannot pay the full price for these drugs will not find themselves in a position to offer their citizens the medications they deserve. The judicial case of a few US pharmaceutical companies (the so-called Big Pharma) against the South African government for the use of drugs to combat HIV infection has been most spectacular precisely because at stake were concentrated economic interests on the one hand and a lifesaving drug on the other. But can we generalise from this case?

#### Four theses to assess TRIPS

**First Thesis:** TRIPS aims to impose the western and broken IP regime on the rest of the world.

The IPRs regime has become stronger in the western world. This trend began in the United States, where the scope of IPRs has 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 western logic to all countries. This has happened at a time when the ability of IPRs to provide incentives to innovators and to facilitate the diffusion of knowledge has been increasingly questioned in the west itself.

**Second Thesis:** TRIPS is the outcome of a nondemocratic process driven by a club of US corporations. TRIPS has not been debated and negotiated as a global public good. On the contrary, it has been strongly pushed by the United States. In particular, it is the outcome of the pressures made by a handful of US corporations which have successfully asked their government to act on their behalf.

**Third Thesis:** TRIPS may serve the interests of western corporations but not necessarily of western economies. There is no evidence that TRIPS has been advantageous for American citizens at large. On the contrary, it seems that TRIPS has 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 in 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 from catching up nor allow developed countries to preserve their dominion in technological innovation. It is much more important to concentrate on the economic rather than the legal conditions that allow or impede countries from maintaining or acquiring their knowledge base.

There are not many lifesaving drugs around (unfortunately!) and several of them are no longer protected by IPRs. And we should not forget that the pharmaceuticals industry is just one of many in the economy.

It is also true that other key sectors of the information society are strongly dependent on other IPRs (Guy, 2007). In spite of the massive investment by companies in the industry to make it difficult to copy software, software revenues benefit strongly from the legal protection guaranteed by copyright. It is also true that audiovisual products rely strongly on IPRs. These are the typical products that are costly to produce but that can be copied at virtually zero cost. Software and audiovisual entertainments are increasingly important industries but, again, they do not represent the total economy. It is difficult to justify 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 happened with Linux in the case of software and Bollywood in the case of audiovisuals. There is a tendency to attribute to IPRs the creation of barriers to entry, and this is in principle true since IPRs generate a legal monopoly. But economic reality shows that barriers to entry are more often associated with anticompetition practices than with IPRs alone. Weakening IPRs may help to generate a more competitive market, but this should also be combined with more active antitrust policies.

Those western-based corporations that have pressed so hard for stronger IPRs have not realised that IPRs codify the positions of the past, not those of the future. To stick to the defence of IPRs is the typical position of losers, that is, those that could maintain their market share only by relying on monopoly positions achieved through the innovations of the past. Winners, on the contrary, would be far 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, and not even the most effective, method to secure returns from 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 provided a good service to their citizens. In fact, they have somehow diverted attention from the problem of offshoring of knowledge-intensive jobs providing an advantage to their major corporations without realising that their workers may also pay a price for it. A better service to citizens would have been provided by 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 would then be able to exploit competitively.

We have already made it clear that developing countries should not have accepted TRIPS. Somehow 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. This is in some way what has happened: the number of controversies continues to be rather small. But opposing TRIPS will certainly not by itself allow developing countries to fill their technology gap. Developing countries need much more demanding active policies to acquire knowledge. Some of them have managed to move from 'developing' to 'emerging' and even 'developed' countries. The active learning policies of these countries, such as the East Asian tigers, created a realisation that there are strong complementarities between domestic education, acquisition of knowledge from abroad, hosting foreign investment and endogenous innovation. The policies of these countries should be a source of inspiration for those countries that are still lagging behind.

## Notes

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1. According to the legend, Doctor Faustus, an earnest alchemist, trades his soul to Mephistopheles to obtain 24 years of unrestrained creativity.
2. For a review, see Maskus and Reichman, 2005; Mowery and Oxley, 1997; UNCTAD, 2005.
3. 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 20th century. A development state is characterised by having strong state intervention, as well as extensive regulation and planning.
4. Cohen et al., 2000; Levin et al., 1987; Mansfield, 1986; Merges and Nelson, 1990; Von Hippel, 1998; Winter, 1987.
5. The Most Favoured Nation clause establishes that whatever more favourable treatment is agreed for two or more countries is automatically extended to all the other nations: in this case to all the TRIPS signatories. Article 4 states: '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 used instead to describe multinational corporations relocating work from their domestic sites to foreign locations.
8. Mansfield, 1994, 1995; Maskus, 2000; Maskus and Reichman, 2005; UNCTAD, 2005.
9. Branstetter et al., 2004; Chen and Puttitanum, 2005; Lall, 2003; Mansfield, 1994, 1995; Maskus, 2000.
10. 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).

## 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), pp. 417–442.
- Archibugi, D. and Iammarino, S. (2002) 'The Globalization of Technological Innovation: Definition and Evidence', *Review of International Political Economy*, 9 (1), pp. 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), pp. 861–884.
- 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 R. R. Nelson (ed.), *Economic Welfare and the Allocation of Resources for Invention*. Princeton, NJ: Princeton University Press, pp. 165–180.
- Barton, J. H. (2000) 'Reforming the Patent System', *Science*, 287 (5460), pp. 1933–1934.
- Bell, M. and Pavitt, K. (1997) 'Technological Accumulation and Industrial Growth: Contrasts between Developed and Developing Countries', in D. Archibugi and J. Michie (eds), *Technology, Globalisation and Economic Performance*. Cambridge: Cambridge University Press, pp. 83–137.
- Bessen, J. and Meurer, M. J. (2008) *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk*. Princeton, NJ: Princeton University Press.
- Blind, K., Edler, J., Schmoch, U., Anderson, B., Howells, J., Miles, I., et al. (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), pp. 33–74.
- Branstetter, L. G., Fishman, R. and Foley, C. F. (2004) 'Do Stronger Intellectual Property Rights Increase International Technology Transfer? Empirical Evidence from US Firm-Level Panel Data', *Quarterly Journal of Economics*, 121 (1), pp. 321–349.
- Chang, H.-J. (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), pp. 474–493.
- Chesbrough, H. W. (2003) *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Boston, MA: Harvard Business School Press.
- Cohen, W. M. and Levinthal, D. A. (1989) 'Innovation and Learning: The Two Faces of R & D', *Economic Journal*, 99 (397), pp. 569–596.
- Cohen, W. M. and Levinthal, D. A. (1990) 'Absorptive Capacity: A New Perspective on Learning and Innovation', *Administrative Science Quarterly*, 35, pp. 128–152.
- 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.
- Drahoš, P. (1995) 'Global Property Rights in Information: The Story of TRIPS and the GATT', *Prometheus*, 11 (1), pp. 6–19.
- Drahoš, 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 within the Innovative Processes of Firms: A Multiple Case Study across the Italian Industries'. SSRN 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 US Patent Reform', *Journal of Economic Perspectives*, 16 (2), pp. 131–154.
- Gleick, J. (2003) 'The Crisis in the US Patent Office', *New York Times Magazine*, 29 July, p. 644.
- Guy, F. (2007) 'Strategic Bundling: Information Products, Market Power, and the Future of Globalization', *Review of International Political Economy*, 14 (1), pp. 26–48.
- Hall, B. and Ziedonis, R. H. (2001) 'The Patent Paradox Revisited: An Empirical Study of Patenting in the US Semiconductor Industry', *RAND Journal of Economics*, 32 (1), pp. 101–128.
- Hardin, G. (1968) 'The Tragedy of the Commons', *Science*, 162 (3859), pp. 1243–1248.
- 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), pp. 698–701.
- Hess, C. and Ostrom, E. (2006) *Understanding Knowledge as a Commons: From Theory to Practice*. Cambridge, MA: MIT Press.
- Hou, C. and San, G. (1993) 'Nation Systems Supporting Technical Advance in Industry: The Case of Taiwan', in R. R. Nelson (ed.), *National Innovation Systems*. New York: Oxford University Press, pp. 384–413.
- 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, NJ: 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), pp. 1657–1680.
- Lanoszka, A. (2003) 'The Global Politics of Intellectual Property Rights and Pharmaceutical Drug Policies in Developing Countries', *International Political Science Review*, 24 (2), pp. 181–197.
- Lerner, J. and Tirole, J. (2002) 'Some Simple Economics of Open Source', *The Journal of Industrial Economy*, 50 (2), pp. 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, pp. 783–831.
- Lieberman, J. I. (2004) *Offshore Outsourcing and America's Competitive Edge*. United States Senate.
- Macmillan, F. (2006) 'Public Interest and the Public Domain in an Era of Corporate Dominance', in B. Andersen (ed.), *Public Interest and the Public Domain in an Era of Corporate Dominance*. Cheltenham: Edward Elgar, pp. 46–69.
- Mansfield, E. (1986) 'Patents and Innovation: An Empirical Study', *Management Science*, 32 (2), pp. 173–181.
- Mansfield, E. (1994) 'Intellectual Property Protection, Foreign Direct Investment, and Technology Transfer'. World Bank Discussion Paper no. 19.
- Mansfield, E. (1995) 'Intellectual Property Protection, Foreign Direct Investment, and Technology Transfer: Germany, Japan and the United States'. World Bank Discussion Paper no. 27.

- 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), pp. 159–179.
- May, C. and Sell, S. (2006) *Intellectual Property Rights: A Critical History*. London: Lynne Rienner.
- Merges, R. P. and Nelson, R. (1990) 'On the Complex Economy of Patent Scope', *Columbia Law Review*, 90 (4), pp. 839–916.
- Mokyr, J. (2002) *The Gifts of Athena: Historical Origins of the Knowledge Economy*. Princeton, NJ: 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), pp. 1214–1236.
- Mowery, D. and Oxley, J. (1997) 'Inward Technology Transfer and Competitiveness: The Role of National Innovation Systems', in D. Archibugi and J. Michie (eds), *Technology, Globalisation and Economic Performance*. Cambridge: Cambridge University Press, pp. 138–171.
- 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), pp. 115–127.
- 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), pp. 1931–1964.
- Ordovery, J. A. (1991) 'A Patent System for Both Diffusion and Exclusion', *Journal of Economic Perspectives*, 5 (1), pp. 43–60.
- Park, W. G. and Ginarte, J. C. (1997) 'Intellectual Property Rights and Economic Growth', *Contemporary Economic Policy*, 15, pp. 51–61.
- Pavitt, K. (1987) 'The Objectives of Technology Policy', *Science and Public Policy*, 14, pp. 182–188.
- Pianta, M. (1988) *New Technologies across the Atlantic: US Leadership or European Autonomy*. Hemel Hempstead: Harvester Wheatsheaf.
- Polanyi, M. (1967) *The Tacit Dimension*. New York: Doubleday.
- Rosenberg, N. and Steinmueller, E. (1988) 'Why are Americans such Poor Imitators?', *American Economic Review*, 78 (2), pp. 229–234.
- Ryan, M. R. (1998) *Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property*. Washington, DC: Brookings Institution Press.
- Sell, S. K. (2003) *Private Power, Public Law: The Globalization of Intellectual Property Rights*. Cambridge: Cambridge University Press.
- Shiva, V. (2001) *Protect or Plunder? Understanding Intellectual Property Rights*. London: Zed Books.
- Tapscott, D. and Williams, A. (2006) *Wikinomics: How Mass Collaboration Changes Everything*. London: Atlantic Books.
- Teece, D. J. (1986) 'Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy', *Research Policy*, 15 (6), pp. 285–305.
- UNCTAD (2005) *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*. New York: 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 N. Rosenberg and C. R. Frischtak (eds), *International Technology Transfer: Concepts, Measures, and Comparisons*. New York: Praeger, pp. 38–89.
- Winter, S. (1987) 'Knowledge and Competences as Strategic Assets', in D. A. Teece (ed.), *The Competitive Challenge: Strategies for Industrial Innovation and Renewal*. Cambridge, MA: Ballinger, pp. 159–176.
- Wong, J. (2004) 'The Adaptive Developmental State in East Asia', *Journal of East Asian Studies*, 4, pp. 345–362.
- Woo-Cumings, M. (1999) *The Developmental State*. New York: Cornell University Press.
- World Bank (2001) *Intellectual Property: Balancing Incentives with Competitive Access*. New York: World Bank.
- World Trade Organisation (2009) Dispute Settlement. Available from: <http://www.wto.org> [accessed 14 July 2009].
- Ziedonis, R. H. (2004) 'Don't Fence Me In: Fragmented Markets for Technology and the Patent Acquisition Strategies of Firms', *Management Science*, 50 (6), pp. 804–820.

## Author Information

**Daniele Archibugi**, Research Director at the Italian National Research Council (CNR) in Rome, affiliated to the Institute on Population and Social Policy (IRPPS) and Professor of Innovation, Governance and Public Policy at the Department of Management, Birkbeck College, University of London.

**Andrea Filippetti**, PhD candidate at University 'La Sapienza' of Rome, Department of Economic Science. Research Fellow at the Italian National Research Council (CNR) in Rome, affiliated to the Institute on Population and Social Policy (IRPPS) and DIME Fellow at the Department of Management, Birkbeck College, University of London.