INTELLECTUAL PROPERTY RIGHTS IN SOUTH AFRICA:

An Economic Review of Policy and Impact

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Abstract

Intellectual property rights (IPRs) are at the centre of several current policy debates, both nationally and internationally, ranging from music piracy and geographical indications in wine labelling to generic alternatives for patented pharmaceuticals.

In order to engage in these debates, a thorough understanding of the pros and cons of the various IPRs as well as their alternatives is essential. This paper is the first step toward a comprehensive economic review of the intellectual property regime in South Africa, and is aimed at reintroducing economics into the intellectual property debate and evaluating the appropriateness of South Africa's laws for its stage of development and economic policy framework.

A discussion of the economic theory of IPRs is followed by a review of the available empirical research. Special attention is given to the impact of IPRs on developing countries, focussing particularly on the impact of the WTO Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS). The paper finds that the appropriate level of IPR protection depends on a number of factors and that developing countries should aim to fully exploit the flexibilities provided by the TRIPS Agreement. The flexibilities that TRIPS provides, such as parallel imports and compulsory licensing, should be fully exploited by South Africa and future extensions of TRIPS need to be carefully assessed for their appropriateness to the South African economy and developing economies in general.

The review of South Africa's IPR regime reveals a rather mixed picture of the state of IPR protection in South Africa. IPR laws are considered 'state of the art', yet their implementation is often found wanting. In addition, whereas adequate intellectual property protection is cumbersome for domestic inventors to obtain, it is at times so ferociously defended when (mainly foreign) patent owners are involved, that technology dissemination could be hampered.

The last section of this paper contains a set of proposals for further research on intellectual property law in South Africa, which is required for a more thorough evaluation of the IPRs regime.

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1. Intellectual Property Rights

"*Property has its duties as well as its rights*", Thomas Drummond (1797–1840), Scottish statesman, engineer. Letter, May 22, 1838.

1.1 Introduction

Intellectual property rights (IPRs) are at the centre of several current policy debates, both nationally and internationally. Whilst music producers are seeking ways to curb illegal copying of music which, facilitated by the rise of the Internet, has reached an unprecedented scale; pharmaceutical patents have been challenged by those seeking access to cheaper generic alternatives; and 'New World' wine producers are forced to abandon certain geographical indications that originated in the European Union.

In order to engage in these debates, a thorough understanding of the pros and cons of the various IPRs as well as their alternatives is essential. IPRs are the legal rights that result from intellectual activity in the industrial, scientific, literary and artistic fields.[1] Intellectual property *laws* are the means via which creators are protected, and confer time-limited rights to control the use of their creations and inventions or applications thereof.[2]

Legally speaking, IPRs give statutory expression to the moral and economic rights of creators and to the obligations of the public in return for access to these creations. The main rationale for these rights is correcting for market failures. The inventor is able – through the right to prevent others from exploiting her invention – to derive material benefits from the invention as a reward for intellectual effort and as compensation for research expenses that she would not be able to reap if unbridled copying of the invention were allowed.

IPRs are also part of government policies aimed at promoting creativity and the dissemination of technological innovation, as the finite lifespan of IPRs eventually places the innovation in the public domain.[3] Other policy objectives include consumer and producer protection, as consumers could be misled and genuine manufacturers' reputations damaged by unauthorised use of trademarks and counterfeiting (i.e. piracy often involves inferior quality). A fiscal dimension is added in cases of illegally produced or imported counterfeit goods for which no taxes and other duties have been paid to the revenue service. IPRs therefore seek to prevent the misappropriation of the

[1] World Intellectual Property Organisation (1998).
[2] The international governing body for intellectual property rights is the UN's World Intellectual Property Organisation, WIPO (est. 1967). The WIPO framework for intellectual property includes: "Literary, artistic and scientific work; performances of performing artists, phonograms and broadcasts; inventions in all fields of human endeavour; scientific discoveries; industrial designs; trademarks, service marks, and commercial names and designations; protection against unfair competition; and all other rights resulting from intellectual activity in the industrial, scientific literary or artistic fields". WIPO (1998).
[3] WIPO (1998).

economic returns belonging to creators. They aim to promote the benefits of technological innovation and restrain the excesses that may result from monopolised knowledge.[4] An important aspect of IPRs that is often forgotten is that they are not an end in itself, but a means to facilitate technological innovation and dissemination.

The debate on intellectual property legislation and reform has long been a legalistic one, both overseas and at home, with law scholars and practitioners arguing in favour of strengthened intellectual property protection and upgraded enforcement, often urging policy makers to ensure accession to a growing number of international treaties. The economic rationale for doing so was habitually taken for granted or glossed over in a few lines regurgitating neoclassical assumptions on the incentives of innovation.

South Africa's accession to the TRIPS Agreement (discussed below) did not involve a significant leap in the IPRs regime, as at that time South Africa had relatively developed intellectual property laws and was already signatory to most international treaties that the TRIPS Agreement incorporates. This situation could suggest either one of two extremes: (i) South Africa was well ahead of its middle-income country peers and ready to engage with international trading partners on equal terms; or (ii) South African intellectual property laws were an apartheid-relic and inappropriate for a country in the early stages of its reintegration with the world economy. However, a preliminary review of IPRs in South Africa unveils a rather mixed picture of the state of IPR protection in South Africa, suggesting that neither of these two views is entirely accurate.

This paper is the first step toward a comprehensive *economic* review of the intellectual property regime in South Africa, and is aimed at reintroducing economics into the intellectual property debate and evaluating the appropriateness of South Africa's laws for its stage of development and economic policy framework. This paper is based primarily on desktop research, supplemented by interviews with South African policy makers, intellectual property law practitioners and academics. The last section of this paper contains a set of proposals for further research on intellectual property law in South Africa, which is required for a more thorough evaluation of the IPRs regime.

1.2 The TRIPS Agreement

Much reference will be made to the TIPS agreement, and a short overview of its history and rationale is therefore warranted. IPRs vary widely across countries, and are generally in line with a country's ability to generate and export intellectual property. The US, Japan and a few Western European countries produce the majority of internationally marketable products and technologies and have commensurate intellectual property laws aimed at protecting these inventions. Policy makers in these countries argue that strong *global* protection would have beneficial spillovers to poor countries and would stimulate innovation in these countries. On the other hand, technology-importing developing countries worry about cost-raising effects of IPRs,

[4] Bergsten, F.C. in: Maskus, K.E. (2000).

particularly in medicines and critical agricultural inputs, and fear that a strengthened system would reduce their access to innovations. IPRs have therefore been the subject of heated debate in the WTO, particularly focusing on the most comprehensive multilateral treaty on IPRs to date, the Agreement on Trade-Related Aspects of Intellectual Property Rights or TRIPS Agreement (1995).

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) was the culmination of more than a decade of political pressure from developed countries, and was strongly driven by US exporting interests in pharmaceuticals, software, and recorded entertainment.[5] As technology grew in importance in international trade and competition and developing countries were increasingly opening up to trade, so did the pressure for 'technological protectionism'.[6]

As early as 1984, the US had made inadequate protection of patented, trademarked, and copyrighted products an unfair trade practice that could invoke retaliation under Section 301 of the Trade Act of 1974. In addition, the US exerted multilateral pressure via the GATT and WIPO and increased bilateral pressure for IPRs on its trade partners (via trade restrictions), which led to stronger IPRs in South Korea and Taiwan (1980s), and Argentina, Brazil, China and Thailand (1990s), often using the Section 301 authority.[7] Admittedly, pressure from domestic innovating businesses in rapidly developing economies also played a role. The EU played its part and influenced advancing IPRs in Turkey and Egypt. Subsequently, IPRs became a part of regional trade agreements involving the US or the EU.

IPRs were introduced into the multilateral trade arena during the Uruguay Round, leading to the TRIPS Agreement. IPRs were deemed trade-related as highly variable national IPRs regimes are incompatible with a globalised economy in which firms aim to operate on an international scale.

The Agreement requires minimum standards of IPR protection, covering both the availability of intellectual property laws and their enforcement. The Agreement strengthens IPR protection particularly in those countries in which IPRs had been weak or non-existent, and at the same time poses as a first step towards harmonisation of the divergent IPR regimes of WTO members. The substantive requirements of the TRIPS agreement will be more elaborately discussed in Section 4.3 (TRIPS requirements).

1.3 Types of intellectual property rights

IPRs are conventionally placed in two categories: (i) copyright, and (ii) industrial property rights. Copyrights and 'neighbouring' rights cover: literary, musical, photographic, artistic and scientific works; map, technical drawings and computer

[5] Correa (2000).
[6] Correa (2000).
[7] Maskus (2000).

programs; and provide protection from piracy and copyright infringement.[8] Industrial intellectual property includes inventions, designs, trade- and servicemarks, commercial names, and designations (see Table 2, Appendices). Industrial IPRs are protected by patents, registered trademarks, registered industrial designs (and integrated circuits), and geographical indications ('appellations'). Ultimately, laws protecting against unfair competition or abuse of IPRs need to be enforced to balance the rights of inventors and imitators.

Copyrights are generally easy to obtain and enforceable through civil suits and therefore appear of secondary policy significance. An important exception is the debate on copyrights for software, databases and electronic transmissions, which clearly has policy relevance for a knowledge-economy in a globalised market. These copyright-dependent sectors face intellectual property challenges as their IPRs fall between copyright and patents and are treated differently among countries. The protection of databases is controversial because it could pose significant difficulties for scientific and educational uses of information. The cost-benefit analysis of copyrights in this area is analogous to that of patents, to which the greater part of the paper is dedicated. The remainder of this overview will consequently focus on industrial IPRs, which will subsequently be referred to as IPRs for simplicity.

General protection of intellectual property is provided by national laws concerning unfair competition. Unfair competition includes the unauthorised use of trade secrets, misleading the public about the goods sold, as well as creating confusion around or discrediting a competitor.

Specific protection, e.g. for a company's name or invention, is provided for a wide range of (industrial) intellectual property; the following table provides an overview.

Table 1. Types of Intellectual Property

Industrial Property	Definition
Inventions/ technological innovations	New solutions to technical/technological problems
Industrial designs	Aesthetic creations determining the appearance of industrial products.
New plant or seed varieties.	A new plant variety that is distinct, stable and uniform.[9]
Trademarks/ servicemarks	Any sign (brand name, slogan or logo) that individualises the goods or services of a given enterprise and distinguishes them from the goods of its competitors.
Trade/commercial name	A name that distinguishes one enterprise from others, independently of the goods or services that the enterprise

[8] I.e. use of the work, generally for commercial gain, without consent from the creator.
[9] Correa, (2000).

Industrial Property	Definition
	renders or markets.
Trade secrets	Undisclosed commercial or technological information.
Geographical indications/ appellation of origin[10]	Geographical indications confer protection on products with a certain origin. In this case the characteristics of a geographical location have, due to its environment (e.g. climate or traditional production method), acquired a reputation and its name has therefore become a valuable commercial asset.

Source: WIPO (1998)

The IPRs associated with the intellectual property defined in Table 1 are discussed below.

Protection for technological innovation and designs

Technological innovations can be protected by a patent. A patent generally consists of a document issued by the government that describes an invention (product or process) and creates exclusive rights for a limited period in which the patented invention can only be exploited with the authorisation of the patent holder and in exchange for licensing or royalty payments.[11] At the end of the lifespan of the patent, the invention is placed in the public domain. Similar protection is awarded to registered designs, covering the original ornamental and non-functional features of an industrial article or product.[12] The innovation has to meet patentability criteria (e.g. novelty and non-obviousness) before a patent is awarded. Inventions differ from scientific discoveries, which involve "the recognition of phenomena, properties or laws of the material universe not previously recognised and capable of verification"[13], and are not patentable.

***Sui generis* protection**

Sui generis protection is a form of protection 'of its own kind', i.e. neither copyright nor patent protection. This phrase is used mostly in an international context (e.g. the TRIPS Agreement) where it signifies that the specific mode of protection is left open to individual countries. *Sui generis* protection is applied to, *inter alia*, protection of plant varieties and integrated circuits.[14]

[10] To be distinguished from an indication of source, which specifies where the product is made but does not aim to designate the characteristic qualities exclusively/essentially due to the geographical environment.
[11] The patent holder (patentee) can enforce this protection from infringement by seeking civil or, in some cases, criminal sanctions in a court of law.
[12] WIPO (1998).
[13] Geneva Treaty on the International Recoding of Scientific Discoveries (1978), in WIPO (1998).
[14] WTO (1995). In this paper, *sui generis protection* is interpreted to refer to protection 'of its own kind' broadly and is not narrowly confined to plant breeders' rights as outlined in the UPOV Convention.

Plant breeders' rights grant exclusive rights of exploitation to the breeders of new plant varieties, permitting developers of new plant varieties to control the production, sales and use of these varieties for a fixed period.[15] *Sui generis* protection is often used in international agreements as a compromise, as patent or copyright protection involves stringent conditions (such as the minimum 20 year protection for patents in the TRIPS Agreement).

Designs of integrated circuits are protected by rights akin to copyrights, involving authorisation and compensation before third parties can copy the design, although the minimum length of the protection (10 years) is shorter than for copyrights. It is important to note that this type of protection does not ban reverse engineering, under the condition that it leads to an improved layout, rendering the copying an advance of technology that is in the public interest.

Trademarks, service marks and commercial names

Registration of trademarks and commercial names prevents unauthorised use of company names and, as it does not grant exploitable (monopoly) rights, is therefore generally not time-limited. These types of IPRs are justified on the ground that they lead to lower consumer search costs and provide an incentive to firms to maintain or improve quality of their products and to differentiate their products. Infringement of these trademarks erodes the stated benefits.

Trade secrets

Trade secrets generally confer protection by laws against unfair competition that govern legal business conduct and consumer protection. For trade secrets no patent or other registered form of protection can be obtained, which explains the generic protection provided by laws prohibiting industrial espionage and piracy.

The benefits of trade secret protection are similar to those of patents, albeit without the creation of a legal monopoly, and include the facilitation of dynamic competition via R&D, learning, and reverse engineering activities. However, trade secrets could also serve to keep innovations out of the public domain in perpetuity, as there is no finite lifespan, such as with patents.

Geographical indication or appellation of origin

Geographical indications confer protection on products with a certain origin from unauthorised and potentially misleading use, either for products that do not originate from the geographical location indicated, or for not complying with regulated quality standards. This type of intellectual property protection has been the subject of much debate, both in multilateral fora such as the WTO, but also in bilateral trade agreements, such as the bilateral free trade agreement between South Africa and the European Union, (the Trade Development and Cooperation Agreement – 1999).

[15] UPOV (2002).

References to geographic origin are generally not distinctive and cannot be registered or protected.[16] A geographical denomination may, however, through long and intensive use, be associated with a certain product or enterprise to such an extent that it becomes distinctive as a trademark for it. References to geographical origin are considered deceptive if the product involved does not originate in the region described or indicated, hence indications such as 'Champagne', 'Port' or 'Swiss Chocolate' may not be used outside of the regions or countries indicated as this would misappropriate regional or local reputations.[17]

Disagreement can arise between countries or regions when geographical indications become generic terms and lose their distinctiveness based on geographical environment, thereby exhausting the basis for their protection. Whether or not a geographical indication has become a generic term is determined by national law (there is no international agreement on the issue), which diverges across countries, giving rise to disputes. For example, 'Champagne' is considered a generic term for sparkling wine in the US, but a protected appellation of origin in France.

1.4 Compulsory licensing and parallel imports

The market power that patents confer can be abused. Abuse of a patent occurs when the invention in question is not or not sufficiently 'worked' (either through production or application by the patent holder or by licensing of others) in the country concerned. In this case, a 'compulsory license' may be granted to third parties or parallel importation may be allowed.

Compulsory licensing is employed when a third party is licensed by government to manufacture a patented product, regardless of the consent or objection of the patent owner. The non-voluntary license holder is not exempt from paying royalties to the patent holder, but is allowed, generally for a specified period to manufacture the product in question.

Parallel importation occurs when a patented product is imported by a person other than the patent holder or local authorised distributor. The imported product is generally purchased from a foreign licensee who produces the product at lower prices than the original patent holder or local licensee. Parallel importation is generally at odds with arrangements between the patent holder and the local licensee, especially when the patent holder has appointed an exclusive distributor in the country in question. Parallel importation is generally allowed when the social benefit of access to certain products at lower prices is considered of greater importance than the private benefit of the patent holder.

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[16] As there is no 'owner' of a geographical indication, there is also no means of preventing other persons or enterprises in the region from the use of this indication, except in cases of domestic regulation regarding appellation use. WIPO (1998), *op cit*.

[17] WIPO (1998).

Therefore, even though patents grant exclusive rights to the patent holder, governments can limit these rights, albeit only when the patent is abused or when the public interest requires these measures. A patent can therefore not be used solely to prevent others from using the invention or to control importation, since in that case no transfer of technology is accomplished.

Some countries explicitly include the use of a patent in violation of competition laws as grounds for compulsory licensing (or invalidating the patent). Compulsory licensing can also be justified on public interest considerations, such as a national emergency or other circumstances of extreme urgency, including public welfare, health, defence, and development of the economy.[18]

2. Economic Impact of Intellectual Property Rights – Theory

This section will concentrate on the strongest instrument of intellectual property protection, and the most controversial – apart perhaps from geographical indications – patents.[19] The economic rationale for other forms of IPRs protection is discussed briefly below.

The benefits of trade secret protection are similar to those of patents. Trade secrets (for which no patent is obtained) are complementary to patents without the negative effects of creating a legal monopoly, and may stimulate dynamic competition via the learning and reverse engineering activities they could spark. However, trade secrets do have a negative side effect as they could keep innovations out of the public domain in perpetuity, as their protection is infinite, unlike patents. Other forms of industrial property protection – such as trademark and servicemark protection and protection of geographical indications – are economically justified as they lead to lower consumer search costs and provide an incentive to firms to maintain or improve quality of their products and to differentiate their products. In developing countries in particular, trademarks can entice companies with distinctive products to enter the market, leading to market deepening and growth.[20] Infringement of trademarks erodes the stated benefits.

2.1 The economics of intellectual property rights

Patents are a policy intervention aimed at reducing certain market failures, particularly in the markets for technological innovation. In order to discuss these market failures a short digression into innovation theory is warranted before moving on to patent theory debates.

[18] WTO (1995) and WIPO (1998).
[19] The economics of patent protection is similar for industrial design protection and plant breeders' rights.
[20] Maskus (2000).

Innovation in economic growth theory

Technological innovation has been incorporated in different ways into the various schools of thought on economic growth. Economic growth theory identifies two types of economic growth, namely static and dynamic. Economic growth in the static sense can be achieved by increasing factor inputs such as capital and labour, leading to proportional (linear) increases in output – returns to scale are constant. Dynamic economic growth leads to increased standards of living and is achieved through increased total factor productivity, which occurs when the increases in output are non-linear positive functions of input utilization – returns to scale are dynamically increasing. A key driving force behind this type of dynamic economic growth is technological innovation.

In neoclassical growth theories, growth is based on physical capital accumulation, constant returns to scale, and diminishing returns to capital. Technological innovation is assumed exogenous to this process, growing at a given constant rate.[21] The economic growth rate in the long-run steady-state equilibrium of the economy is equal to the exogenous and constant growth rate of technological progress. The policy implication is that there is no rationale for government intervention in economic growth.[22]

Neoclassical growth theories can not explain the economic growth rate beyond linear output increases due to increased inputs and assumes that the 'residual' in economic is somehow exogenously determined. This deficiency gave rise to the development of endogenous growth theories, aimed at explaining this economic growth residual.

In endogenous growth models, long-run economic growth is driven by knowledge-based factors that improve the productivity of production factors, such as enhanced human capital, learning by doing, research and development (R&D) and innovation. The production factors are no longer exogenous, but form part of a firm's and society's cost structures (as they can be invested in) and can be influenced by public policy. Inventions and innovation thus become endogenous to economic growth. This integration of innovation into conventional economic analysis is in contrast to neoclassical growth theory in which inventions are treated as exogenous occurrences acting on the economic system.

Market failures in innovation

In reality, technological innovation is indeed generated by concerted efforts, including R&D activity, as well as testing and marketing, which are typically motivated by the anticipation of economic gain.[23] In order for investments in technological innovation to be made, the expected returns should exceed the sum of capital outlays with interest and a risk premium. Investments in technological innovation differ from other types of

[21] Abstracting from population growth.
[22] Department of Finance and Revenue Canada (1997).
[23] Scherer (1999).

investment due to a number of market failures, *inter alia*: (i) the high degree of uncertainty in the outcome of inventive activity; (ii) the partial inappropriability (or 'public good' character) of inventions (the inability of inventors to reap the full rewards of the technological innovation and recoup their costs and risk premiums)[24]; and (iii) the indivisibility of inventions (once a new process has been discovered it can be spread to all firms at – virtually – zero marginal cost).[25]

The uncertainty surrounding innovative activity leads to high risk premiums that make less projects viable. The appropriability problem[26] leads to imitation of inventions soon after application by the inventor (short imitation lags), which erodes the expected returns on the innovative product and thereby reduces the incentive to innovate. The indivisibility and inappropriability of inventions further lead to spillovers: benefits that accrue to entities other than the one making investments in the required research and development (free-riding). Other market failures in the market for R&D include asymmetric information (which limits external financing) and imperfect competition.

Due to these market failures, and the accompanying shortfall of private benefits relative to society-wide benefits, a bias is created against investing in R&D (especially concerning 'basic research' as opposed to applied research[27]), leading to systematic underinvestment in advancing technology as the incentive to invest in the creation of new productive knowledge by private entities is eroded.[28]

Patents as a remedy for innovation market failure

Although the spread of inventions can be delayed by several private mechanisms[29] – including inventor secrecy, market lead times, imitation difficulties and trade secrets – a widespread remedy for the misappropriation of innovation returns is the government-sanctioned patent system. Patents award temporary monopoly power to innovators, allowing them to reap economic rents before the innovation is disseminated into mainstream technological knowledge and into competitors' products.

The creation of such market power involves a certain degree of welfare loss (e.g. because of higher prices), and this leads to the fundamental trade-off in patent

[24] Technically, if a good is non-rival and at least partially non-excludable, it is inappropriable and other individuals can benefit from using that good at no cost. Perfect inappropriability leads to the absence of production by private firms and perfect appropriability leads to efficient production. Knowledge and technology are not fully appropriable in a market economy. Department of Finance and Revenue Canada (1997), *op cit*.

[25] Nordhaus (1969). In practice not all inventions are spread quite so easily, which is why patents come with a disclosure requirement upon termination of the protection period.

[26] Scherer (1999).

[27] Basic research leads to scientific advances that generally are not patentable. R&D or applied research generally builds on scientific advances by applying these new insights in developing new products or processes that generally are patentable. Pre-competitive generic enabling technologies, i.e. technological advances that are not mature enough to permit commercial exploitation, lie in between these two types of research and generally suffer from the same underinvestment are basic research.

[28] Lall (2001).

[29] Maskus (2000).

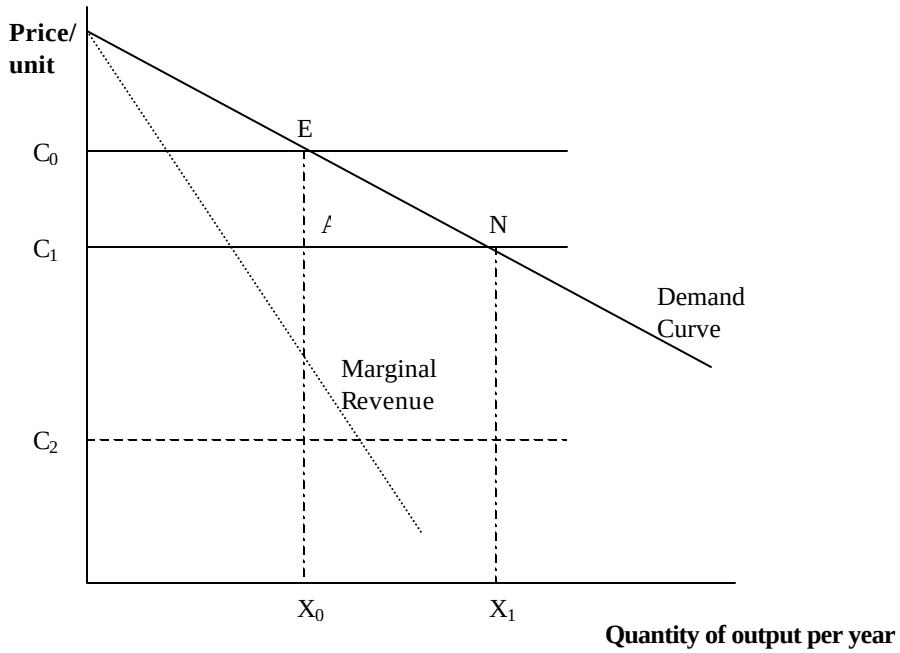
protection between the static costs of patent monopoly power and the dynamic benefits associated with innovation.[30] Another way of expressing this trade-off is as follows: IPRs generate monopoly positions that reduce current consumer welfare in return for providing adequate payoffs to innovation, which raises future consumer welfare.[31] Other arguments in favour of patent protection include the use of the new knowledge in productive activity leading to higher economic growth and the facilitation of markets for developing and disseminating knowledge and the encouragement of follow-on innovation.[32]

To cushion the static costs of patent protection, the extent of the monopoly power is generally limited in length and breadth.[33] The length of a patent is the number of years a patent awards monopoly power; governments usually grant patents of a fixed number of years (the length of patents is fixed for signatories of the TRIPS Agreement – 20 years). A patent's breadth or scope of coverage is the relative distance that is granted between the innovation and potential imitation (e.g. in Japan patents are defined extremely narrowly, so that close imitations do not infringe on the patent). Narrow patents allow imitators to closely resemble the innovation, thereby limiting the monopoly rents (as consumers switch from the patented to the unpatented brand), whereas broad patents, which may cover a class of products, do not allow competitors to closely copy the innovation, thereby granting significant monopoly rents (possibly leading to consumers switching out of the product class altogether).[34]

Formal economic proof for the assumption that inventions are stimulated by patents is provided by Nordhaus (1969) and Scherer (1972), best illustrated by Scherer's graphical representation.[35]

[30] Gilbert & Shapiro (1990).
[31] Maskus (2000).
[32] Lall (2001) and Maskus (2000).
[33] For a full discussion of optimal patent length and breadth, refer to Nordhaus (1969, 1972), Scherer (1972), Gilbert & Shapiro (1990), Klemperer (1990) and Denicolò (1996).
[34] Klemperer (1990).
[35] Scherer (1972).

Graph 1. Trade-offs in IPRs



Source: Scherer, (1972)

Production is initially carried out under competitive conditions, resulting in cost and price C_0 and quantity X_0. A firm that invents a cost-reducing process and is granted patent rights can reduce its costs to C_1 and command a monopoly rent of C_0EAC_1 per year. Alternatively the firm can license the patent to an existing producer, charging royalty payments which would amount to the same C_0EAC_1 surplus. Note that for the type of cost-cutting invention represented here (a so-called 'run of the mill' invention), the innovating firm will not expand output to X_1 and lower the price, but will rather maintain price C_0 and quantity X_0. If the cost reduction is substantial enough to let the cost curve cut the marginal revenue curve to the right of X_0, the price will be reduced below C_0 and output expanded.

This graphical representation is also useful for considering the price-raising effects of patents on completely new products. The innovative firm can produce its innovation at C_0 and fully recover the capital outlay required for the R&D (i.e. the discounted sum of its post-innovative profits minus its cost is positive).[36] Competitors can produce the product via reverse engineering at a cost C_1. If no patent were granted the price would rapidly drop from C_0 to C_1, at which price the innovator would suffer a loss on its invention. A social-welfare maximising intellectual property regime aims to maximize the discounted present value of the difference between the social benefits and the social costs of innovation, including the cost of administration and enforcement.[37]

[36] Denicolò (1996).
[37] Maskus (2000).

The life of a patent affects the rents an innovator can reap, and the longer this patent life, the further a profit-maximising firm will carry its cost-reducing R&D efforts. Patent life is a policy variable for governments that should, in theory, provide a balance between private and social returns.

Society's gains from the innovation become apparent only after expiry of the patent. When the patent expires, competitors start producing substitutes, thereby reducing the price to C_1, increasing output to X_1, eroding the producer's surplus completely and leading to a gain for society of C_0ENC_1 (a new consumers' surplus). The price society pays to induce a reduction in unit costs from C_0 to C_1 therefore consists of the sum of the annual welfare triangle EAN from the time the invention is introduced until the date of patent expiration plus the inventor's R&D costs. To find the socially optimal patent life, the welfare triangle and the rising R&D costs should be balanced against the increasing cost reduction (and increases in consumers' surplus) stimulated by longer patent lives, leading to a socially optimal patent life. In these early works on patent length, it was found that in all but some special cases it was possible to define a finite (temporary) socially optimal patent life.[38]

Patent length

Since the 1970s, a steady stream of articles has been devoted to optimal patent length, breadth or length-breadth mix, with diverging outcomes (some find short broad patents to be optimal whereas others prescribe infinite narrow patents) and various policy implications.

In the initial writings of Nordhaus (1969, 1972) and Scherer (1972), their main concern was patent length. Scherer argued that the best policy would be to tailor the life of each patent to the economic characteristics of its underlying invention and suggested a flexible system of compulsory licensing, under which the patent holder bears the burden of proof as to why the patent should not expire or be licensed after 3 or 5 years. Scherer said the patent length should increase if: (i) the market is small relative to research costs; (ii) the cost savings achieved were modest in relation to research costs; or (iii) there were extraordinary uncertainties and risks that justify a longer patent period. This period should be kept shorter if the patent holder has a substantial relevant market share and/or well-established marketing channels or there are non-patent barriers to entry.[39]

Scherer further argued that a uniform policy of long-lived patent grants confers excessive private rewards, compensated to some unknown extent by the social benefits realised from low benefit cost projects, which otherwise would not have been undertaken and by stimulus effects at the margin that would have been undertaken even with short patent lives.

[38] Scherer (1972).
[39] These conditions tend to apply to certain regulated industries, such as pharmaceuticals.

Nordhaus, in his 1972 reply, disagreed and argued that too long a patent life is better than too short a patent life. For so-called *run-of-the-mill* inventions, the losses from monopoly are small compared to the gains from invention, and the best way to prevent abuse is to ensure that trivial inventions do not receive patents.

More recent research takes account of different assumptions[40] – such as moral hazard and asymmetric information – showing that it can be welfare improving to *differentiate* patent lives when firms have different R&D productivities. A uniform patent life generally provides too much R&D incentive to low-productivity firms and too little R&D incentive to high-productivity firms. The optimally differentiated patent scheme would involve a menu of patent lives and fees. The TRIPS Agreement has set a uniform standard for patent life (20 years), thereby eliminating the potential for differentiated patent schemes.

Patent breadth

Initial patent design theory focused on patent length, but since empirical work in the 1980s showed that the effective protection provided by a patent is often less than its legal life[41], subsequent research into socially optimal patents incorporated the effects of the breadth of the patent. A wide patent implies that the new product or process cannot be easily imitated, whereas a narrow patent allows even non-innovating firms to develop similar processes without infringing the patent and thereby reduce their costs. The breadth of the patent therefore determines the fraction of the cost reduction that does not spillover as freely available technology to the non-innovating firms.[42] Put differently, a wider patent implies a higher demand curve for the patentee.[43]

Much depends on whether one assumes that social welfare increases or decreases with the breadth of a patent, as theoretical arguments can be made for either case. Klemperer (1990) and Gallini (1992) assumed that close imitations lead to socially wasteful imitation costs, so that social welfare increases with the breadth of the patent.[44] By contrast, Gilbert and Shapiro (1990) assumed that deadweight losses from monopoly pricing outweigh the benefits of imitation, so that social welfare decreases with patent breadth. These theories do not conclusively explain the factors that determine the social impact of patent breadth. Denicolò (1996) introduced competition into the debate and showed that social welfare does not necessarily increase or decrease with increasing patent breadth; "almost anything could happen" with different assumptions. Narrow patents can indeed reduce the incentive to innovate, but this could be outweighed by social welfare gains and *vice versa*, depending on the nature of competition.

[40] Cornelli and Schankerman (1999).
[41] Mansfield, E. (1984), cited in Maskus (2000).
[42] Denicolò (1996).
[43] Klemperer (1990).
[44] Gallini (1992).

In a Cournot duopoly[45], a cost reduction by the high cost firm (imitating the low cost firm's patented product) may be socially disadvantageous. Broad patents then reduce the output of less efficient firms and avoid wasteful duplication of entry costs when imitation is costly; then a maximum breadth, minimum length patent is optimal. Bertrand competition[46] is the most efficient and leads to deadweight losses that decrease more rapidly than the incentive to innovate (so that narrow patents are optimal).

Where imitations are of inferior quality as well as lower price, the patent breadth-length mix does not affect discounted overall social welfare.[47] In this case, the social problem is to choose the patent's length-breadth combination so as to minimize the discounted deadweight loss of the patent.

Optimal patents

As was illustrated above, different assumptions lead to different recommendations. Moreover, different economic circumstances may warrant different optimal combinations of patent length and breadth. Gilbert and Shapiro (1990) suggested that the policy lever in this case should be patent breadth, with infinite length so as to provide a pre-specified reward to the patentee. Cornelli and Schankerman (1999) suggested that patent length should be differentiated, leading to a menu of patent lives and fees. Klemperer (1990) and Gallini (1992), on the other hand, advocated a combination of patent length-breadth. Gallini favoured short but broad patents, whereas Klemperer defined conditions under which either infinitely lived but narrow patents or short-lived but broad patents are socially efficient.

Denicolò pointed to two fundamental drawbacks of the analyses discussed here, arguing that the optimal patent design depends on the type of competition in the product market. Firstly, the analyses are based on the assumption that innovations are independent. In reality, inventions build on each other, and infinite patents may have deleterious effects on the incentives of other firms to innovate. Overly long patents could retard subsequent innovation by establishing monopoly rights to an entire line of research. The actual social costs of long patent lives may therefore be much higher than the stand-alone costs of deadweight losses associated with a patent for an isolated product.

The second issue that Denicolò argued is that the innovator's profits are just one component of the firms' incentive to innovate, as firms compete in the product market and also compete for obtaining an innovation. The analysis is extended to include not only the innovator's profits, but also profits earned by non-innovators and the profits earned after the patent expires (so deadweight losses should be traded off against the sum of these benefits to firms).

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[45] I.e. a duopoly in a homogeneous product market that competes on quantity. Assumptions include: homogeneous product; both firms producing at constant marginal costs before the innovation; and low market share of the inefficient firm.

[46] I.e. a duopoly in a homogeneous product market that competes on price.

[47] Additional assumptions: product innovation in a vertically differentiated industry; and linear utility functions of consumption dependent on product quality and price.

His examples indeed confirmed that "almost anything could happen" depending on the assumptions. Narrow patents can reduce the incentive to innovate, but this could be outweighed by social welfare gains, depending on the nature of competition. Bertrand price competition is the most efficient and leads to deadweight losses that decrease more rapidly than the incentive to innovate, so that a narrow and long patent is recommended. Cournot quantity competition, however, leads to increasing output of less efficient firms when the patent breadth is narrowed, so that a broad but short patent is optimal. Thus, the less efficient competition is in the product market, the more likely it is that broad and short patents are socially optimal.

Policy implications

There is no presumption that either infinite but narrowly defined or minimum length broad patents are most likely to be optimal. The diverging recommendations that follow from the theory discussed in this section are not inconsistent, since they are based on different assumptions regarding the relationship between social welfare and patent breadth. The effects on R&D also appear to be more complicated when post-innovation profits and spillover effects are considered.

Generally speaking, reducing the breadth of a patent leads to more competition in the product market after the innovation. This competition may or may not be socially desirable, as it may involve large social costs, such as duplication of entry costs or inefficient production. Different forms of competition show different degrees of efficiency. The less efficient the type of competition prevailing in the product market, the more likely it is that broad and short patents are socially optimal.

With differentiated products and price competition, broad patents generally involve social costs but may be very effective in widening the difference between the winners' and losers' rewards, thus increasing the incentive to innovate at a relatively low cost.[48] Moreover, for a reduction in the patent breadth to be socially optimal it does not suffice that more competition increases social welfare: it must increase social welfare more than it reduces the incentive to innovate of the firms participating in the patent race.

One can only conclude that there is not one straightforward answer.[49] The theory of optimal patent design suggests that the patent length-breadth mix should be tailored according to the particular economic circumstances of the innovation. This may appear impractical, but a menu system of different lengths and breadths is not inconceivable for categories of products.

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[48] Denicolò (1996).

[49] For further extensions to the models discussed here, refer to Hopenhayn, H.A. and Mitchell, M.F. (2001), "*Innovation Variety and Patent Breadth*", RAND Journal of Economics, Vol. 32, No. 1, Spring 2001, Green, J.R. and Scotchmer, S. (1995), "*On the Division of Profit in Sequential Innovation*", RAND Journal of Economics, Vol. 26, No. 1, Spring 1995, and Chang, H.F. (1995), "*Patent Scope, Antitrust Policy, and Cumulative Innovation*", RAND Journal of economics, Vol. 26, No. 1, Spring 1995.

Patents that are either too long or too wide have social welfare costs, so length and breadth should be evaluated periodically. The effects of consumer switching to (inferior) imitations in the case of narrow patents should be weighed against the effects of non-consumption, which may occur with broad patents. From a policy perspective, this consideration may prove to be most workable. If non-consumption is a greater problem than inferior quality, then narrowly defined, long-lived patents are optimal. That is, if demand is price-elastic, the patents should be narrow but infinitely lived. If demand is price-inelastic, the patents should be broad but short-lived.

An interesting question thus arises regarding the demand for HIV/AIDS anti-retroviral drugs in South Africa. The demand for this medication is arguably price-inelastic, but only up to a certain point beyond which the price becomes unattainable by those who are infected (i.e. switching out of the product altogether). Ensuring a supply of cheaper imitation drugs requires a narrow patent, whereas wider supply of the initial medical innovation (which may be a unique cure) at lower prices would be available sooner with a broad short-lived patent.[50]

International commitments permitting, it could be optimal for developing countries to err on the side of narrow patents[51], particularly when non-consumption is not socially desirable. This could, however, have serious implications for the innovative climate in developing countries and may reduce domestic technological innovations to free-riding on foreign inventions. This would be particularly damaging if developing country specific diseases and problems were subsequently starved of R&D capital due to the lack of IPRs protection.

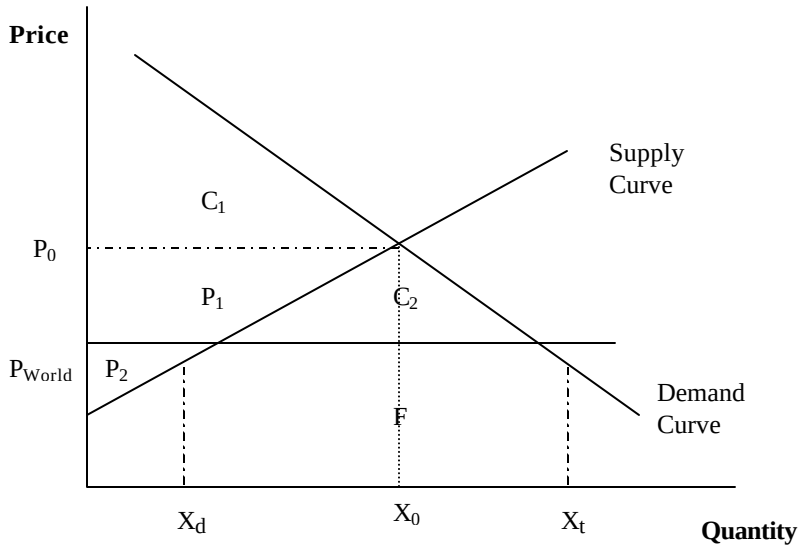
An optimal policy for promoting innovation would thus require specific knowledge of each product market, including demand, spillovers and the efficiency of competition. In practice, this solution is not optimal, due to the onerous information requirements, the number of patent applications, and rent-seeking involved in such a specific regime. Alternatively, a menu of length/breadth combinations could be devised, taking account of sectoral strengths and weaknesses.

2.2 Economics of parallel importation

Parallel importation, when allowed, has some interesting effects. Competition is introduced and innovators, consumers, retailers and domestic agents are affected, altering the consumer and producer surpluses. If the consumer surplus rises more than the fall in producer surplus as a result of parallel importation, there is a net welfare gain. Parallel importation lowers the monopoly effect of patents, lowering the overall return for innovators and possibly reducing innovate incentives. Consumers, on the other hand, generally obtain lower prices and access to a greater range of goods. Of concern in this regard are reduced support services and counterfeit or inferior quality goods entering the market.

[50] N.B. Patent length is fixed by the TRIPS Agreement.
[51] The TRIPS Agreement has a fixed patent length of 20 years, eliminating patent life as a policy lever.

Graph 2. Trade-offs in parallel importation



Source: NZIER, (1998)

If there is a ban on parallel importation, the quantity sold is X_0 at domestic price P_0. Consumer surplus is equal to C_1, producer surplus is equal to $P_1 + P_2$. Parallel importation allows the sale at world prices, so that the quantity sold by domestic firms falls to X_d and the difference between X_t and X_d is supplied by foreign firms. Consumer surplus is equal to $C_1 + P_1 + C_2$, the domestic producer surplus falls to P_2 and F is the amount of revenue received by the international producers of the goods imported. If the sum of C_1, C_2, P_1, and P_2 is greater than the sum of C_1, P_1, and P_2, there is a net – national – welfare gain.

Research on the New Zealand market for books, CDs and motor vehicles[52] suggests that removing the parallel importing restriction would lead to an overall welfare gain (due to the small size of the New Zealand market, innovation incentives were assumed to be negligible; prices would fall and support services could improve with parallel import competition). On the other hand, price discrimination could be an important vehicle for cross subsidisation, for instance, between medicine users in the developed and developing world, which is impossible if parallel importation is allowed by every country.[53] For developing countries, parallel importation is an essential part of government policy, e.g. to secure access to affordable medicines. Further empirical research is required to assess the net welfare impact on South Africa in different sectors.

2.3 Alternatives to patents

[52] New Zealand Institute of Economic Research (NZIER inc.) (1998).
[53] Ganslandt, Maskus and Wong (2001).

Patents are not the only panacea imaginable for R&D market failures. Complementary to patent protection are policy instruments that address these market failures without conferring monopoly power to R&D performers. In theory, a lump-sum transfer from consumers to inventors could be calculated that would stimulate the same amount of technological innovation without the negative distortions of patents. Practical and political[54] considerations, however, make these transfers quite unworkable.

More practical measures include: indirect support for R&D by enhancing private firms' incentives; or direct support for innovation via public funds, e.g. subsidies, government sponsored R&D, and procurement of technologies. The form depends on the nature of the market failure and policy objectives. In most cases, the policy response to a market failure of this kind is a combination of regulatory (such as IPRs) and fiscal support.[55]

In this regard a distinction should be made between basic research, applied research (R&D) and 'pre-competitive generic enabling technologies', as patents and the alternatives are not equally suitable for each type of research.[56] Basic research leads to scientific advances that usually do not have a commercial objective or application and are generally not patentable. Failures in this market therefore require solutions alternative to patents. Applied research (R&D) generally builds on scientific advances by applying these new insights to development of new products or processes that are patentable. Pre-competitive generic enabling technologies include technological advances that are not mature enough to permit commercial exploitation, and are in between these two types of research. These technologies generally suffer from the same underinvestment as basic research. Private profit-oriented enterprises engage in relatively little basic research, and this research has generally become the ambit of government-funded universities or laboratories.[57] Patents are therefore mainly beneficial for addressing market failures in applied research for developing products or processes.

Policy formulation in the US and the UK suggests that market failure concerning investment into basic and pre-competitive generic enabling technologies research may best be addressed by (multilateral) government funding of basic research via universities and laboratories.[58] R&D subsidies tend to be more beneficial when the research has industry-wide applicability and is not firm-specific (due to rent-seeking effects).[59] Procurement policies are more effective when government is a major customer for the products developed. R&D subsidies are subject to international treaties, such as those agreed upon during the Uruguay Round of GATT (1994).

Subsidies

[54] Chiefly political resistance to cash transfers, Maskus (2000).
[55] Department of Finance and Revenue Canada (1997).
[56] Scherer (1999).
[57] Scherer (1999).
[58] Exceptions include IT, pharmaceutical and biotechnology industries where private sector investments are made in basic research, Scherer (1999).
[59] McFetridge (1995).

Targeted subsidies to encourage applied industrial R&D have been used by many nations[60], especially in areas where the potential exists to enhance competitive advantages in international trade. To prevent R&D subsidy wars from creating significant distortions of international trade, the Uruguay Round of GATT specified explicit limits for R&D subsidisation at the risk of countervailing duty actions. The Uruguay Round set the following limits[61]:

- Maximum 75% government subsidies for 'industrial research'[62];
- Maximum 50% government subsidies for 'precompetitive' research; and
- No government subsidies allowed for periodic alteration of existing products and processes and other continuing operations.

Indirect spending: tax incentives

Tax incentives to influence private industry's R&D investment decisions can include: (i) accounting rules (e.g. allowing companies to write off R&D outlays as current expenses, thereby dampening profits and reducing company taxes); (ii) rules allowing companies to write off capital expenditures for R&D (e.g. laboratory construction) or accelerated depreciation; (iii) differential capital gains tax; and (iv) explicit tax credit incentives for R&D.[63]

Research on Canadian R&D incentives suggests that tax incentives and concessionary financing may be more cost-effective than direct subsidies, although the empirical evidence is limited.[64] Important from a policy perspective is that direct subsidies allow for greater targeting of sectors/products by government, whereas tax incentives leave investment decisions in the hands of market players, thereby reducing the potential for government failure.

Policy implications

Whether patents are the least-cost means of stimulating R&D remains a matter of debate. Patents are undeniably crude policy instruments for rewarding inventors, resulting in inadequate returns for investors when patent protection is too weak and transferring excessive returns to patent holders when it is too strong. Evidence of excessive returns (over and above investment outlays and risk premiums) exists[65], giving credence to those who oppose strong IPRs, especially in least developed countries. Patents are also less effective in industries where copying is difficult or

[60] Scherer (1999).
[61] GATT (1994).
[62] Industrial research is defined as "planned research or critical investigation aimed at discovery of new knowledge, with the objective that such knowledge may be useful in developing new products, processes or services, or in bringing about a significant improvement to existing products, processes or services."
[63] Scherer (1999).
[64] Department of Finance and Revenue Canada (1997).
[65] Scherer, F.M. (1980), "*Industrial Market Structure and Economic Performance*", Chicago, cited in Maskus (2000).

costly.[66] For innovating companies, the legal costs involved in securing a patent and litigation in the case of infringement can be very high. Furthermore, uncertainty regarding the scope of patent protection granted and the possibility to 'invent around' an existing patent has led some well-established business enterprises to consider patents as a relatively unimportant means of protecting their innovations from imitation, placing greater emphasis on trade secrets, reputational and learning curve advantages of innovation, and the threat of creative destruction that forces companies to continue innovating or risk being left behind.[67]

As was argued before, the optimal dynamic resource allocation is achieved through a menu of variable patent lengths and breadths, and fixed-term patents with limited economic investigation of the optimal patent scope are particularly unsophisticated.

However, the alternatives may not be more precise. From the literature, it appears that although patents are imperfect, they are viewed as the best possible solution for the trade-off between incentives for investment and the diffusion of the innovation's benefits to consumers and other innovators. IPRs are ultimately market-based incentives, making them more attractive than direct public support.

The patent system may therefore be the most efficient system for promoting innovation, although this hypothesis cannot be tested.[68] It is certainly a popular measure; in 2000, the European Patent Office estimated that the number of patents in force in the world exceeded 4 million with an additional 700 000 annual applications. Patent licensing revenue worldwide amounted to US$ 100 billion, ten times higher than in 1990.[69]

Alternative and complementary measures such as subsidies and tax measures should however not be discounted, particularly in those industries in which the fall-out from too strict an intellectual property regime on social variables such as public health or access to essential technology outweighs the potential benefit from patent protection. Patents are particularly important in the pharmaceutical and biotechnology industries, which are also the most controversial areas of intellectual property protection.

3. Economic Impact of Intellectual Property Rights – Empirics

The initial economic debate on IPRs in the late 1960s and early 1970s focused on the formal theoretical effects of IPRs, emphasising the algebraic or geometric proof of the appropriability problem. Empirical testing of the theories on IPRs – some research papers in the 1980s aside – did not start in earnest until the 1990s, when many countries had well-established intellectual property regimes and developing economies were strengthening theirs.

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[66] Lall (2001).
[67] Scherer (1999).
[68] Maskus (2000).
[69] European Patent Office, website: http://www.european-patent-office.org.

Upon close reading, the available evidence regarding the impact of IPRs appears mixed, and in some cases contradicts the theoretical assumptions. Furthermore, much of the research concerning the impact of patents on innovation focuses on advanced industrialised economies with developed IPRs and systems of R&D, often involving the evaluation of a strengthening or fine-tuning of the existing patent regime. This type of research is of limited relevance to developing economies, which are either introducing a patent regime for the first time or gauging the impact of global patent regimes on their economies.

3.1 Measuring intellectual property rights

The first hurdle in measuring the impact of IPRs is quantifying the level of intellectual property protection in a country, which requires subjective assessment of a number of qualitative variables, such as legislation, implementation and enforcement.

The level of intellectual property protection can be expressed based on the *input* of the IPRs regime (institutional arrangements, e.g. legislation), or on the *output* of this regime (e.g. litigation procedures, number of patents). Most commonly, particularly for cross-country studies, an IPRs indicator is devised based on 'checklists' of inputs, such as national legislation and enforcement, sometimes supplemented by surveys. This is a cumbersome process, riddled with statistical pitfalls, as qualitative data is not easily translated into suitable quantified variables.

Simple input measures – such as a checklist of legislation and membership of international agreements – do not lead to a meaningful reflection or classification of the intellectual property regime, since legislation *per se* does not necessarily indicate the strength of IPRs protection and the majority of countries are currently members of the TRIPS Agreement (making the distinction irrelevant).[70] Moreover, quantifying and combining these variables into a weighed composite indicator is a thorny issue.[71] A more accurate analysis should therefore include a detailed study of national laws and enforcement mechanisms and preferably be complemented by qualitative assessments via surveys.

An often-used input measure is the so-called RR-index, named after its developers R. Rapp and R. Rozek. This input measure is a numerical indicator between 0 and 5, based on each country's patent laws and an approximate indication of conformity with minimum standards.[72] Ginarte and Park (1997) use a similar approach based on protection duration, coverage and limitations, membership of international agreements, and enforcement mechanisms.[73] Enforcement or effectiveness are not included in the RR-indicator or the Ginarte and Park approach.

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[70] Maskus (2000).
[71] Kaufman, D., Kraay, A. and Zoido-Lobaton, P. (1999), cited in Lesser (2001).
[72] 0 indicates the absence of patent law and 5 indicates full conformity with certain minimum standards. Rapp and Rozek (1990).
[73] Ginarte and Park (1997), cited in Lesser (2001).

Other approaches involve surveys of practitioners' judgements regarding the IPRs regime. Lesser (2001) suggests that a more comprehensive indicator should be based on: (i) protectable subject matter; (ii) convention membership; (iii) enforcement; (iv) administration; and (v) cost of protection, but notes significant problems regarding the quantifiability and reliability of the data required. Combining survey results of US and EU practitioners with empirical testing, Lesser identifies three factors with different weights: scope (based mainly on UPOV[74] and TRIPS compliance); efficiency (based on Patent Cooperation Treaty (PCT)[75] applications); and transparency (based on prices). The maximum score is 12.36 in theory, but in practice the study of developing countries finds a maximum of 7.4 and a minimum of 1.6. Lesser assigned the highest score (7.4) to South Africa, which is high for a middle-income country, but as the table below indicates, particularly high for a sub-Saharan African country.

Table 1. Lesser's intellectual property score, 1998

Middle-income developing country	Score	Sub-Saharan African country	Score
Egypt	2.7	Nigeria	1.8
India	3.6	Tanzania	1.8
Indonesia	4.2	Zambia	3.3
Argentina	4.9	Mauritius	4.7
Malaysia	5.5	Malawi	4.7
Mexico	6.0	Zimbabwe	4.8
South Korea	6.1	Kenya	4.8
Brazil	6.7	Namibia	5.0
Chile	7.2	Botswana	5.8
South Africa	**7.4**	**South Africa**	**7.4**

Source: Lesser (2001)

Output measures of an IPRs regime include measurement of the degree of copyright infringement and piracy or estimates of revenue losses by owners of IPRs. Output measures are equally difficult to measure and are deceptive, since they are often expressed in currency values, suggesting empirical objectivity. Unfortunately, output measures such as revenue losses are unreliable and tend to be overstated as actual sales of counterfeit goods are estimated by multiplying the number of counterfeit units sold by the price of a patented product without taking price elasticities or substitution effects into account. Output measures are also merely indirect indications of the strength of the IPRs regime.

Although neither measure is ideal, the survey-based approach by Lesser that takes enforcement and effectiveness into account is one of the best available alternatives for comparisons of IPRs regimes. Constructing a similar index for one country as a time series may, however, be unfeasible (year-on-year changes in judgements may introduce

[74] UPOV is an agreement regarding protection of new plant varieties; see Appendices.
[75] PCT; see Appendices.

an unacceptable level of arbitrariness into the survey), limiting the usefulness of this index to cross-country studies. The index is also not an appropriate substitute for in-depth analysis of the IPRs regime of a single country.

3.2 Intellectual property rights and economic growth

Partial equilibrium outcomes aside, an interesting research question is whether and how IPRs affect economic growth. Although cross-country data on IPRs show that IPRs are positively associated with real Gross National Product (GNP) per capita in simple log-linear regression analyses[76], this does not imply causation. Nor does it indicate the direction of causation, i.e. whether stronger IPRs lead to higher GNP or whether this simply shows that countries with high GNP prefer stronger IPRs. When this data is considered over time, it is found that there is a dynamic element to the relationship between GNP and IPRs: poor countries tend to weaken their patent laws as incomes begin to rise and subsequently strengthen them after they have passed some critical point in per capita income.[77]

A likely explanation for this phenomenon is that patents are demand-driven – countries experiencing growing GNP require stronger patent protection over time as domestic industries develop and innovate – and that patent regimes are part of strategic trade policies. Some research shows patent strength to be positively correlated with GDP per capita and the secondary enrolment ratio[78] (as a proxy for human capital development) in log-linear regressions, or even to wider sets of conditions and economic policies, including openness to trade and the degree of market freedom.[79] This suggests that the conditions for domestic firms to take advantage of IPRs need to be in place before countries are willing to implement patent regimes that potentially raise the cost of their access to foreign innovation.

Data on patenting show that some developing countries, particularly middle-income countries, are experiencing rapidly growing patent applications, suggesting a domestic innovative response to enhanced IPRs protection. This effect is strongest in countries such as Mexico, Brazil, South Korea and South Africa, but also includes China. However, many of these applications are filed by non-resident foreign firms or individuals via the PCT[80] and do not necessarily indicate a rise in innovative activity of domestic firms.[81] Rather, it shows that these countries are becoming more attractive for patent applications due to positive economic conditions for foreign firms, including economic growth, liberalisation and stronger IPRs.

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[76] Maskus and Penubarti (1995), cited in Maskus (2000).
[77] This minimum point was estimated at US$523 per capita in 1984. Maskus (2000).
[78] Maskus (2000).
[79] Ginarte and Park (1997), cited in Maskus (2000).
[80] Particularly Mexico, Brazil, Malaysia, Indonesia and Thailand. Maskus (2000).
[81] Except South Korea, where the increase in applications came from domestic firms.

To sum up, economic growth tends to precede protection of intellectual property and the introduction of intellectual property protection generally requires the ability of domestic firms to reap the benefits of a (strengthened) IPRs regime.

3.3 Intellectual property rights and innovation

The innovative effects of patent protection are difficult to measure, as there is no counterfactual for empirical testing – there are no industrialised countries in which patent protection does not exist at all. In addition, comparisons with developing countries with limited patent protection but dissimilar industrial structures would suffer from statistical weaknesses.

When measuring the impact of a strengthening of the patent regime, the net effect on incentives is also not always evident.[82] In the US, for example, the creation of a centralised patent appeal court in 1983 led to greater consistency in decisions, believed to bolster incentives for innovators. This centralisation also led to a marked change in the legal treatment of patents and to increased amounts of damages awarded for infringement, thus making innovation more risky in technologies with complex and overlapping patents. Whether this policy change effectively strengthened or weakened the patent regime from the innovator's point of view is unclear.

Moreover, it is also virtually impossible to isolate patent protection from other incentives to R&D. As was mentioned before, competition in technological innovation and barriers to imitation may induce inventions naturally and allow the inventor to price above production costs for long enough to recover R&D outlays and risk premiums. Whether or not inventors can appropriate the economic returns on their inventions depends on many variables, including the market imperfections, the imitation barriers, information diffusion, and market demand. Patents are superfluous if the inventions would have happened without patent protection. Identifying these cases in a situation in which patent protection exists is impossible. Consequently, much of the research in this area relies on survey data rather than time-series of economic indicators.

Evidence

Contrary to the theory of IPRs, empirical studies performed with data on the US, France and Japan generally find that patent protection is not of critical importance in R&D decisions. At best, patent protection stimulates patenting behaviour, not innovation. Sakakibara and Branstetter (2001), for instance, find no evidence of an increase in either R&D spending or innovative output that could plausibly be attributed to the 1988 Japanese patent law reforms. These reforms broadened the general scope of patents and led to an increase in the number of claims per patents (reducing the number of patent applications in some sectors), but did not lead to increased innovation or R&D. A study concerning patenting in the US semiconductor industry by Hall and Ziedonis (2001) also challenges the assumed role of strengthened IPRs in inducing additional

[82] Scherer (1999).

innovation. The findings suggest that strengthened IPRs led to a greater propensity of semiconductor firms to patent, but not to greater innovation efforts. In fact, they suggest that strengthened IPRs can be sub-optimal as this leads to socially wasteful accumulation of defensive patent portfolios (patent portfolio races).

Patent protection is considered valuable by firms, but patents are not the main source of private returns to inventive effort, so that the effect of strengthened IPRs on R&D expenditure and innovation could be limited. Schankerman (1998), for instance, finds in his research on French technology sectors that patents are equivalent to a relatively minor R&D cash subsidy of 15-25% on average across technology fields.[83] Cohen *et al* (1998) conclude that patents are relatively weak, imperfect instruments of appropriation, so that even substantial increases in the IPRs regime might be insufficient to induce additional innovation.[84]

The survey findings from developed industrialised nations such as the US and the UK suggest that patents are only considered essential to innovation investment decisions in pharmaceutical, chemical, biotechnology, and plant genetics industries. These industries face high R&D costs and significant appropriability problems, as their innovations are easily identified and misappropriated or reverse-engineered.[85] However, even in these industries, the absence of patent protection would prevent less than 40% of the pharmaceutical inventions.[86] In many other industries, patents may be insignificant or only marginally significant in inducing R&D.[87] Unfortunately, the sectors where patent protection is essential are precisely the sectors in which patent protection is of particular concern to developing countries, due to the social implications of potential abuse of strong patents in these areas, such as monopoly pricing in medicines and limited distribution of new plant seeds.

In summary, the empirical evidence suggests that strengthened patent protection leads to an increase in patents, rather than in innovation. These results do not, however, imply that the introduction of patent protection (or a significant strengthening of IPRs from a low base) would not induce higher R&D expenditure in developing countries, as these surveys were generally performed in a context of a strong and highly developed system of patent protection.

3.4 Intellectual property rights, technology transfer and foreign direct investment

The relationship between IPRs and technology transfer is not clear-cut, as reasonable theoretical assumptions can be developed in either direction. Stronger IPRs could lead

[83] The value varies across technology fields, estimated at 5-10% for pharmaceutical and chemical patents and 15-35% for mechanical and electronics patents. Schankerman (1998).
[84] Cohen *et al* (1998), cited in Sakakibara and Branstetter (2001).
[85] Correa (2000).
[86] Mansfield, Schwartz and Wagner (1981); Taylor and Silbertson (1973), cited in Maskus (2000).
[87] Although this does not mean that the products involved were not patented.

to slower rates of imitation, which in turn slows down the rate of innovation as there is less competitive pressure. Equally reasonable is the proposition that technology diffusion is strengthened by stronger IPRs as foreign direct investment (FDI) and licensing replace imitation and the quality of transferred technology is improved.[88]

Measuring the impact of IPRs on quantified indicators of economic development such as technology transfer or FDI is possible, albeit rather involved. The complexity of quantifying the impact of IPRs explains why opinion surveys rather than time series data are often used to estimate the impact of strengthening a patent regime on FDI or technology transfer.[89]

For a more rigorous assessment, statistical regressions or more complex econometric models are generally used. Once an appropriate measure (e.g. RR-index) has been devised, simple OLS regressions could be performed, using the IPRs index as an explanatory variable for R&D expenditure, royalty payments or licensing agreements, or even trends in the stock of FDI. Since the line of causation is not clear and many factors other than the patent regime are likely to impact on these variables, these regressions are likely to suffer from statistical weaknesses such as heteroscedasticity or multicollinearity or may simply be spurious.

Sakakibara and Branstetter (2001) estimate a simple log-linear equation for R&D spending in Japan, in which patent reform is one of many explanatory variables, including investment opportunities, research productivity, sales and dummy variables for industry-specific R&D spending (they found no significant impact of patent reform on R&D). Similar approaches could be followed for licensing agreements or royalty payments as proxies for technology transfer. The data requirements of these exercises tend to be quite burdensome, making them less appropriate for developing countries where data on research productivity or investment opportunities may be unavailable.

Survey data suggests that IPRs are – at best – of medium importance to technology transfer decisions.[90] Two critical factors in technology transfer emerge: (i) the level of development (or GNP) of the country in question; and (ii) supporting economic policies. Openness to trade, for instance, appears to be an important condition for successful technology transfer through trade in patented products. Trade in technologically advanced inputs, such as software, chemicals and machinery, is particularly important as a driving force for technology convergence among developed countries and technology diffusion into developing countries.[91] Strengthened IPRs in developing economies aimed at technology transfer are therefore more likely to succeed in a supportive economic policy environment, including liberalised trade.

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[88] This literature is reviewed in detail by Maskus (2000), refer to, *inter alia*, Helpman (1993); Glass and Saggi (1995); Lai (1998); Davies (1977) and Contractor (1980), cited in Maskus (2000).

[89] In these surveys, companies rate the importance of IPRs in their FDI decisions. Mansfield, Schwartz and Wagner (1981); Mansfield (1994), cited in Maskus (2000).

[90] Correa (2000).

[91] Eaton and Kortum (1996); Coe and Helpman (1995); and Coe, Helpman and Hoffmaister (1997), cited in Maskus (2000).

When estimating the impact on FDI, the statistical pitfalls are particularly treacherous because the line of causality is, once again, not clear. On the one hand, economic theory suggests that strong IPRs are an increasingly important location factor determining inward FDI, although it is only one of many factors.[92] It is, however, equally possible in theory that strong IPRs are negatively associated with FDI, as multinational corporations will be more inclined to license technology in countries with strong IPRs and less inclined to opt for FDI to prevent infringement. An increase in the IPRs index would in this case lead to a decrease in FDI. These theoretical ambiguities are not conclusively set straight by empirical evidence, as many developing countries with relatively advanced IPRs have not received significant FDI flows, whereas other developing countries have received FDI prior to strengthening their IPRs protection.[93]

The effects of IPRs on FDI are also likely to differ across sectors and depend on the stage of production.[94] Lower technology goods and services production, such as textiles and the tourism industry, are less reliant on IPRs than high technology industries. Barriers to imitation (such as technical difficulty) can make a product less reliant on IPRs. Therefore, most vulnerable to the counter-intuitive negative effect of IPRs on FDI are technologies with high R&D expenditure but with low barriers to imitation, such as chemicals, software, and pharmaceutical products.[95] Simple OLS regressions of FDI and a patent index could easily miss these sectoral and product specific nuances.

Quantitative assessments generally use an econometric model to estimate a set of determinants of FDI. Gravity models[96] are popular in this respect, used to regress FDI on several variables, one of which is an index of IPRs (the other variables can include, *inter alia*, market size, past investment stock, degree of industrialisation and openness of the economy). The evidence regarding the impact of IPRs on FDI obtained with gravity models has been very mixed. Some studies find no significant effect of IPRs on FDI, whereas others show that weak IPRs have a significant negative impact on the location of, for instance, American FDI.[97]

Yet even these models tend to focus on only part of the relationship between IPRs and entry of foreign firms. A multinational corporation generally has several modes by which it can enter a certain foreign market, including: exporting its goods and services, either via established importers or directly via affiliates of the foreign firm; licensing a local firm to produce its goods and services; or via direct investment for local production.

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[92] These factors include, *inter alia*, market size, human capital, infrastructural development, the availability of business services and openness to trade. Maskus (2000).
[93] Correa (2000).
[94] Mansfield (1994), cited in Correa (2000).
[95] Correa (2000).
[96] A general gravity model explains flows of good, people, etc. from one area to another as a function of characteristics of the origin, characteristics of the destination and some separation measurement. Krugman (1991), cited in Porojan (2000).
[97] E.g. Primo, Braga and Fink (1998); Lee and Mansfield (1996), cited in Maskus (2000).

An extension of the multivariate approach discussed above includes estimating the effect of IPRs on a set of simultaneous equations in which the four modes of entry into a foreign market – namely exports, patent applications (proxy for licensing), sales through local affiliates, and local production (measured by local assets) – are determined by the same set of variables (including GDP, tariffs, a patent index, tax concessions, etc.), so that the effects of IPRs on all four modes of entry into a foreign market are captured simultaneously. Using this method, Maskus (2000) finds that developing countries react differently to changes in patent strength than developed economies: exports to affiliates are strongly influenced by patent strength in developing economies, whereas in developed countries this effect was weak; and strengthening of patents leads to significantly positive increases in assets by foreign affiliates (i.e. FDI), whereas for developed countries this effect is negative (leading to disinvestment effectively).

It should be remembered that using any of these methods for measuring the impact of IPRs requires the development of an appropriate IPRs index or proxy, which is either qualitative in nature and of limited use outside a cross-country study, or quantitative in nature, the data for which may be unavailable in South Africa. A sudden increase in the RR-index (a structural break) is often helpful in determining the statistical relationship between IPRs and other variables in a country, but as South Africa's IPRs developed gradually over a long period of time, this may be of limited use in determining the impact on South Africa's FDI and other indicators.

Policy implications

Combining these empirical findings with those from the previous sections, the following conclusions can be drawn. Firstly, although strengthening of IPRs in developing countries does not necessarily lead to significant increases in innovation or patent applications (particularly by domestic companies), this policy change does increase the assets owned in the host country by foreign affiliates (as well as imports by foreign affiliates). However, once patent protection exceeds a certain level, licensing agreements will substitute for FDI. There are also significant sector-specific effects, since FDI and technology transfer in complex but easily copied technologies are positively related to IPRs but less sensitive to IPRs in sectors with standardised, labour-intensive technologies (such as textiles). Lastly, transfer of sophisticated technology to developing countries is more likely when IPRs are strengthened.

For developing countries, strengthening of IPRs could be part of a package of reforms aimed at FDI attraction, although it appears to be only a necessary but not sufficient condition for attracting FDI and may in fact promote switching away from FDI and towards increased imports and licensing payments.

3.5 Intellectual property rights and effects on prices

IPRs essentially increase the market power of suppliers of technological innovation, allowing them to reap monopoly rents for a limited period of time. Consumers in

technology-importing or imitating countries could therefore be confronted with increased prices when an IPRs regime is strengthened. The impact on prices depends on many factors, including the structure of the relevant market (before and after the change in IPRs), demand elasticity of the product involved, price regulation in the industry, and competition policies.[98] It is theorised that price increases will be stronger if – using the pharmaceutical industry as an illustrative case – the local market were more competitive, the market share of imitation drugs were larger, and the demand for the product were more price inelastic before patent protection.

Testing for this effect generally involves econometrically relating a price index (for a product or product class) to a set of variables, including per capita GDP, per capita consumption of the product, patent protection and price controls.[99] This is the method used by Schut and Van Bergeijk (1986), who show that a standardised pharmaceutical price index was much lower on average in countries without patents than in countries with patents.[100] To capture the substitution effect, the price elasticity of the product in question could be included. This method is probably best suited to cross-country studies, as quantifying the 'value' of the patent protection indicator for one country over time could be difficult in practice. A relatively effortless alternative would be to compare the price of patented products in different countries[101], although this method does not isolate the impact of IPRs, but rather measures the total price difference that is due to a number of factors including GDP, barriers to entry, etc.

Scherer (1999) argues that prices for certain innovative products need to be high to cover the costs of unsuccessful R&D initiatives. The distribution of returns to patented inventions is extremely skewed and relatively few observations tend to account for most of the cumulative returns. Empirical studies of R&D projects in chemical, pharmaceutical, electronic and petroleum enterprises show that on average 27% of the projects initiated achieved financial success, and had to provide sufficiently high returns to offset the costs of less successful projects.[102]

These studies do not explicitly differentiate two distinct price-raising effects, namely: (i) the skewed distribution of returns in R&D; and (ii) the price increases due to exercise of market power or profit-maximising behaviour (pricing according to 'what the market can bear'[103]) that patents enable by preventing competition from cheaper imitation drugs. The former is a legitimate ground for higher prices and protection from patent infringement, the latter suggests excessive pricing practices that would be for competition authorities to restrain.

Distinguishing between the two effects may be difficult statistically, but the price-raising effect of market power can be eroded quite efficiently via the entry of generics.

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[98] Maskus (2000).
[99] Dummy variables for patent protection and price controls.
[100] Schut and Van Bergeijk (1986), cited in Maskus (2000).
[101] Lanjouw (1997).
[102] Mansfield (1986), cited in Maskus (2000).
[103] Subramanian (1990), cited in Correa (2000).

Maskus (2000) finds that *legitimate* competition by generic drugs can significantly narrow the gap between prices of branded products and of generic substitutes, thus moderating the market power effect on prices associated with patents. The policy implications of these findings are clear: legitimate competition by generic substitutes should be stimulated by permitting entry of generics and laws allowing pharmacists to dispense generics as well as patented brand-name medication.[104] Allowing narrow pharmaceutical patents only to erode the mark-up further could damage innovation because the returns could fall short of the initial R&D expenses, requiring careful consideration by policy makers; obviously the effect of narrow patenting will be more damaging for technology-exporting than for technology-importing countries.

3.6 Intellectual property rights and trade

The impact of IPRs on trade flows is another contentious issue. Economic theory does not categorically predict the impact of patents on trade volumes. Weak IPRs can depress imports as they provide import-substituting imitation incentives (although this could be offset by imported counterfeit goods). In this case, a strengthening of the IPRs regime leads to higher imports. On the other hand, strong IPRs can also deter imports due to the higher prices or due to collusive behaviour of domestic firms aimed at limiting import competition. In this case, strengthening of the IPRs regime would lead to lower imports.

Theoretically, there is a trade-off between increased market power (due to stronger patents, allowing foreign firms to reduce exports and increase prices) and the larger market for patented products created by the reduction in imitation by local firms (which would increase imports). The market expansion effect is likely to dominate in larger countries with competitive local imitation firms, whereas the market power effect is likely to dominate in smaller economies with limited imitation.[105] Therefore, much depends on local market demand, the efficiency of imitative production and the structure of trade barriers. Trade is an important conduit for technological innovation, but as many studies show, this comes at a balance of payments cost.

The impact on the current account of the balance of payments is twofold: via the trade account and via payments in the service, income and current transfer account. For a technology importing country, the impact on the trade account can be either increased manufactured imports (market expansion effect dominates) or decreased imports (market power effect dominates). The impact on service and income payments and current transfers includes the monetary reward for intellectual property. Also known as the 'technology balance of payments', this account comprises money paid or received for the use of patents, licenses, trademarks, designs, inventions, know-how and closely related technical services, and indicates the extent of technology importation and is particularly influenced by services that are sensitive to IPRs protection (such as IT

[104] Maskus (2000).
[105] Maskus (2000).

services).[106] The balance on this account is often negatively influenced by strengthened IPRs, particularly in developing countries.

The trade effects are captured by the elasticity of imports with respect to the patent index. Calculation of this elasticity requires detailed historical information on changes in the IPRs regime and trade flows and careful isolation of the effects of patents on imports by estimating import demand functions. More rigorous econometric trade models can be used to gauge the effect of strengthened IPRs on trade. Problems in applying these methods to South Africa for instance include the development of a patent indicator and data availability.

Maskus and Penubarti estimated reduced-form equations for bilateral trade in manufacturing sectors based on the Krugman-Helpman trade model.[107] Explanatory variables included a scaling factor, per capita GNP, trade restrictions in the importing country and an adjusted RR index of patent rights in the importing nations. Dummy variables were used in order to capture the effects of market size and technological capacity. They found that in large developing countries, strengthened patent laws had a significant positive – market expansion – effect on manufacturing imports (from the OECD) and that the results were similar but lower for smaller developing countries. The pharmaceutical industry was found to be particularly sensitive to patent rights, as were relatively low-technology goods (such as clothing and other consumer goods) as increased trademark protection lowers sales of counterfeit goods.

The empirical evidence regarding the impact of strengthening IPRs on international trade flows is ambiguous on a national level, but shows that generally across countries, stronger patent protection is associated with a positive reaction in international trade. However, individual countries, particularly small poor countries, can experience losses.[108]

3.7 Private value of patents

Patent strength can affect firm-level decisions and international competitiveness, which is not easily identified in aggregate effects on FDI, pricing and technology transfer. Much of the empirical work regarding patents therefore centres on the private value of patents.[109] Lerner (1994) investigates the impact of patent scope on a start-up firm's value in the biotechnology sector by examining the relationship between the stock of intellectual property and the valuation of firms, particularly taking the scope of these

[106] Maskus (2000).
[107] Maskus and Penubarti (1995, 1997), cited in Maskus.
[108] Maskus (2000).
[109] For a detailed discussion of the valuation of patents, please refer to: Cohen, W.M. *et al* (2000), "*Protecting their Intellectual Assets: Appropriability Conditions and Why U.S. manufacturing Firms Patent (or Not)"*, NBER Working Paper; Lanjouw, J.O. (1992), "*The Private Value of Patent Rights"*, Ph.D. dissertation. LSE, 1992; Levin, R. et al (1987), "*Appropriating the Returns from Industrial Research and Development*", Brookings Papers on Economic Activity, Vol 3, 1987; Putnam, J. (1996), *"The Value of International Patent Rights*", Ph.D. dissertation, Yale University.

patents into account.[110] The findings of this and similar empirical work show that the length and breadth of a patent significantly affect firm valuations, and thereby influence the ability of the firm to raise capital and expand. This effect is stronger in R&D intensive sectors. For instance, intellectual property is found to be the most valuable asset of a starting-up biotechnology company (although many other factors affect firm valuation).[111]

Furthermore, patent scope is more highly valued in firms that patent in subclasses with many other patents, which supports Klemperer's relationship between patent scope and the ease with which consumers can switch to alternative products. The theory suggests that the marginal value of increased patent scope will be higher when there are many substitutes in the same product class.

There is strong policy relevance to this research because it shows that, although patent length is fixed by international agreements, patent scope is a powerful tool: if a patent has an inappropriate scope, this could significantly affect a domestic firm's (or a sector's) potential to raise capital, ultimately affecting R&D expenditure, production, exports and even economic growth. Internationally, there are noticeable differences in patent scope between the patent-granting countries. The US regime is generally regarded as one that awards broad patents, sometimes awarding broad claims to inventions that many regard as incremental[112] (although this can be expected in new areas of technological innovation in which the US has a large stake), whereas the EU is considered to grant patents with a narrower scope. There also tend to be shifts in the scope of awards over time; for example, biotechnology patents were very broad in the early 1980s when this was a new and groundbreaking area, but narrowed significantly after the late 1980s.

4. Impact on Developing Countries

This section discusses some of the developing country specific concerns around IPRs and the impact of the TRIPS Agreement.

4.1 Intellectual property rights in developing countries: catalyst for economic growth or immiserising practice?

IPRs are distributed quite unevenly across countries, with the most comprehensive regimes generally concentrated in industrialised countries and the least sophisticated regimes concentrated in the least developed countries, although South Africa is perhaps an exception to this rule. This uneven distribution is not surprising, since an equally

[110] Patent breadth proxies are: the number of subclasses into which a patent is assigned (broader patents span more sub-classes); the number of citations in later patents (broader patents are likely to be cited in subsequent innovations); and the involvement in litigation (broader patents are likely to be litigated).
[111] Lerner finds that an increase in average patent scope of one standard deviation translates into a 21% increase in firm value.
[112] Lerner (1994).

uneven distribution applies to the production of internationally marketable technologies and goods. The bulk of patented technologies and products originates in the US, Japan and Western Europe.

Developing countries thus tend to be dependent on innovations from industrialised countries and apply for few patents in the developed world. Only 2% of all patents granted in the US between 1977 and 1996 involved applicants from developing countries. Analogously, only 4% of global R&D expenditures originated in developing countries in 1990 (down from 6% in 1980), despite increased R&D outlays in the Asian newly industrialised countries.[113]

PCT applications to the World Intellectual Property Organisation (WIPO) in 2001 totalled more than 90 000 and were 42% American, 13% German, 10% Japanese, 6% British and 4% French. Developing country applications constituted a mere 3.5%, although they have been rising rapidly in recent years.[114]

The technology exporting countries have argued that strong global intellectual property protection would have beneficial spillovers to poor countries and would stimulate innovation in these countries. Technology importing countries on the other hand, have pointed to the rise in costs of medicines, agricultural inputs and the decreased access to technology that a strengthened system for IPRs could entail.[115]

The effects of strengthened IPRs are widely accepted to depend on countries' levels of economic development and could indeed be costly for developing countries.[116] Counterfeiting occurs mostly in developing countries, where it has in some cases given rise to thriving industries. This type of infringement is cross-sectoral, affecting not only the apparel industries, but industrial machinery, prepared foods and beverages, electronics, computers and software manufacturers. Trademark protection may therefore impact asymmetrically on developing countries.

Formally, the representation in Graph 1 (p.15) is slightly more complex for an open developing economy. For a technology-importing or product-imitating country that introduces IPRs, a transfer of monopoly rents to foreign firms will ensue, so that as a country it suffers a static loss of C_0ENC_1 from the worsened terms of trade. Local producers will also have to cease production (if no licensing agreement is reached), access to international technologies will be restricted and there is a risk of exploitation by patent holders. If the country does not attract R&D or FDI inflows from foreign firms, there is a net loss in 'national' welfare. Therefore, weak IPRs can be beneficial to technology-importing developing countries, as it provides inexpensive technology transfer.

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[113] Correa (2000).
[114] Williams, F., "*World's Patent Bids Burgeon*", Businessday, 26 February 2001.
[115] F.C. Bergsten, cited in Maskus (2000).
[116] Lall (2001), Maskus (2000).

For some products such as apparel, the market power effect could dominate when IPRs are strengthened, which makes net (i.e. global) gains from this policy reform unlikely, as the foreign producer does not sell any additional products abroad whilst local imitation industries are shut down (in terms of sales, counterfeit items sold in developing countries do not necessarily crowd out imports of the original due to prohibitively high prices).

Maskus evaluates the available research on the impact on developing countries and concludes that:

> …While there are reasons to be concerned about potential exercise of market power by firms endowed with greater intellectual property rights protection, the balance of evidence strongly suggests that intellectual property rights provide an important foundation for promoting technology transfer, local innovation, and economic growth in the long run.

The similarity of this argument to those used to entice developing countries to agree to rapid trade liberalisation, structural adjustment and 'new issues' in the WTO is salient. Maskus stresses the importance of appropriateness of IPRs to the development needs of each country, yet argues in favour of minimum global norms, which leave little scope for 'special and differential' treatment of developing countries. Developing countries should critically evaluate the available empirical research and assess ways in which IPRs can be incorporated in an appropriate manner in their respective policy frameworks and become truly growth enabling.

More specifically, developing countries should carefully examine the impact of strong IPRs on their economies and public health, and should beware of broad patenting as is common in the US – particularly pertaining to biotechnology, genetic sequencing, life forms and new economy business practices – as this could create monopoly rights on entire lines of research, impeding further R&D and leading to costly licensing agreements. Equally important is the coherence of the overall policy framework; IPRs should interact consistently with other policies and regulations, such as competition policy, trade and FDI policies, and general technology development strategies.[117]

4.2 The impact of IPRs on developing countries' trade

Maskus (2000) shows that many developing countries are large technology importers (e.g. South Korea, Brazil) and that developing countries that strengthened their IPRs protection (mainly in the 1990s) have significant negative balances on the royalty and license fees account. The US experienced significant increases in payments for royalty and license fees between 1990 and 1996, indicating that their aggressive campaign for global IPRs paid off.

[117] Maskus (2000).

The Maskus and Penubarti evidence suggests that the pharmaceutical industry is particularly sensitive to patent rights, as well as relatively low-technology goods (such as clothing and other consumer goods) as increased trademark protection lowers sales of counterfeit goods.[118] IPRs in clothing and pharmaceuticals are clearly 'sensitive' for developing countries, both for workers and consumers; clothing is generally a labour-intensive sector and the pharmaceuticals industry does not only provide employment in reverse-engineering production, but is also considered essential for affordable health care in least developed countries. Stronger IPRs could increase prices and reduce employment in these sectors. Goods that are more difficult to imitate were less sensitive to changes to the patent regime.

Stronger patents in developing countries therefore do lead to higher imports. More recent studies[119] further show that the market expansion effect is highest in industrialising economies with weak patents but effective imitation industries (such as China and India). Strengthening of IPRs in these countries leads to higher import volumes, which inevitably displace local production. Developing countries with weak imitative abilities (but with patent protection in place) on the other hand tend to lower their imports as IPRs are enhanced further (market power effect), effectively depriving these countries of the benefits of technological innovation. The findings of these studies show that weak patent rights are significant barriers to manufacturing trade, particularly in goods sensitive to IPRs. Moreover, they show that strengthening IPRs in lower-income developing countries with low imitation ability will be of little benefit to manufacturers in technology exporting countries, but will only decrease the access of these countries to technological innovation and high technology products.

Maskus (2000) argues that these distributional consequences are the short-term pain that is required for the long-term gain: "(…) stronger global IPRs could enhance the dynamic efficiency with which resources are allocated internationally, which should help mitigate any adverse distributional consequences." Unfortunately, small developing countries may not be in a position to take the risk of incurring most of the pain for only some of the gain.

4.3 TRIPS requirements

TRIPS requires minimum standards for the protection of IPRs, aimed at strengthening global norms and enforcement, as well as reducing the variance in national intellectual property regimes. The largest adjustments were expected from developing countries that generally had weak or no intellectual property protection prior to the TRIPS Agreement. The question is whether these changes will be growth enhancing for developing countries, due to newly stimulated innovative activity, or immiserising, due to higher prices for imported patented products. Unfortunately, as H.R. Haldeman once remarked: "Once the toothpaste is out of the tube, it's hard to get it back in!" Developing countries will have to find ways to accommodate the current TRIPS requirements, and exert

[118] Maskus and Penubarti (1995, 1997), cited in Maskus.
[119] See for instance Smith, P.J. (1999), cited in Maskus (2000).

caution when multilateral negotiations on raising the minimum requirements are conducted.

The minimum standards of TRIPS concern the availability and enforcement of IPRs (see Table 6, Appendices), requiring signatories to adopt appropriate legislation protecting products covered by patents, copyrights, trademarks, registered integrated circuits, *sui generis* protection for new forms of technology, and trade secrets. TRIPS provides some flexibility to individual countries in selecting standards of protection, as it permits countries to exceed the minimum levels or, in some cases, to limit the scope of protection. TRIPS further mandates that countries set up mechanisms for enforcing these stronger rights. Of particular interest and contention are the TRIPS requirements for protection of pharmaceuticals, biotechnology, plant varieties, software, and electronic databases.

For developing countries there are several implications. The TRIPS requirements on copyright protection include protection of computer programmes and databases that were previously not recognised in many developing countries as copyrightable. Protection of databases could hamper access to knowledge and research by developing countries and copyrights on computer codes could obstruct legitimate reverse engineering activities. Likewise, TRIPS requires effective protection of trade secrets (confidential business information). Although trade secret protection could slow down technology diffusion, it is a potentially beneficial supplement to the patent system for developing countries, particularly in technology-follower countries, since they do not prevent independent discovery.[120] Other extensions include trademark protection for internationally well-known trademarks, so as to prevent speculative registration and fraudulent use. This means that well-known marks might be protected even when they are not used in the relevant country, thereby favouring the IPR owners.

The most controversial part of the TRIPS however, concerns patents. Patent protection was noticeably harmonised and widened under the TRIPS Agreement. Patent length was set at a minimum of 20 years from date of filing. Fixing the length of patents multilaterally clearly diminishes the patent policy levers of national governments, reducing patent policy to differences in patent scope. For infringement of process patents, the burden of proof was reversed, and placed on the defendant (who has to prove that she is not infringing on the plaintiff's patent) instead of the plaintiff, potentially opening the door for 'patent harassment' of close imitators or legitimate reverse engineering companies by patent holders. This reversal works in favour of patent owners and can be detrimental to technology importing or follower countries.

More importantly, the definition of patentable subject matter was broadened. Article 27 defines protectable subject matter as follows: "any inventions, whether products of

[120] Trade secrets include pharmaceutical clinical trial data submitted by an applicant, which may not be used for a certain period of time by a subsequent applicant for generic copies or similar products in many developed countries. In many developing countries a second applicant is allowed to base its application for a similar product partly on the test results of the initial applicant. The latter option facilitates generic competition.

processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application." Article 27.3.b provides an exemption for biotechnological inventions, allowing countries to exclude from patentability: plants and animals (other than micro-organisms); diagnostic, therapeutic and surgical methods; and 'essentially biological processes for the production of plants or animals' (other than non-biological and microbiological processes, i.e. traditional breeding methods). At the same time, the Agreement requires that all countries adopt patents or an effective *sui generis* system of protection for plant varieties to protect plant breeders' rights (for instance, a registration system for protection that differs in scope and length from the usual patent protection). Patents on lifeforms and living processes have been contested on scientific grounds and are potentially harmful, both in biological and economic terms. In economic terms, the practice can easily descend into biopiracy, the wrongful appropriation of biological material without appropriate compensation to the rightful owners. Scientifically speaking, a case could be made against patenting lifeforms as this may involve hazardous inventions and discovery or knowledge instead of innovation, and it could also stifle scientific and medical research.[121]

Plant breeders' rights give exclusive rights to produce, sell and import seed varieties and restrict the right of farmers to save, exchange and use seeds. Plant breeders' rights act like patents but have less stringent requirements, since new plants need only be distinctive from earlier varieties and genetically stable, whereas for patentability new products or processes need at least to be novel (akin to the distinctiveness requirement for new plant varieties), non-obvious and have industrial utility.[122] Plant breeders' rights are a matter of debate, as developing countries with significant farming sectors but no or limited agricultural innovation could be exposed to restricted access to improved plant varieties. Farmers in poor countries may not be able to purchase these varieties, which not only has a relative impact on their yields and ultimately on national self-sufficiency, but also makes them less competitive in the global market place.

The TRIPS Agreement also makes a rather artificial distinction between certain organisms and biological processes that may be excluded from patentability and other organisms and processes that are not allowed exclusion.[123] The Africa Group in the WTO has proposed that the review should clarify that all living organisms and their parts and all living processes cannot be patented.[124] Another issue for review in this context is the interpretation of *sui generis* protection, since there remains confusion as to whether this requirement refers specifically to UPOV requirements or to any kind of *sui generis* protection, including protection that is less stringent than UPOV. It should also be noted here that UPOV is a living charter that has been revised and strengthened over the past decades since its inception in 1961. The revisions comprised several changes; patents were added as an option for the protection of plant breeders' rights and

[121] Ho (2001).
[122] Maskus (2000).
[123] Khor (2000).
[124] Khor (2000).

the protection for a limited number of varieties was changed to a requirement to protect all plants and species 10 years after joining.[125]

The widened patentability embedded in the TRIPS Agreement could be balanced by extensive possibilities for parallel importation and compulsory licensing. As was discussed in Section 1.4 Compulsory licensing and parallel imports), both are allowed, but only under strict conditions. Patent protection was extended by TRIPS to include the exclusive right of importation, thereby effectively banning parallel importation, unless the national interest is demonstrably affected. Compulsory licensing of patented products was made more challenging as countries are no longer able to base them on obligations to work patents through domestic production; importation is sufficient to meet working conditions. However, the exclusive importation right is at the same time limited by Article 6 of the same agreement, which specifies that each country may adopt its own regulation regarding whether the first international sale of a good would 'exhaust distribution rights'.[126] If this is the case, the rights of the initial patent holder are 'exhausted' when the product in question is licensed abroad or exported, effectively enabling member countries to allow parallel importation. To clarify the position on these issues, the WTO Secretariat issued a statement[127] explaining that members to the TRIPS Agreement have the right to grant compulsory licences as well as to determine, within limits, the public interest grounds upon which such licences are granted and are free to adopt their own regulation regarding parallel importation.

Transitional arrangements

Developed countries had to comply with TRIPS within one year (i.e. before 1 January 1996). The TRIPS Agreement requires developing countries to upgrade their protection to the standards of industrialised nations within five years, i.e. before 1 January 2000, (and within 10 years for patents in areas of technology that were not previously covered, e.g. pharmaceutical, agricultural and chemical patents, and micro-organisms)[128], while the least developed countries are required to upgrade within 11 years, i.e. before 1 January 2006.[129]

For the purposes of the TRIPS Agreement, South Africa is deemed to be a developed country and had until 1 January 1996 to adopt the required legislation to comply with the TRIPS requirements.[130] To this end, South Africa adopted several amendment acts, albeit only in 1997, but is currently not fully TRIPS compliant (see Section 5. Intellectual Property Rights in South Africa).

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[125] Nijar (1999).
[126] Maskus (2000).
[127] WTO (2001a).
[128] Countries that were to introduce product patent protection in areas of technology thus far not protected in their territory – e.g. pharmaceuticals in Argentina, India and Egypt – had 10 years to comply. However, these concessions to developing countries were made in exchange for long transitional periods for industrialised nations' compliance in agriculture and textile obligations. Correa (2000).
[129] WTO (1995).
[130] One of the declared objectives of the IP Laws Amendment Act 38 of 1997 is to comply fully with those requirements. Burrel (1999).

The TRIPS Agreement introduces WTO principles[131] and the WTO Dispute Settlement Mechanism into the national intellectual property regimes. The outcomes of WTO Dispute Settlement procedures are binding and may be applied for disputes regarding compliance with minimum standards, thereby preventing unilateral actions such as those undertaken by the US under Section 301 of its Trade Act.[132]

4.4 Impact of TRIPS on pricing, development and growth

The expected impact of the TRIPS Agreement on developing countries involves static costs and dynamic gains. The short-term static costs of enhanced IPRs in terms of employment and royalty payments may be offset by long-term dynamic gains of innovation, imitation and diffusion, including competitive advantages for innovative firms, expanded investment and technology flows to developing countries, which may in turn become greater sources of innovation. Technology transfer is of particular importance to developing countries that are, in the main, technology importers.

Both theory and empirical examination suggest that the most important short-term impact of TRIPS is a transfer of economic benefits from technology-importing to technology-exporting countries, with the largest gains accruing to the US.[133] Not so clear is what happens in the long run, when the proclaimed benefits of IPRs protection for economic growth and development via technology transfer and FDI should materialise.

Ceteris paribus, strengthened IPRs will not lead to these benefits. It is important to remember that countries in sub-Saharan Africa with relatively developed IPRs regimes[134] have generally attracted little FDI and registered few domestic or international patents, whereas countries in East Asia, many of which had weak IPRs until the 1990s, attracted most developing country FDI.

In the long run, therefore, much depends on the interactions between IPRs reform and other economic policies, such as strong human capital development (encouraging technology dissemination and innovation), labour market flexibility, capital market liberalisation, upgrading of technology infrastructure, trade liberalisation, competition policy (to prevent and remedy anti-competitive practices in licensing and distribution), and social regulation (e.g. health and environment). TRIPS may lead to net gains for the

[131] Including transparency, most-favoured nation (MFN) and national treatment (see glossary). In the context of TRIPS, the MFN obligation allows for certain exemptions for regional trade agreements with intellectual property rights clauses.
[132] Correa (2000).
[133] Maskus (2000) shows that the implementation of TRIPS could lead to a 6.2% increase of total 1984 merchandise imports annually by small developing economies or 1.4% of their combined GNP. Large developing countries could increase their imports by between 5.4% and 8.9% of 1984 imports per year.
[134] Albeit with limited enforcement.

global economy in the long run[135], but this could be at the cost of a very unbalanced international distribution of these gains.

Domestic prices

The changes required by the TRIPS Agreement are most substantial for developing countries that are net importers of new technology and high technology products, reducing their ability to imitate foreign products and technologies, which will subsequently be available only at higher prices, deteriorating their terms of trade.

Counterfeit goods are widely produced and sold in developing countries, and the presence of these goods is found to: (i) lower prices of state-of-the-art products; (ii) lower firms' profits; and (iii) increase consumer welfare. The magnitude of this effect depends on the income distribution of the economy: the greater the degree of income inequality, the greater the welfare effect and the smaller the profit effect.[136] Therefore, the impact of IPRs could be disproportionately negative in developing countries with a high degree of income inequality.

The price-raising effect of patents is of particular concern when it involves pharmaceuticals. Pharmaceutical prices will generally increase when patent protection is introduced or strengthened, depending on a number of factors: the more competitive the local pharmaceutical market was before patent protection; the larger the market share of copied drugs; and the more price inelastic the demand for medicines.[137] Several studies show that for countries such as India, which resisted patents for pharmaceuticals and used weak intellectual property protection to develop a highly competitive domestic pharmaceutical sector and successful product adaptation firms, the impact on medicine prices could be severe.[138] Currently, branded products capture only a small price premium (approx. 5-10%) vis-à-vis generics in India, and drug prices in India for medicines that are patented elsewhere are substantially lower than in the countries granting protection.[139] In this case, pharmaceutical patent protection is likely to increase prices significantly.[140]

Impact on development and growth

The TRIPS Agreement removes the policy option of using weak patent protection as a protectionist measure for infant industries, for which it has been used by both developing and developed countries in the past, (e.g. the US in the case of its publishing

[135] Maskus (2000).
[136] Scandizzo (2001).
[137] Schut and van Bergeijk (1986) show that a standardised pharmaceutical price index was much lower on average in countries without patents than in countries with patents, cited in Maskus (2000).
[138] Lanjouw (1998). See also National Working Group on Patent Laws (1993), Nogués (1990) and Subramanian (1990), cited in Correa (2000).
[139] In Pakistan, which grants product patents for pharmaceuticals, for instance, prices for a sample of drugs were 3 to 14 times higher than in India. Lanjouw (1998).
[140] Although even if patents lead to higher prices, this will only affect a small share of the market, as patented products are only around 10% of the total market for pharmaceuticals in India, Lanjouw (1998).

industry and India in the case of its pharmaceutical industry). Setting up institutions for enforcement of IPRs is not only costly, but can be very difficult, given the dearth of skilled intellectual property professionals. Of particular concern to developing countries is the fact that the banning of counterfeiting or imitation industries will also have a negative impact on their ability to compete internationally and lead to job losses.

In addition, legal imitation becomes riskier with enhanced IPRs, thereby lowering the potential for learning through adaptation of foreign technology. Potential abuses of IPRs (via anti-competitive practices of multinational corporations) are also a significant concern. Once developing countries, particularly small and poor countries, strengthen their IPRs, the domestic markets could become more concentrated as foreign firms increase their market shares. Effective competition enforcement is required but may not be feasible in the short term in the countries concerned.

The empirical research on the static short-term effects of TRIPS shows significant transfers on the 'technology balance of payments' to the US (due to its significant ownership of patents abroad), totalling nearly US$6 billion. Other net transfers include Germany, France, Italy, Sweden and Switzerland. In fact, all the positive net transfers will go to the US and Europe.[141] South Africa would incur a negative outward transfer in licensing fees of US$183 million and an inward transfer of US$15 million due to TRIPS, resulting in a net outflow of US$168 million. Surprisingly, the largest absolute losses of this redistribution include developed economies, namely the UK and Canada.

The long-term effects on FDI and import flows have been estimated by Maskus (2000). A key assumption in the econometric model used for these calculations is that imports and FDI are both positively associated with patent rights, which is not necessarily the case for individual countries.

The long-term effects on the UK and Canada would be the largest among developed countries, as FDI assets would shrink in those countries. Developing countries would receive more of the benefits in terms of FDI, but also incur more of the costs in terms of increased imports. China and India, for instance, will increase their FDI assets by US$573 and 657 million, but increase their manufacturing imports by US$16.0 and 6.6 billion, with significant effects on their balance of payments. Middle-income developing countries, such as South Korea and Brazil, will increase their manufacturing imports by US$2.1 billion and 1.4 billion, but this will have very different effects on their FDI assets, South Korea will receive an FDI inflow of only US$188 million, whereas Brazil will receive as much as US$1.4 billion in FDI assets.[142]

[141] With the exception of a small net transfer to Panama. McCalman (1999), cited in Maskus (2000). All figures quoted in constant 1995 US$.

[142] This difference may be explained by the difference in the degree of strengthened IPRs that TRIPS entails: South Korea's index will rise from an already high number of 3.94 to 4.3, whereas Brazil will upgrade from a lower base of 3.05 to 3.75.

South Africa will only upgrade its IPRs index by a relatively small amount due to TRIPS: from 3.57 to 3.75, whereas India is increasing its index from 1.17 to 3.25.[143] The relatively small increase in South Africa's IPRs index would subsequently increase its manufactured imports by relatively small amounts: US$184 million (1995 prices), and US$25 million in high technology manufactured imports. South Africa will also attract only US$27 million in additional FDI assets, explained in the model by the relatively small increase in its IPRs index.

This empirical evidence regarding the impact of IPRs on FDI, technology licensing and international trade flows shows that aggregate impact studies must be used with caution, because although the overall impact may be positive, small poor countries in particular can experience significant losses. The link between IPRs and FDI is particularly tenuous, as Lall (2001) finds that most studies suggest that IPRs are fairly unimportant to MNC location decisions, even in IPR-sensitive industries such as pharmaceuticals.

Lall (2001) categorises South Africa as a country with 'moderate technological activity', indicating moderate R&D and a medium level of industrial development. On balance, countries in this category are likely to benefit from stronger IPRs, although the adjustment costs may be significant.

Maskus emphasises the technology transfer effects associated with FDI, royalty payments and even imports. For developing countries, strengthening of IPRs could be part of a package of reforms aimed at FDI attraction, although it appears to be only a necessary but not sufficient condition for attracting FDI and may in fact promote switching away from FDI and towards increased imports and licensing payments. For many developing countries, these increases in imports will be contradictory to government policies aimed at export promotion, even when, as is the case in South Africa, import competition is seen as a catalyst for the restructuring of domestic industries. The reinforced import competition could well prove to be too forceful and too early for many countries and not only lead to balance of payments deterioration, but could destroy entire industries and result in significant job losses. The political fall-out of these implications of the TRIPS Agreement may lead many countries to delay implementation or to weakly enforce their IPRs obligations. Poor countries in particular will suffer in the short run if TRIPS obligations are implemented and enforced promptly.

Given the link between IPRs and levels of GNP, Maskus (2000) suggests that many developing countries are not at income levels that warrant stronger IPRs. Lall (2001) argues that the ideal IPR regime must depend on the structure of economic activities in each country, including the level of technological activity; industrial performance and technology imports are critical in determining the benefits of IPR protection by LDCs. Therefore, it appears that a set of harmonised minimum standards as incorporated in TRIPS is inappropriate for many developing countries. This is a 'chicken and egg' dilemma, as technology importing developing countries may have insufficient domestic

[143] Maskus (2000), based on the Ginarte-Park (1997) methodology of IPRs indexation utilised by McCalman (1999).

innovation to warrant enforcement, yet on the other hand, require protection to stimulate innovation and reduce technology import dependency.

It seems clear that the losses from the global redistribution of rents due to TRIPS are generally incurred by larger, semi-industrialised developing economies who, in return, receive *potential* benefits. IPRs protection could transform their imitative skills into effective technical capabilities for legally adapting foreign technologies and may attract more foreign direct investment, whilst in theory providing incentives for domestic entrepreneurs to innovate. The appropriateness of advanced IPRs for the least developed countries is questionable, particularly in light of the cost-benefit analysis discussed here. Despite the benefits of harmonised and strengthened global IPRs[144], TRIPS will undeniably lead to a large redistribution of wealth from the poor to the rich, in return for long-term potential benefits. How this 'levels the playing field' or shows the WTO's commitment to special and differential treatment for developing countries (apart from a longer transition period) remains unclear.

4.5 TRIPS and affordable medicines – Case study

After much debate in the November 2001 Doha Ministerial Conference, the WTO Secretariat issued a statement clarifying the position on parallel importation and compulsory licensing of pharmaceuticals.[145]

The flexibilities in TRIPS to promote access to medicines include: the option for governments in developing countries to issue compulsory licences for pharmaceuticals and the freedom to determine the grounds upon which such licences are granted. Individual countries have the right to determine what constitutes a national emergency: public health crises, including those relating to HIV/AIDS, tuberculosis, malaria and other epidemics, are explicitly included as a national emergency or as other circumstances of extreme urgency.[146] In addition, each Member is free to establish its own regime for 'exhaustion of IPRs' (i.e. allowing parallel importation) without challenge, subject to the MFN and national treatment provisions.[147]

Being able to grant compulsory licenses or parallel importation in the public interest is of great importance to developing countries in particular, as these clauses could enable fiscally constrained governments to provide essential medication or equipment in case of an epidemic or other national emergency.[148] Procedural safeguards are required to

[144] Maskus (2000).
[145] WTO (2001a).
[146] WTO (2001a).
[147] See glossary.
[148] Compulsory licensing is, however, not intended solely for developing countries. The US has issued compulsory licenses in a number of cases outside of anti-trust remedies, e.g. technology used in the Gulf War, and recently considered issuing a compulsory license to produce Cipro in response to the threat of widespread Anthrax infections following the September 11th terrorism attacks. (In the end, a lower price was negotiated with the patent holder instead). Bennett, P. (2001), "*Defending against Anthrax: U.S. Patent Implications and Safeguarding Public Health*", The Metropolitan Corporate Counsel, November.

ensure that these clauses are not abused and that the patent owner is compensated where possible.

TRIPS recognises the legitimacy of using compulsory licenses to achieve goals related to health and nutrition or other social purposes and to discipline competitive abuses of patent rights, but at the same time significantly restricts their use. Governments are required to negotiate beforehand with patent owners and can only issue non-exclusive temporary licenses for the domestic market, and must rescind the licenses when the conditions that triggered their use disappear. Market-based remuneration of patent holders is required of the compulsory licensees.

Nevertheless, these concessions constitute a significant victory for the developing countries (including South Africa), who argued in favour of exemptions for essential medicines. However, some unintended side effects may result. For instance, a number of developing country specific diseases do not receive adequate R&D funds for the development of pharmaceuticals because of the weak IPRs protection and the low incomes of the patients involved. Patents in developing countries are an important incentive for R&D into tropical or developing country specific diseases[149] and strengthening patent protection in developing countries could therefore channel more research funds into these areas.[150] The exemptions to patent protection that TRIPS allows for developing countries are therefore useful for 'global diseases' (which affect both the developed and developing nations), but potentially harmful to finding cures for tropical or developing country specific diseases.

As stronger IPRs protection does not solve the deficient income problem or the lack of health infrastructure, the International Intellectual Property Institute has suggested two kinds of subsidies that are required to provide affordable state-of-the-art HIV/AIDS therapies to patients in poor countries.[151] The IIPI proposal includes: (i) an indirect subsidy which is paid by consumers in developed countries (by higher prices for patented drugs); and (ii) direct funding of the treatment infrastructure and the purchase of drugs for patients in poor countries by the governments of developed countries (coordinated, for instance, via UNAIDS). The cost of such a structure has been estimated at US$8-12 billion per annum.[152]

4.6 Room for manoeuvre

Special and differential treatment for developing countries under TRIPS is limited to a longer transition regime and exceptions for extreme circumstances relating to public health or the public interest. Yet, although TRIPS sets minimum standards, the Agreement allows for some discretion at the national level, as long as the IPRs regime

[149] Lanjouw (2000).
[150] Lanjouw finds evidence to suggest that this trend is already discernable in the case of malaria, which is a disease specific to the countries that recently introduced stronger patent protection.
[151] International Intellectual Property Institute (2000).
[152] Ganslandt, Maskus and Wong (2001).

adopted does not discriminate against foreign interests. This room for manoeuvre should be carefully analysed and fully exploited by developing countries in order to diminish the negative effects on their economies.

Compulsory licensing, parallel imports and reverse engineering are legal options under the TRIPS Agreement (Article 8) when used to prevent the abuse of IPRs by rights-holders or practices that unreasonable restrain trade or adversely affect the international transfer of technology. Public health and the public interest in sectors of vital importance to socio-economic and technological development are grounds for adopting special measures.

Article 31 of TRIPS further allows member states to use compulsory licensing (with limitations) to ensure access to critical technologies. The grounds on which these licenses may be granted are not limited and member states are to define 'working requirements' for themselves.[153]

TRIPS also allows countries to exclude certain innovations – namely therapeutic, surgical and diagnostic techniques – from patent protection for reasons of public order, national defence and environmental protection. In addition, genetic discoveries can be excluded, and plant varieties and higher lifeforms do not have to be protected by the patent system if they are covered by *sui generis* protection. Computer programmes do not necessarily receive patent protection as they are protected with copyrights. TRIPS signatories are even permitted to allow for unauthorised use of patents under certain circumstances (Article 30) – private and non-commercial purposes, research, experimental or teaching purposes and for preparation of individual medicines by pharmacies.[154]

The greatest weakness of the TRIPS Agreement is its enforcement. TRIPS requires adequate protection in addition to legal redress (civil and criminal measures) but does not demand patent examinations, stipulate time frames, or demarcate patent scope. There is also room for manoeuvre within the required minimum standards. Technology follower developing countries could therefore set out more appropriate regimes by choosing high standards of novelty and non-obviousness before awarding a patent or by requiring early disclosure of patent applications.[155] Patent authorities could also permit opposition proceedings before the grant of a patent.

More importantly, imitating developing countries can adopt a policy of patent appraisal in which patents are restricted to a very narrow scope (so that competitors can 'invent

[153] The following rules apply: 1. Non-exclusive and non-assignable licenses may be issued when patent holders have failed, within a reasonable period of time, to negotiate voluntary licenses with applicants offering reasonable commercial terms. 2. Licenses must be used predominantly in domestic markets (to protect the patent holder's interests in third countries). 3. The patent holder should be paid adequate remuneration based on the economic value of the authorised use.

[154] Although these cannot interfere unreasonably with exploitation of the patent or prejudice the legitimate interests of the patent holder, Maskus (2000).

[155] The US, EU and Japan publish applications within 18 months of filing in order to promote dissemination of new information, Maskus (2000).

around' the patent).[156] The potentially negative effects these measures could have on domestic innovation could be mitigated by so-called utility model patents that have lower thresholds and a shorter lifespan[157] but can lead to technical change in technology follower countries. These 'loopholes' should be used with extreme caution and only after the costs in terms of weaker incentives for domestic innovation and benefits in terms of technology dissemination have been thoroughly evaluated.

5. Intellectual Property Rights in South Africa

IPRs are essentially national regimes, albeit subject to international agreements, particularly the TRIPS Agreement, which sets minimum standards for all signatories. A country's IPRs regime consists of several aspects, including standards, limitations and enforcement.[158] The standards define the scope of the innovator's exclusive rights, the limitations set the boundaries of those rights (e.g. by allowing compulsory licensing) and the administrative and judicial enforcement determine the effectiveness of the IPRs regime. All three elements vary widely across countries, even among developed economies.

South Africa is seen as quite advanced by international standards in terms of its legislation. Lesser (2001) ranks the South African IPRs regime highest among developing countries, based on an indicator that includes TRIPS compliance, PCT applications, and prices as proxies for efficiency of the patent regime. However, this reputation is undermined by the absence of patent examination capacity and enforcement concerns. In order to evaluate the South African regime, it is necessary to examine the intellectual property policy framework and its enforcement. However, as the data required for most of the more sophisticated analyses discussed in Section 3 is not readily available in South Africa, the following discussion does not involve an attempt to emulate this research. Rather this section is aimed at illustrating the current state of IPR protection in South Africa, to be used as a basis for further research, a proposal for which is outlined in Section 7.

5.1 Intellectual property policy framework

The Department of Trade and Industry (DTI) is the custodian of IPRs in South Africa, providing the general enabling legislation and services required for registration, examination (in the case of trademarks), and adjudication. However, legislation affecting IPRs can originate or involve participation from a number of government departments and statutory bodies, such as, *inter alia*, the Departments of: Arts, Culture, Science and Technology; Health; Communications; Environmental Affairs and Tourism; Agriculture; Education; as well as statutory bodies such as the National

[156] Obviously this is only relevant to patent-examining countries.
[157] Utility models are awarded to mechanical inventions with less stringent non-obviousness standards than invention patents. These inventions, which tend to be incremental improvements in existing products and technologies, embody less technological progress and receive shorter protection. Maskus (2000).
[158] Maskus (2000).

Advisory Council on Innovation (NACI) and the Council for Scientific and Industrial Research (CSIR). New legislation regarding genetically modified foods, for instance, requires an assessment of the agricultural, health, environmental and industrial policy aspects, thus requiring careful policy coordination, balancing potentially conflicting policy goals.

5.2 Domestic legislation and international treaties

Unlike many other developing countries, South Africa's current system of intellectual property laws has a long history, originating in the South African Patents, Designs, Trade Marks and Copyright Act of 1916.[159] The first South African Patents Act covered many different subjects that – when Act 9 of 1916 was repealed – were covered by individual specialised Acts. These Acts each had their own particular provisions and they subsequently developed more or less independently.[160] More recently efforts have been made to bring the various Acts more in line with each other (several amendment acts were passed in 1996, 1997 and 2001).

General protection from unfair competition is provided by the Harmful Business Practices Act (1988) and specific protection for industrial property is provided by, *inter alia,* the Merchandise Marks Act (1941), the Trade Marks Act (1993), the Patents Act (1978), the Designs Act (1993), the Copyright Act (1978), the Counterfeit Goods Act (1997), and their respective amendments. The application of South African intellectual property laws was extended to the former homelands by the Intellectual Property Laws Rationalisation Act (1996), and compliance with the TRIPS Agreement and the PCT was the reason for the Intellectual Property Laws Amendment Act (1997). (For a comprehensive list, refer to Table 3, Appendices).

Although recently several attempts have been made to rationalise and harmonise the intellectual property laws, a process of almost continuous law reform is required in the area of intellectual property, either to comply with the latest international treaties or to bring the intellectual property laws in line with other domestic legislation. For instance, the Medicines and Related Substances Control Act (1965) was amended in 1997 to allow for parallel importation of medicines[161], which required amendment of the Patents Act, which grants exclusive rights to the patent holder.[162]

In addition, there are bilateral agreements that influence South Africa's intellectual property policies and practices, e.g. the trade agreement with the EU requires a registration system for geographical indications of wines and spirits. Current areas for reform include the development of a system of *sui generis* protection for indigenous knowledge, further amendments to ensure TRIPS compliance (as well as making full

[159] Act 9 of 1916, Du Plessis (2001).
[160] Burrell (1999).
[161] I.e. importation by a person other than the patent holder of the medicine.
[162] Although Burrel (1999) disagrees, arguing that Section 15C of the Medicines Act was superfluous as the Patents Act already allowed for exceptions of this kind.

use of the flexibilities it provides, such as aforementioned amendment of the Patent Act) including accommodation of proposed biodiversity and inventions Bills[163] and legislation allowing for improved enforcement.

International treaties and institutions

The international body governing IPRs is WIPO (1967)[164], of which South Africa became a member only in 1995.[165] WIPO is linked to the WTO by means of a cooperation agreement, via which WIPO assists the TRIPS Council.[166]

South Africa has firmly established itself in international intellectual property law by becoming a member of 10 of the currently existing 15 international treaties (listed and described in Table 4, Appendices), which culminated in the TRIPS Agreement in 1995. The TRIPS Agreement increased developing countries' membership of several existing international agreements as it incorporates a number of these agreements by reference. The treaties of which South Africa is not a member mainly concern international classification systems, required for international cooperation on intellectual property registration. South Africa is considered to be a developed country under the TRIPS Agreement and was therefore granted until 1 January 1996 to become fully TRIPS-compliant.

South Africa has a particularly advanced formal position in international patent protection, and is a member of, *inter alia*, the Paris Convention, the PCT, the Budapest Treaty and TRIPS, which ensure national treatment and grant priority to first application for intellectual property protection filed in one member country in respect of corresponding applications filed in other member countries. The PCT enables inventors to file patents in up to 109 countries based on a single examination procedure, although individual applications in all of the countries concerned are still required.

Plant breeders' rights are governed by UPOV (see appendices), of which South Africa is a member as well as the TRIPS Agreement, which requires signatories to provide either patent or *sui generis* protection for plant breeders' rights.

South Africa is not a member of the relevant regional intellectual property association – the African Regional Industrial Property Association (ARIPO) – since, according to

[163] Initiated by the Department of Agriculture and the Department of of Arts, Culture, Science and Technology respectively. There is also a biodiversity initiative driven by the Department of Environmental Affairs and Tourism.

[164] Uniting two secretariats that were established previously at the Paris (1883) and Berne (1886) Conventions for industrial property and copyrights protection. WIPO is responsible for "(…) promoting creative intellectual activity and facilitating technology transfer related to industrial property to the developing countries in order to accelerate economic, social and cultural development." WIPO (1998).

[165] Burrel (1999). South Africa was a signatory to the Paris and Berne Conventions prior to joining WIPO.

[166] The 1996 WIPO-WTO Cooperation Agreement. As part of this effort, the two organisations launched two joint technical cooperation agreements, aimed at assisting developing and least developed countries to meet the 2000/2006 deadlines for the TRIPS Agreement and to make use of intellectual property protection for their economic, social and cultural development. WTO website.

policy makers, a proliferation of regional treaties could detract from multilateral rule-making. This is unfortunate because South Africa does not have patent examination capacity and the aim of ARIPO is to pool resources to avoid duplication of the human and financial infrastructure required for intellectual property law enforcement.[167]

5.3 Substantive provisions, institutional arrangements and service delivery

The institutional machinery required for intellectual property policy and administration is part of the DTI. Policy formulation has been separated from the judicial and operational functions: intellectual property policy formulation is the responsibility of a directorate in the DTI, while administration is performed by the Companies and Intellectual Property Registration Office (CIPRO).

The South African Companies Registration Office and the South African Patents and Trademarks Office were recently merged to form CIPRO. Its responsibilities include: maintaining current registers of enterprises, trademarks, designs, patents and copyrights; conducting *ex parte* hearings; and adjudicating in cases involving trademark infringement disputes.[168]

CIPRO's current revenue (via revenue stamps) is collected by the South African Revenue Service (SARS). The services presently provided are limited to simple searches and registration, which provides little scope for increasing the patent's office funding.[169] Many patent offices in the developed world generate substantial turnover from services related to patent registration and examination. It is envisaged that CIPRO will be commercialised and transformed into a trading entity in 2002, aimed at becoming self-financing in the second financial year of operation. In the interim (FY 2002/3), CIPRO will be funded by a transfer payment from the DTI's budget. A profit incentive is not uncommon for intellectual property offices and could help to transform work processes and systems, but, as it is by nature a monopolistic activity, this is by no means guaranteed. Obviously, these revenue-generating opportunities require substantial investments to build the required physical and human capacity.

CIPRO will be governed by a board of directors accountable to the DG and minister of trade and industry (the Director-General of the DTI will serve as a board member). A functional separation between company registration and intellectual property will remain as CIPRO will appoint separate registrars for companies and intellectual property with two deputy registrars responsible for patents and trademarks respectively.

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[167] ARIPO website: http://aripo.wipo.net.
[168] CIPRO (2002).
[169] The European Patent Office for instance uses electronic databases and provides internet access to patent documents (from more than 50 countries). The EPO's services include special searches, ranging from the compilation of technology inventories to statistical analysis, e.g. for benchmarking studies. As a result, patent applications from all over the world are often filed at the EPO first.

It is generally the responsibility of intellectual property owners to take legal action in case of infringement, although specific areas of enforcement (e.g. the counterfeit goods) fall under the ambit of the National Inspectorate of the DTI in cooperation with the South African Police Service and SARS custom officials.

Patents

South Africa has limited the maximum lifespan of patents in line with the TRIPS Agreement to 20 years, with an annual renewal obligation.[170] No extension is possible.[171] Patents are awarded to the first applicant; this so-called 'first-to-file' rule is nearly universal, with the main exception being the US, which uses the 'first-to-invent' rule.[172]

South Africa is not a patent examining country, i.e. South Africa has no domestic institution that will put a patent application to the test, judging its novelty and non-obviousness and limiting its scope if the application is unduly wide. CIPRO merely registers patents (a 'depository system') or provides applicants with the relevant forms for registration under the PCT. In the registration of domestic patent applications, WIPO's International Patent Classification system (IPC) is followed, but only to a limited extent: South Africa classifies up to the level of subclasses (of which there are 628 at present) but not up to the level of groups and subgroups (of which there are approximately 69 000). This crude classification inevitably leads to excessively broad scope of patents granted.

Currently, there is a five-month backlog in new patent applications. After allowing for statutory waiting periods of nine months, the entire procedure may take up to two years, which is a lengthy procedure considering there is no examination involved.

Trademarks

Trademark applications are examined for (conditional) approval or rejection after a statutory waiting period of six months (in accordance with the Paris Convention). The trademark examination conducted by CIPRO involves a search among registered marks and pending applications to ascertain the presence of conflicting marks. Approved applications are subsequently open to a three-month opposition period.

The current backlog in trademarks examinations is approximately 2 to 2.5 years, and there are frequent delays in judicial functions.[173] Delays in examination are generally ascribed to a number of factors: a lack of human capacity at the registration office; increasing numbers of applications and outdated systems of registration. There has been a backlog in the registration of trademarks since the early 1980s, when it ranged between 10 and 12 months, but the lead times became particularly serious in the late

[170] The Patents Act, act 57 of 1978.
[171] Burrell (1999).
[172] Maskus (2000).
[173] In February 2002, CIPRO was examining trademark applications from November 1999.

1990s, when it took between 21 and 27 months to obtain a trademark (after deduction of the six-month waiting period).

Trade names

A searchable electronic register of company names is available via the CIPRO website. Company names are currently registered within 3-4 days.

Copyrights

Copyrights are easily obtained in South Africa. For most works, except for films, there is no application required for copyright. Copyrights are recognised whenever an author, artist or performer adds "copyright", or "©" followed by her name and the year of publication.[174] Enforcement is generally obtained by civilian action in the South African courts.

Service delivery

The intellectual property law practitioners in South Africa cite the long lead times for obtaining patents and trademarks as problematic.[175] Not all of the delays can be blamed on insufficient funding or capacity, but clearly involve outdated business practices. Patents, trademarks and designs are captured in hardcopy files and no searchable electronic database is available for the electronic recording of specific criteria, such as the nationality of applicant or the trademark class (sector) in which the application is made (company names on the other hand can be searched electronically).[176] This makes searching for prior patents or trademarks and trends in patenting behaviour a time-consuming task, placing an administrative burden on the administrators but also on local and foreign innovators (as this procedure tends to raise their cost of filing a patent, design or trademark application). Changing to an electronic system that can be accessed and searched by applicants should be possible even within the current constraints. Mexico, a middle-income country that performs substantive patent examinations, has an electronic documentation system and a patent register that is available on CD-ROMs[177], while the Russian Federation and Slovenia have internet-based searchable databases of patents.[178]

CIPRO has invested approximately R35 million in IT systems over the past three years to convert from a paper system to electronic processes and has devised action plans aimed at reducing the backlog in trademark applications.[179] Since December 2001, the number of accepted registrations has increased, clearing some of the backlogs in

[174] DTI, http://www.dti.gov.za.
[175] Du Plessis (2001).
[176] Trademarks are captured electronically by the Trademark Office once the requisite documentation has been filed in hardcopy, this systems suffers from clerical errors made in the transcription from hardcopy files to the electronic database.
[177] website: http://www.impi.gob.mx/
[178] http://www.fips.ru/ensite/dbs/dbs.htm, and http://www2.uil-sipo.si/dse.htm.
[179] CIPRO (2002).

trademark applications. It is envisaged that in the future, CIPRO will: provide the opportunity to lodge applications via the internet; change the currently published Patent Journal to an electronic searchable version; provide for electronic payment; and the automation of several steps in the application processes. An internet search facility for trademarks is currently being developed.[180] Once fully established, all records will contain past records for a relevant past time period (e.g. patents for the past 20 years). The DTI is currently assessing the future possibility of patent examination in South Africa, possibly starting with a few sectors initially (e.g. sectors in which domestic innovators are relatively advanced, such as mining and chemicals).

Resources

A comparison of lead times needs to be accompanied by a comparison of resources. CIPRO currently has a staff complement of 467 persons (372 permanent and 95 temporary – unfortunately, no functional breakdown of these figures was available from CIPRO). The available budget is R90 million. In 2001, CIPRO received 7793 patent applications (or 16.7 per staff member); 1382 design applications; and 21 904 trademark applications (or 46.9 per staff member).

The UK Patent Office, with a budget of approximately GBP 50 million and 953 staff members, received 31 412 patent applications (33 per staff member), 93 801 design applications, and 33 067 trademark applications (34.7 per staff member) in 2000. The UK Patent Office struggles to get all patents granted within three years of the request (although this is an examination and not a simple registration). Trademark applications, to which no substantive objections are raised or oppositions filed are generally granted within nine months.[181]

The current lead times for obtaining a trademark in South Africa are clearly very high, even when corrected for differences in staff complements and number of applications (47 per staff member in South Africa and 35 per staff member in the UK). This could prove to be even more problematic when South Africa embarks on substantive patent examinations, which take several years in patent offices in developed countries with ample resources. The technical staff requirements for patent examinations are daunting: the European Patent Office PO (admittedly among the largest patent offices in the world) employs hundreds of engineers, biologists, chemists, medical doctors and IT experts.[182] The UK Patents Office recognises: (i) the growing number of patent applications; (ii) the difficulties in recruitment and retention of qualified patent examiners; and (iii) the processing of national instead of international patent applications as reasons for seeking further cooperation with other patent authorities and the development of a European Community Patent.[183] In light of these considerations, the development of a Southern African regional intellectual property office appears to be a logical solution.

[180] CIPRO (2002).
[181] UK Patent Office (2001).
[182] EPO (2001).
[183] UK Patent Office (2001).

Impact on local innovators

In the absence of empirical evidence regarding the impact of the current IPRs regime on local innovators, the evaluation of the non-examination system for patents rests on the experiences and opinions of intellectual property practitioners. These views tend to depend in part on the ideological framework of the practitioner in question. Some patent attorneys favour the patent registration system as opposed to an examination, since patent registration is less complicated and less costly and may therefore be more appropriate to developing countries.

However, non-examination of patents also creates incentives for registration of superfluous patents with – according to some practitioners – large companies registering high numbers of patents or even small businesses registering strategic patents, some of which would not pass the international criteria of non-obviousness and novelty. Anecdotal evidence suggests that, as a result, some companies have diverted R&D funds away from an area in which superfluous patents exist, even though the company can contest the validity of the patent. A real danger exists in such a situation of delayed technology transfer and higher prices that do not reward any real inventive effort.

The delays in granting patents and trademarks are further likely to impede domestic innovators' uptake of IPRs. As the economic lifespans of products become shorter, the possibility to obtain legal intellectual property protection within three years may be irrelevant to businesses.[184] The system outlined above clearly disputes the notion of an IPRs regime that is on a par with the developed world. The system used for recording patents is backward and the fact that no substantive examinations are performed for patents creates a risk of superfluous patent registration, which can hamper technology dissemination and economic development.

Selected statistics

South Africa is – on balance – a technology importer. Total cross-border receipts for copyrights, royalties, etc. (captured *inter alia* under 'other services' in the services account of the balance of payments), amount to approximately R400 million per year and payments from South Africa to the rest of the world for these services are estimated at R1.5 billion per year, leading to a net deficit on the technology balance of payments of R 1.1 billion per annum.[185] (Disaggregated data for this category is not released by the Reserve Bank).

Patent applications have been relatively stable in South Africa in the last decade, with a sharp – as of yet unexplained – drop in applications in 1999 and 2000. The number of

[184] E.g. Consider trademarks for products associated with sporting events – South African businesses would need to apply for protection three years in advance, when details of the events may not be known yet.
[185] South African Reserve Bank.

designs applications increased significantly in the mid-1990s. The number of trademark applications has steadily grown since 1996, at an average annual rate of 7.8%. In 2001, 116 285 new companies and close corporations were registered.

Table 2. Patent, Trademarks and Designs applications in South Africa

Year	Patents	Trademarks	Designs
1990	10,469	n/a	1,078
1991	10,202	n/a	1,087
1992	10,127	n/a	1,196
1993	9,807	n/a	999
1994	10,414	n/a	960
1995	11,050	n/a	1,274
1996	10,956	18,408	1,354
1997	11,734	20,271	1,278
1998	11,961	23,567	1,531
1999	7,879	23,849	1,484
2000	7,793	25,623	1,561
2001	10,553	21,904	1,382

Source: unpublished figures, CIPRO, the DTI

There are no reliable statistics available indicating the number of patents filed by residents vs. non-residents. CIPRO estimates that approximately 40% of patent and trademark applications are filed by South African residents. According to WIPO statistics, however, 99% of patent applications filed in South Africa in 1999 were filed by non-residents.[186] In either case the number of patents filed by residents is alarmingly low. By comparison, 81% of trademark applications, 39% of design applications and 57.9% of patent applications in the UK are filed by residents. The bulk of the remainder of applications originates in Europe, the USA and Japan. The rest of the world accounted for only 4.6% of patent applications in the UK.[187]

PCT applications

South Africa ranks third among developing countries in the number of PCT applications filed at WIPO, after South Korea and China. The absolute numbers involved are, however, very low: South African PCT patent applications totalled 418 in 2001 (386 in 2000) or 0.4% of the PCT total. South Korean inventors filed 2318 applications or over five times the South African number of application.[188]

5.4 Substantive provisions and enforcement

[186] WIPO (2002a).
[187] UK Patent Office (2001).
[188] WIPO (2002b).

As more intellectual property issues are incorporated in international treaties, national sovereignty in intellectual property policy is eroded. A critical issue for developing countries is retaining flexibility in intellectual property laws, for instance, by including provisions concerning parallel importation or compulsory licensing. The TRIPS Agreement allows for parallel importation and compulsory licensing of medicines under certain conditions but individual members are expected to put national legislation in place to enable application of this option.

South Africa has lobbied extensively for inclusion of these rights in international agreements (such as the TRIPS)[189], and has amended the Medicines and Related Substances Control Act in 1997 to allow for pricing regulations and parallel importation of pharmaceuticals (the South African Patents Act already allowed for compulsory licensing). As a result, South Africa was temporarily placed on a US list of countries deficient in patent coverage (the 'Special 301' watchlist)[190], and faced legal action by pharmaceutical companies over the issue of parallel importation.[191]

It would thus appear that South African intellectual property laws are 'best practice' and able to accommodate specific developing country concerns. However, despite these advanced provisions, some patent and design law practitioners claim that there are areas requiring reform. For instance, South Africa has not made full use of the flexibilities provided by the TRIPS Agreement: the Patents Act has not yet been amended to legalise parallel importation (the importation of anti-retrovirals by the Treatment Action Campaign was in fact unlawful) and there has been no instance of compulsory licensing or significant parallel importation of medicines.

A possible exception is the Trademark Act of 1993, which is considered 'state of the art', as it embodies the EU developments of the early 1990s, removed complicating formalities and is copied throughout the Commonwealth. Current law reform initiatives tend to focus on the accommodation of 'new issues', such as biotechnology innovations and protection of indigenous knowledge, but should also include basic changes of existing intellectual property laws.

Potential areas for law reform

Practitioners and policy makers generally agree that the Patents Act needs to be amended to specifically allow for the flexibilities provided by the TRIPS Agreement, although some trademark lawyers remain ideologically opposed to the 'exhaustion of rights doctrine' that applies to parallel importation. Policy makers at the Departments of Trade and Industry and of Health are currently collaborating on the formulation of appropriate regulations for the parallel importation of medicines. Nearly seven years

[189] Some legal scholars remain sceptic of these examples of coherent integration of patent protection into the overarching policy framework, describing the amendment to the Medicines (…) Control Act as "*an unfortunate and ill-considered ideological approach by the South African parliament*." Burrel (1999).
[190] Maskus (2000).
[191] The case brought by 38 pharmaceutical companies and the Pharmaceutical Manufacturers' Association intended to strike down major provisions of the Medicines and Related Substances Control Amendment Act of 1997 was withdrawn in April 2001. Department of Health (2001).

after signing the TRIPS Agreement, South Africa is not yet fully compliant. For example, trademark protection cannot be refused or invalidated based on geographical indications, databases are not explicitly covered by the Copyright Act, and there is no system for rental rights, all of which are requirements of the TRIPS Agreement.

Moreover, the absence of a patent examination system favours incumbent companies who file a large number of patents that are subsequently granted as a matter of routine, suggesting that the development of domestic examination capacity or referral of patents to a foreign patents examination office should be prioritised.

The South African Designs Act appears to be an anomaly in international design protection because it separates aesthetic and functional designs and does not provide for registration of a design as a combination of aesthetic and functional properties.[192] As a result, designs are often registered in both categories, thus raising costs of design protection for local designers.

Other areas for reform include the development of a system protection for indigenous knowledge, accommodation of proposed biotechnology, biodiversity and inventions Bills[193], and legislation allowing for improved enforcement by extended search and seizure powers for the South African Police Services (to allow for improved enforcement of the laws governing piracy and counterfeiting).

Indigenous knowledge is currently insufficiently protected from misappropriation because existing intellectual property right legislation is unable to accommodate complex indigenous ownership of knowledge, which is often cross-generational and communal. The 2001 Indigenous Knowledge Bill, initiated by the Department of Arts, Culture, Science and Technology, addresses many areas of concern regarding indigenous knowledge, such as improper appropriation of indigenous knowledge without due compensation or informed consent, biopiracy, and misuse or theft of indigenous knowledge and related heritages. The Bill also addresses institutional support such as linkages with formal institutions and knowledge systems.[194] Once ratified, the Indigenous Knowledge Bill will undoubtedly require additional law reform.

Enforcement

The main weakness of the South African IPRs lies in its enforcement. The enforcement is problematic on two counts: there is a decided lack of infrastructure and capacity; and there is an alleged bias in the application of IPRs by the judiciary (although this perception is highly subjective and a matter of debate among practitioners). The latter issue is hardly quantifiable and based on impressions of practitioners who find that in their judgements, magistrates show a decided bias in favour of intellectual property owners and a lack of understanding of the principal aim of IPRs, namely technology dissemination.

[192] The terms of protection also differ: 15 and 10 years for aesthetic or functional designs respectively.
[193] Initiated by the Department of Agriculture; and of Arts, Culture Science and Technology respectively.
[194] Department of Arts, Culture, Science and Technology (2001).

For instance, one area in which South African intellectual property law is apparently 'advanced' is in respect of the protection afforded to established brands. For example, section 35 of the Trade Marks Act expressly protects 'well-known marks.' Fast-food chain McDonald's successfully used that section in 1996 to prevent a local trader from using a name similar to that of McDonald's, despite the fact that this trademark was not worked in South Africa at the time and the registration of the trademark appeared to be aimed at excluding legitimate businesses in South Africa from registering similar names.[195] Trademark attorneys differ in their analysis of this case, depending on their ideological stance. Some practitioners argue that the sole aim of the law is to protect the owners of intellectual property and that therefore this judgement was not biased at all.[196]

Further study of case law could indicate whether or not the South African legislators and judiciary are overzealous in their protection of the rights of (foreign) intellectual property owners to the detriment of legitimate imitators. This tendency might instil foreign investors' confidence in the South African legal framework, but if taken too far, will harm local businesses involved in legitimate reverse engineering activities.

6. Evaluation and Policy Implications

6.1 Evaluation of South African intellectual property policy

In the White Paper issued in 1996 on science and technology, the Department of Arts, Culture, Science and Technology raised the issue of South Africa "not being a patent examining country" as a significant shortcoming. To date, this situation has not changed. The alleged sophistication of the South African intellectual property regime is clearly relative. South Africa's IPRs regime is arguably among the most advanced on the continent in terms of its legal maturity and on a par with industrialised nations in terms of membership of international treaties governing IPRs. This may lead sceptics to believe that South Africa has gone too far too rapidly, and that its intellectual property laws are too advanced for the country's stage of development, serving minority interests instead of facilitating technology dissemination and obtaining affordable medicines for the masses.

The picture that emerges, after a rather limited amount of desktop research and several interviews, is more complicated. Although the laws are considered 'state of the art' by many practitioners, this assessment is only accurate on paper. Enforcement of the intellectual property laws is rudimentary in some areas (e.g. patents) and unduly protracted in most areas (in trademarks, designs and patents). The implementation of the Patent Act consists of mere registration of patents, providing an incentive for

[195] McDonald's Corp. v Joburgers Drive-Inn Restaurant (PTY) LTD & Dax Prop CC: 1997 (1) SA 1 (A).
[196] The recognition of well-known marks is a TRIPS requirement that affords the same protection to companies from all member countries. The condition that the companies have a local reputation in the country in which protection is sought does however mean that mainly multinational corporations will benefit.

registration of superfluous patents.[197] Whether or not this is damaging to small businesses in particular, is a matter of debate. Some practitioners argue that mainly large corporations file superfluous or excessively broad patents aimed at colonising large technology areas; other practitioners view small businesses or private individuals as the beneficiaries of strategic patenting.[198] In any case, superfluous or strategic patenting is not beneficial in economic social welfare terms.

In addition, trademark registration is crippled by severe administrative and judicial backlogs, rendering trademark protection irrelevant for some products or companies. The design law is cumbersome for innovators, and in need of reform (allowing for combined registration of function and design). These problems limit the exploitation of patents, designs and trademarks by local inventors, designers and businesses, thereby significantly reducing the benefits of intellectual property protection, ultimately constraining economic growth.

Similarly, membership of international treaties on IPRs do not necessarily imply adherence to these treaties or sophisticated domestic enforcement. In the same manner, legal options for compulsory licensing have not been exploited to their fullest. These problems prevent legal copying and dissemination and could preclude local firms from the benefits of foreign technological innovation.

Moreover, although this is a matter of debate, the legal interpretation of the patent, design and trademark law appears to suffer from a systemic bias in favour of the owners of IPRs and against technology dissemination. The economists' view of protection of IPRs as a means to an end is not shared by all legal intellectual property practitioners. In addition, only in extreme circumstances are parallel imports resorted to while compulsory licensing is generally avoided. These problems will hamper legitimate copying and dissemination and could preclude local firms from the benefits of foreign technological innovation.

Taken together, these two sets of problems are very damaging indeed: adequate intellectual property protection is cumbersome for domestic inventors to obtain yet so ferociously defended when (mainly foreign) patent owners are involved, that technology dissemination could be hampered. When taken to the extreme, this would mean that South African inventors reap none of the benefits, but suffer all the disadvantages of IPRs. This is particularly damaging to a country that is a technology importer. Ultimately, both consumers and producers will suffer as a result. Consumers pay for innovation and when patent protection is too protracted or too broad, they pay dearly. Local producers face costly licensing agreements or even more costly lawsuits, and if intellectual property protection is not aimed at technology dissemination, local producers will fail to compete internationally. Careful balancing of the rights of intellectual property owners and the benefits of technology dissemination is therefore

[197] Obviously, examination of patents does not solve this problem *per se*, as registration of superfluous patents can also happen in examining countries.

[198] Even though superfluous patents would be invalidated when subject of litigation, the transaction costs involved could deter some inventors from entering a 'colonised' technology field.

required. Further research into the various aspects of IPRs (as put forward in the next chapter) could be useful in identifying useful changes to the current IPRs regime.

6.2 Policy implications

Developing countries can and should have sophisticated intellectual property laws, but care needs to be taken in designing smart laws, i.e. laws that are firmly grounded in the framework of economic policies, provide appropriate incentives for local innovators, and are designed in a way that exploits the opportunities for differential treatment provided by the TRIPS Agreement. In practice, this requires a pragmatic approach and one that may require some tough negotiating in the next round of WTO.

For South Africa it would make sense to differentiate patents where possible, e.g. provide narrow patents for sensitive sectors such as pharmaceuticals and agricultural inputs and broader patents in areas of international competitiveness; in addition, renewal fees can be raised and the lifespan of patents can be shortened via indirect ways.[199] Other sectors, where South Africa has a comparative advantage – such as mining, the armaments industry and banking technology – could be more defensively protected from patent infringement by broader patents.

Using patent scope as a policy tool may, however, prove quite treacherous. For optimal stimulation of domestic innovation broad patents could be desirable, but this would only be achieved at the cost of limited domestic competition between innovation firms. For access to affordable medicines (generally patented abroad), narrow pharmaceutical patents could be more appropriate to allow for close imitation, although this could be detrimental to domestic innovating firms. For a country that is on balance a technology importer, though both a technology importer and exporter like South Africa, it would be advantageous to analyse competitive advantages and public interest considerations in various sectors and to broaden the scope of patents accordingly. Legal and institutional restrictions (e.g. the fact that South Africa is not a patent-examining country) clearly limit the room for policy decisions in this regard.

It appears that technology protection is much like trade protection: the world is worse off if every country does it, but there are good reasons to allow developing countries to receive special and differential treatment to allow for fairer integration in the world intellectual property system. The flexibilities that TRIPS provides, such as parallel imports and compulsory licensing, should be fully exploited by South Africa and future extensions of TRIPS need to be carefully assessed for their appropriateness to the South African economy and developing economies in general.

[199] Patent life can be shortened indirectly via increased administrative demands (currently patents have to be renewed annually with a renewal fee from the third year), high renewal fees for certain categories of patents and exploiting the flexibilities provided in the TRIPS Agreement (TRIPS allows for the effective lengthening of a patent life by partial-term restoration e.g. in pharmaceuticals to allow for the lengthy clinical trials and regulatory approval processes, a signatory can however, choose not to do this).

7. Proposals for Future Research

In lieu of a conclusion to the various debates highlighted in this paper, this section of the paper will spell out two sets of proposals for further research in the area of IPRs.

Many of the sophisticated analyses applied in economic research on IPRs as discussed in Section 3 require equally sophisticated data. As this type of data is not readily available in South Africa, the following proposal incorporates only the techniques deemed practicable for South Africa specific research.

7.1 Domestic issues

Impact assessment

Currently, there is no South Africa specific research available that assesses the impact on the IPRs regime on domestic innovation, technology dissemination, imports and licensing payments.[200]

A comprehensive study should include econometric estimation of a set of simultaneous equations in which the four modes of entry into a foreign market – exports, licensing, sales through local affiliates and local production – are determined. Unfortunately, any quantitative assessment will require the cumbersome measurement of the South African IPRs regime (RR index) over time, which may not be possible with the required degree of accuracy. Trends in proxy variables, such as royalty payments/licensing fees, high technology imports and infringement lawsuits could be studied instead.

Evidence from opinion surveys may be more useful in gauging the effect of intellectual property laws in the domestic economy. These studies should provide insights into how local innovators benefit or suffer when patents are narrow or short. In particular, sectoral studies aimed at understanding the relationship between the patent regime, pricing and the incentives to innovate would be useful, particularly in the sensitive pharmaceutical and biotechnology sectors. Appropriate sectors could be determined based on a study of a single year's supply of patent applications, which would indicate the most and least patentable sectors in South Africa. Such a study could be extended to a cross-country study comprising several (African) countries besides South Africa, which have less developed intellectual property laws. These surveys could be of use in informing appropriate intellectual property law design and implementation with a sectoral focus (e.g. biotechnology, pharmaceuticals).

Understanding patenting trends

[200] Two current initiatives aimed at assessing the changing intellectual property law, policy and practise in South Africa are worth mentioning here: the Advisory Committee to the Minister of Trade and Industry and a joint IPR project between the DTI and the CSIR

Key trends in patenting behaviour in South Africa would provide valuable policy information. Statistical information including trends in domestic vs. foreign-owned patents, the sectoral distribution of domestically granted patents, and South African patenting abroad is required. However, this is currently impossible without changes to the registration systems of CIPRO.

Snapshot information on sectoral involvement and ownership of patents could be obtained for one year, requiring evaluation of around 10 000 patent applications available from the Patents Office (at a cost of R4 each). Other useful exercises would be to analyse time-series data on royalty payments and licensing fees, in order to gauge the importance of IPRs on the balance of payments.

Domestic law reform

A legal analysis of the main South African intellectual property acts, i.e. the Patents Act, the Copyright Act, the Trademarks Act, the Designs Act, Plant Breeders' Rights Act (and their amendments) and their implementation is required in order to gauge the economic impact. Substantively, this analysis should include an assessment of the exploitation of the flexibilities allowed under TRIPS, a comparison with international best practices and study of case law to evaluate the 'bias' in the judiciary towards intellectual property owners.

Policy coherence

IPRs affect many aspects of economic activity; the following suggested topics focus on policy coherence:

- Competition policy vs. IPRs: IPRs confer monopoly rights to inventors, yet there is no block exemption for IPRs in the Competition Act, leading to potential conflicts. An analysis of the policy coherence regarding competition cases with an intellectual property focus could be useful.
- IPRs and e-commerce: Are IPRs more vulnerable in the new economy? What is the economic impact of the recently proposed system for domain name registration (and the subsequent dispute between legislators and private sector companies involved in domain name registration) in South Africa?
- SMEs and IPRs: How can IPRs assist small business development?
- IPR policy coherence across government departments: Are the various intellectual property initiatives from the DTI, Departments of Arts, Culture, Science and Technology, Agriculture, Health, Education, Environmental Affairs and Tourism, etc. in line with each other?

7.2 TRIPS and the next round of WTO

The WTO work programme agreed in Doha[201] includes a deepening of TRIPS, which is to be "guided by Articles 7 and 8 of the TRIPS Agreement and taking full account of the development dimension." Articles 7 and 8 of TRIPS indicate that IPRs are not ends in themselves, but are meant to promote technological innovation and the transfer and dissemination of technology.

The work programme includes:

- Outstanding implementation issues;
- Patentable subject matter (in particular, extension to plants and animals and biological processes, as well as diagnostic, therapeutic and surgical methods);
- Geographical indications (the negotiation of a multilateral system of notification and registration of geographical indications for wines and spirits and an extension to products other than wines and spirits);
- The relationship between TRIPS and the Convention on Biological Diversity;
- The protection of traditional knowledge and folklore; and
- Other relevant new developments.

All of these issues are of concern to developing countries and should be included in the TRIPS research programme.

TRIPS and Geographical Indications

TRIPS identifies two types of protection conferred by geographical indications: (i) protection against false or misleading claims of geographical origin for all products; and (ii) special protection for wines and spirits that precludes the use of geographical terms with products that do not originate in the indicated area (even if modified by 'imitation' or 'kind').[202] The stricter protection for wines and spirits is contested by Chile, Argentina and South Africa.

Geographical indications have been a matter of heated debate in South Africa and were a considerable hurdle in the negotiation of the bilateral free trade agreement with the EU, the Trade Development and Cooperation Agreement (1999), resulting in the negotiation of a separate wine and spirit agreement.[203] South Africa disagrees with the European interpretation of international intellectual property law, namely that international law requires South Africa to protect all products covered by European geographical indications. The TRIPS Agreement does require members to protect products covered by geographical indications, unless the indication falls under one of the exceptions, such as geographical indications that have become generic names. Recognising all of the geographical indications used in both countries as European

[201] World Trade Organisation (2001b).
[202] TRIPS also calls for an international registration system for these products.
[203] The EU insisted that South Africa prohibit domestic producers from labelling their products as Grappa, Ouzo, Port, Sherry or use a number of indications for wines, including Nederburg.

would also violate other Articles of the TRIPS Agreement, which require that international intellectual property protection is non-discriminatory and balanced.[204]

Some legal research has been conducted in this area, and future economic research should aim to assist policy makers in ensuring that the multilateral rules and proposed registration system do not unduly discriminate against local wine and spirits producers.

TRIPS and Biodiversity

Article 27.3.b of the TRIPS Agreement addresses patentable subject matter and will be under review in the upcoming round of multilateral negotiations of the WTO. Currently, TRIPS members can opt to exclude plants, animals and biological processes, as well as diagnostic, therapeutic and surgical methods. Extension of the patentable subject matter to biotechnology patents to cover genes, cell lines, organisms and living processes effectively turn these various life forms into commodities. For instance, the patentability of genetic sequences[205], which are generally discovered and not invented, and which may not pass other patentability tests such as industrial utility, is dubious and currently a matter of heated debate in the WTO.[206]

The US is a fervent advocate of strong and broad patents in biotechnology, and the EU is in favour of strengthening patent rights for micro-organisms. Many least developed countries do not permit patenting of biotechnological inventions. Under TRIPS, the obligation to patent biotechnological inventions is ambiguous, with a relatively broad definition of excludable subject matter.[207] Plant breeders' rights are also seen as a cause of reduced genetic diversity, with unknown impact on the environment and public health. Biotechnology patents could stifle scientific and medical research and innovation, have severe economic repercussions for developing countries by undermining farmer's rights to create new plant varieties or to use existing ones, and involve plagiarism of indigenous knowledge or biopiracy by patenting plants and animals that were bred and used by local communities for centuries.[208]

For developing countries, the impact of strengthened protection of plant varieties can be costly; farmers in poor countries may not be able to purchase these varieties, which not only has a relative impact on their yields and ultimately on national self-sufficiency, but also makes them less competitive in the global marketplace. Moreover, the differential impact on commercial and small-scale farmers would be worthy of further investigation.

Plant breeders' rights are also seen as a cause of reduced genetic diversity, with unknown impact on the environment and public health. Further economic research is required to define multilateral rules that are acceptable to South Africa and to gauge the

[204] Boles (2001).
[205] Such as those mapped in the Human Genome Project.
[206] Ho (2001).
[207] Maskus (2000).
[208] Ho (2001).

potential impact on the domestic economy. This research should analyse the dependence of local farmers on imported inputs and price changes due to biotech patents.

TRIPS and Traditional/Indigenous knowledge

The working programme for the next round of WTO negotiations mentions work on the relationship between IPRs and traditional knowledge. Traditional knowledge is often confused with indigenous knowledge, and it is unclear whether both types of knowledge are included in the WTO programme. Indigenous knowledge is associated with knowledge held by a people prior to colonisation, whereas traditional knowledge can be held by any distinct culture and is not necessarily indigenous.[209] Protection of indigenous knowledge is of particular importance to developing countries. Many developed economies with indigenous communities already have some systems for indigenous knowledge protection in place, e.g. US, Canada.

This type of protection is essential for benefit-sharing between owners of traditional knowledge and technical experts – who are able to, for instance, isolate a certain chemical compound for commercial exploitation – illustrated by a recent South African dispute between the San people and the CSIR. The San have used the *Hoodia* cactus as an appetite suppressant and thirst quencher for centuries. The CSIR patented the relevant ingredient, initially without benefit-sharing arrangements with the San people. The dispute was eventually settled by a memorandum of understanding, which recognised the San as the custodians of traditional knowledge associated with the uses of a large variety of plant materials and the CSIR's role in isolating the active ingredient. Details of financial arrangements have not yet been published.[210]

IPRs of these indigenous communities are often ignored, and the economic rents due to them are misappropriated in the patenting of existing knowledge and subsequent commercial use, typically by corporations in the developed world. Research is required[211] to evaluate the following:

- Changes to intellectual property registration systems to enhance protection of traditional knowledge and expressions of folklore;
- Development of appropriate *sui generis* legislation for indigenous knowledge;
- Means of documentation of traditional knowledge, etc., via databases at a national and international levels; and

[209] Indigenous knowledge is held and used by a people who identify themselves as indigenous to a place based on a combination of cultural distinctiveness and prior territorial occupancy relative to a more recently-arrived population with its own distinct and subsequently dominant culture. Traditional knowledge is held by members of a distinct culture and or sometimes acquired by means of inquiry peculiar to that culture and concerning the culture itself or its local environment. WIPO (2001).
[210] Kahn (2002).
[211] WIPO (2001).

- Systems designed to ensure continued customary use of genetic resources and related knowledge.

Glossary

Biotechnology	Combination of 'biological' and 'technology', referring to the use of biological materials in industrial processes, e.g. beer brewing, and the application of industrial processes to biological materials, e.g. producing plant fibres. Also refers to the manipulation of genetic material, such as DNA.
Biopiracy	The wrongful appropriation of biological material without appropriate compensation to the rightful owners.
Compulsory licensing	Licensing of a third party by government to manufacture a patented product.
GNP	Gross National Product.
Most-favoured nation	WTO principle of non-discrimination that ensures that any preferential tariff or other advantage granted by one country to another will immediately and unconditionally be applicable to the like product of all other signatory countries.
National treatment	WTO principle that ensures that each member country must afford to nationals of other member countries the same protection as it affords to its own nationals.
Parallel importation	Importation of a patented product by a person other than the patent holder or local authorised distributor, generally from a foreign licensee who produces the product at lower prices than the original patent holder or local licensee.
PCT	Patent Cooperation Treaty
Sui generis protection	Protection 'of its own kind', allowing countries to institute protection other than patent protection.
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
Utility models	Type of patent awarded to mechanical inventions with less stringent non-obviousness standards than standard invention patents. These inventions, which tend to be incremental improvements in existing products and technologies, embody less technological progress and receive shorter protection.
WIPO	World Intellectual Property Organisation
WTO	World Trade Organisation

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Appendices

Appendix I International property rights, national legislation and treaties

Table 2. Classification of Intellectual Property Rights

Classification	General Coverage	Modality
Copyright	Literary, musical, photographic, artistic and scientific works, maps and technical drawings and computer programs	Copyright protection against piracy and infringement (use of the work, generally for commercial gain, without consent from the creator).
Neighbouring (copy)rights	Performances of performing artists, phonograms, broadcasts and expressions of folklore	Copyright protection against piracy and infringement.
Industrial property rights	Inventions, industrial designs and trademarks, service marks and commercial names and designations, protection against unfair competition.	Registered patents, registered trademarks, registered industrial designs and integrated circuits, geographical indications ('appellations'), application of competition laws.

Source: WIPO (1998)

Table 3. Current South African Intellectual Property Legislation

Name	Year
Merchandise Marks Act	1941
Business Names Act	1960
Unauthorised Use of Emblems Act	1961
Performers' Protection Act	1967
Trade Practices Act	1976
Plant Breeders' Rights Act	1976
Registration of Copyright in Cinematography Films Act	1977
Copyright Act	1978
Patents Act	1978
Designs Act	1993
Trade Marks Act	1993
Intellectual Property Laws Rationalisation Act	1996
Counterfeit Goods Act	1997
Intellectual Property Laws Amendment Act	1997
Medicines and Related Substances Control Act (parts)	1997
Harmful Business Practices Act	1998
Patents Amendment Acts	1986, 2001
Merchandise Marks Amendment Act	2001
Trade Practices Amendment Bill	2001
Performers' Protection Amendment Bill	2001
Copyright Amendment Bill	2001
Indigenous Knowledge Bill	2001

Source: Government Gazette, NB excludes some amendments to individual acts

Table 4. International treaties (WIPO, GATT/WTO, and UPOV)

Treaty classification	Treaty	South Africa
International protection	• Paris Convention for the Protection of Industrial Property • Berne Convention for Copyright Protection • Madrid Agreement for the Repression of False and Deceptive Indications of Source on Goods • Lisbon Agreement for the Protection of Appellations of Origin and their International Registration • Trade-Related aspects of International Property Rights Agreement of the WTO • Union for the Protection of New Varieties of Plants (UPOV) • Regional Industrial Property Association (ARIPO)	× ×
Facilitation of international protection	• PCT • Madrid Agreement Concerning the International Registration of Marks • Lisbon Agreement • The Budapest Treaty on the International Recognition of the Deposit of Micro-organisms for the Purposes of Patent Procedure [212] • The Hague Agreement Concerning the International deposit of Industrial designs.	×
Classification systems	• International Patent Classification Agreement • Nice Agreement Concerning the International Classification of Goods and Services for the Purposes of the Registration of Marks • The Vienna Agreement Establishing an International Classification of the Figurative Elements of Marks • Locarno Agreement Establishing an International Classification for Industrial Designs.	× × ×

Table 5. International treaties by type of intellectual property

Intellectual property right	Treaty
Patents	• The Paris Convention, • The PCT, • The Budapest Treaty • TRIPS.
Trademarks	• The Madrid Agreement • The Vienna Agreement • The Nice Agreement.

[212] I.e. biotechnology patents.

Intellectual property right	**Treaty**
Industrial designs	• The Hague Agreement, • The Locarno Agreement • TRIPS.
Integrated circuits designs	• The Washington Treaty • TRIPS.
Plant breeders' rights:	• UPOV • TRIPS

Appendix II Description of Treaties

The Paris Convention

The Paris Convention for the Protection of Industrial Property[213] (1883). South Africa acceded in 1947. The Paris Convention provides that the filing of an application for intellectual property protection in one member country gives a right of priority to the date of that filing in respect of corresponding applications filed in other member countries (12 months for a patent, 6 months for a design application).

PCT (Patent Cooperation Treaty)

South Africa is one of 100 member countries to the Patent Cooperation Treaty (1970). This Treaty enables an individual inventor to file a patent in several countries at the same time.

Budapest Treaty

International cooperation on biotechnological patents, obviating the need for applying in individual member countries. South Africa acceded in 1997.

TRIPS Agreement

South Africa became a signatory to the Agreement on Trade-related Aspects of Intellectual Property Rights in 1995, resulting from the Uruguay Round (1986) of Multilateral Trade Negotiations of GATT.[214] The TRIPS Agreement includes the Berne and Paris Conventions by reference.

UPOV – International Union for the Protection of New Varieties of Plants

This is an independent organisation, which sets minimum standards for protecting new plant varieties. South Africa became a member in 1978.

Unfair competition

International protection is contained in the Paris Convention and in the TRIPS Agreement.

Lisbon, Paris and Madrid Agreements

The Lisbon, Paris and Madrid Agreements concern geographical indications, including the international protection of appellations of origin. Conditions include: registration of the appellation in the country of origin and with WIPO. At a national level protection is granted via (i) jurisprudence, (ii) registration of collective / certification marks or (iii) via special titles established by a government authority.[215] The TRIPS agreement also includes protection of products covered by geographical indications.[216]

ARIPO (African Regional Industrial Property Association)

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[213] As revised: Brussels 1900, Washington 1911, The Hague 1925; London 1934. Burrel (1999), *op cit*.
[214] The World Trade Organisation replaced the GATT in 1995.
[215] WIPO (1998).
[216] Maskus (2000).

This 1985 regional agreement includes the following Treaty Member States: Botswana, The Gambia, Ghana, Kenya, Lesotho, Malawi, Mozambique, Sierra Leone, Somalia, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. South Africa is not a member. The Organisation was formed to pool resources to avoid duplication of human and financial infrastructure required for intellectual property law enforcement.[217]

Table 6. Substantive requirement of the TRIPS Agreement - summarised

Intellectual property rights	Obligations
Copyright and related rights	Protection for literary and artistic works. Minimum term of protection is 50 years, includes protection for programs and databases; neighbouring rights protection for phonogram producers and performers; specifies rental rights.
Trademarks and related marks	Priority rights of a filed application in one member country over corresponding subsequent applications filed in other member countries. Strengthens protection of well-known marks can be dependent on use, prohibits compulsory licensing. Products covered by geographical indications are protected with additional protection for wines and spirits (only if protected in country of origin).
Patents	Extended patentability (products and processes in all fields of technology), including biotechnology (with exceptions for plants and animals developed by traditional methods) and plant breeders' rights (patents or effective *sui generis* systems are required), exclusive right of importation, restrictions on compulsory licenses (domestic production can no longer be required; non-exclusive licenses with adequate compensation), minimum 20-year patent length from filing date, reversal of burden of proof in process patents, industrial designs (minimum protection: 10 years)
Industrial designs	Minimum 10 years protection. Includes integrated circuits designs. Explicitly permits reverse engineering.
Plant Breeders' Rights	Protection required, either by patents or by an effective *sui generis* system.
Undisclosed information	Trade secrets must be protected against unfair commercial practices and disclosure.
Abuse of IP rights	Wide latitude for competition policy to control competitive abuses associated with the exercise of intellectual property rights, such as certain exclusive conditions.
Transitional arrangements	Transition periods of 5 years for developing and transition economies (until 1/1/2000); 11 years for the poorest countries (until 1/1/2006), pipeline protection of drugs and chemicals on patent elsewhere but not marketed in these countries is not required, thus permitting local pharmaceutical firms to continue producing imitations. The poorest nations can request open-ended extensions. Developing countries have 10 years to provide patents for technology not previously covered, incl. pharmaceuticals, agricultural and other chemicals, food products and micro-organisms.
Institutional arrangements	TRIPS Council established and Dispute Settlement Mechanism applies.

Sources: Maskus (2000), Correa (2000) and WTO (1995

[217] ARIPO website: http://aripo.wipo.net.