

Ideal matter

Globalisation and the intellectual property debate

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Foreword

The purpose of FMF *Monographs* is to use the analytical method of political economy to show how markets will improve the South African economy. Authors are urged to apply the microeconomic approach of studying how individuals, firms and households behave in response to positive and negative incentives in naturally occurring environments or institutional frameworks which evolved over time or were imposed by fiat.

Since before the first crudely-chipped stone hand-axe it has been by imitation, that sincerest form of flattery, that good ideas tended to proliferate and usually triumph over bad ideas. Increasingly, modern recording and copying technology has facilitated cheap, easy and fast copying. It is a plausible if primitive notion that, when you have shown your new moves or sung your new song, they are ‘out there in the public domain’ for all to copy and use at will.

But some, perhaps most, of the creators of new ideas have always felt a sense of unfairness when the products of their own minds, often after long, hard and costly effort, are used freely to the advantage of others who have not ‘earned’ such cost-free benefits. The argument that unrestrained copying and imitation acts as a disincentive to their creativity is powerfully persuasive – over time it has enabled the institution of various forms of “intellectual property”.

This paradoxical term is not generally used to refer to property in its conventional, concrete sense. It does not mean the actual papers bearing the original score of a composer’s new symphony. It means an abstract idea, the detailed design of the symphony, regardless of where or even whether it is written down. This is indeed an unusual and controversial form of ‘property’, mental or conceptual, even abstract and emotional, rather than material, everywhere rather than somewhere, and potentially usable by many at once rather than one owner at a time.

It seems necessary, therefore, to treat intellectual property differently to the manner in which material property is treated, if only to avoid perpetual monopoly and denial of imitative use (except under licence) of the wheel, the hoe, and other inventions which might have arisen in an imaginary parallel universe before stagnation re-established itself. The content of an intellectual property right may be regarded as a ‘mere’ compromise: how best to spread new ideas without discouraging their creators. Finding the optimal compromise, however, is no easy matter. Worse than that, in an era of accelerating development and change, adjusting the compromise to keep pace with new realities rather than retarding progress is even harder.

The authors of this monograph recognise the reality, benefits and drawbacks of intellectual property rights, and their exploration of these makes fascinating reading.

Since the Free Market Foundation has no corporate view, it neither agrees nor disagrees with the authors’ views and their proposals are not necessarily those of the FMF’s directors, staff or members. Nevertheless we recommend serious consideration of this *Monograph* by all who are interested in the future political and economic well-being of our country.

Leon Louw
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The author

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1 Introduction

The past three centuries have seen more rapid technological development than any previous period in history. Consider just a few of the wondrous substances from which we benefit that were unavailable to our ancestors. Antiseptics such as trichlorophenol (TCP) enable doctors to perform surgery without killing their patients. Antibiotics such as penicillin have dramatically reduced the incidence and deadliness of bacterial infections such as TB and cholera. Synthetic pesticides and fertilisers result in far higher and more reliable crop yields, enabling more people to be fed at lower cost. Plastics such as polyvinyl chloride (PVC) offer (amongst other things) cheap and highly effective means of packaging food, ensuring its safe transport and storage and thereby reducing waste. Octane (the major constituent of gasoline) and other derivatives of crude oil power the vehicles we use to travel from place to place. And then there is the silicon chip which, with a little help from fibre-optic cables and power derived from generators burning carbon-based fuels, enables the Internet to function and with it a whole new web of human connectedness.

These technological advances have led to incredible improvements in quality of life. A person born 300 years ago might have expected to live to the age of forty in more-or-less constant fear of disease and malnutrition. Today, a person born in Europe, Japan, America, or any of an increasing number of similarly-developed countries can expect to be well-nourished and reasonably healthy for seventy-five years or more.

Many factors have played a role in stimulating these technological advances. At least amongst economists and historians, however, it is now almost universally accepted that a combination of relatively free markets, private property and the rule of law have been of absolutely fundamental importance. Property in physical goods such as land creates incentives to invest in those goods because the owner knows that he will be entitled to any returns he makes on his investment. But it also offers a form of security against which entrepreneurs are able to borrow the capital they need to develop their businesses. Without property rights there can be no entrepreneurial activity and without entrepreneurs there can be no growth.

Many commentators also argue that ‘property’ in this context should include ‘intellectual property’. This is a form of intangible property that protects the products of the intellect. Intellectual property (IP) includes *inter alia*: patents, which protect certain kinds of inventions; trademarks, which protect brands; and copyright, which protects certain kinds of creative expression (such as music, art, literature, film and software). IP, it is argued, creates incentives to invest in the development of new ideas and thence to acquire capital to develop businesses based on these ideas. Commentators point to evidence that intellectual property rights have been an important spur to innovation and growth over the past century and a half.

In spite of the benefits that IP appears to have conferred on society, there has long been a debate over its real utility. Criticisms of IP come in waves and at the present time we seem to be at the crest of such a wave. Ironically, this criticism has been stimulated in large part by recent technological developments. Users of distributed networks such as Freenet, Gnutella and Napster (until it was successfully sued by the RIAA) acquire copyright material without payment. Pressure groups seeking cheaper medicines co-ordinate their activities through websites and email lists, demanding that patented pharmaceuticals be provided without due payment to the patent holder. Other pressure groups, using similar means, object to the patenting of genes, threatening to undermine billions of dollars invested in the development of new and superior crops and medicines. Even trademarks have come under attack in the new economy, with cybersquatters linking to competitors’ web pages or defaming brands.

These attacks have called into question the morality of intellectual property rights. Is it just that individuals and corporations should be granted exclusive rights to ideas and/or their expression? Are the higher prices that are charged by the owners of IP worth paying in return for the stimulus to invention that results? Are there more morally acceptable ways of promoting invention and creativity?

The *Monograph* begins with a discussion of the ethics of intellectual property (IP). In Chapter 3, we move on to consider the ways in which economists have viewed IP. Globalisation issues such as the problem of parallel imports and the issue of how to encourage technology transfer to developing countries are considered in Chapter 4. In Chapter 5 we consider more specifically some of the problems associated with economic development and IP, with a case study of the problem of access to treatment for AIDS and AIDS-related illnesses. In Chapter 6 we examine how IP may develop further in the electronic age. Finally, in Chapters 7 and 8, the conclusions of the study are stated and then summarised.

2 Is intellectual property just?

In this chapter we consider the ethical foundations of intellectual property (IP). Before doing so, however, we briefly consider what we mean by property generally and IP in particular.

What is property?

Property is in essence a bundle of exclusive rights in an object. Anything from a cow to a castle to a camcorder may be property, as long as it is possible to prevent others from using it. Moreover, property does not have to be held by individuals: it can be held in common by a group or by a common-stock company. As long as ownership may be clearly defined and is readily enforceable, exclusivity – and hence property – is possible.¹

In addition to exclusivity, owners of property are also typically entitled to modify, exchange, or even destroy their property (although in some cases these rights might be curtailed). Secure property rights are the basis of almost all economic activity. Property enables exchange: if A cannot exclude B from taking A's goods, then B will have no incentive to give A any form of consideration – be it money, goods, food, etc. – in exchange for his goods. As important, property – in the form of land or goods – enables owners to secure loans. With these loans, property owners are, for example, able to improve the productivity of their land by buying seed, fertiliser and pesticide. Alternatively, they may engage in other kinds of entrepreneurial activity such as the production of non-agricultural goods and services. Although some entrepreneurial experiments will fail, many will succeed. In general, returns to such entrepreneurial activity have exceeded the interest paid on loans, with the result that economies will expand.

Property, then, is fundamental to economic growth, which is in turn fundamental to the alleviation of poverty. Only economic growth offers the billions of people scraping a living from the bare earth a chance of escaping from poverty. An alternative answer to the question posed in the title of this section, then, is that property is a moral concept, whose ultimate end is to enable humanity to rise above the misery of subsistence.

What is intellectual property?

Intellectual property, which may be crudely characterised as property in ideas or their expression, is conventionally divided into three broad categories: patent, copyright and trademark. We consider each of these in turn, giving some historical background to their present status.

Patents

A patent is an exclusive right in an invention. It confers on the holder the right to prevent others from making, using or selling copies of the invention for a limited period – now usually 20 years. For an invention to be patentable, it must be novel, useful (generally implying that it should have some kind of commercial application) and non-obvious. Patents encourage investments in research and development by providing investors with security that they will be entitled to some part of the flow of benefits that come from any new technologies that are developed. However, the granting of such exclusive rights has always raised concerns regarding abuse of power.

The earliest known patent on an invention was awarded in Florence in 1421 to Filippo Brunelleschi for a barge with hoisting gear capable of transporting marble.² In Britain, the first such patent was awarded in 1449 to a Flemish glassmaker for a method of making stained-glass windows (Patent Office, 2000). However, these were isolated cases: patents were first consciously employed as a means of encouraging inventions more generally in the Republic of Venice in 1474, when a law was enacted with the objective of: “stimulating great and ingenious men ... to discover and build devices, which are very useful and advantageous.”

During the 16th century, English monarchs discovered that the sale of monopoly privilege could be very lucrative and granted patents on an indefinite basis to all manner of trades and manu-

factures, regardless of their novelty.³ Even the trade in commodities such as leather, salt, iron and paper was patented. The consequent high prices of these goods led to accusations that such perpetual monopolies were unjust. Responding to these criticisms, Queen Elizabeth revoked some patents and gave the common-law courts jurisdiction over the others. The courts subsequently rescinded numerous patents,⁴ but King James continued to use the granting of monopoly privilege as a means of lining his coffers. So, in 1623, Parliament foisted on the King a Statute of Monopolies, which declared that all monopolies were illegal except those granted for “new manufactures within this Realm to the true and first inventor”. Moreover, the monopoly was limited to a period of 14 years and there was a restriction that such monopolies should not be “contrary to the law nor mischievous to the State by raising prices of commodities at home or hurt of trade.”⁵

From this initial Statute, the British Patent system was developed through judicial interpretation – there was no regulatory oversight for over 200 years. One important innovation that emerged during this time was the requirement that for a patent to be granted, a specification of the invention must be supplied.⁶

The introduction of regulatory oversight came in 1883 with the creation of the office of the Comptroller of Patents and his staff of patent examiners, whose job it was to ensure that the specification of a patent described the invention satisfactorily. In 1902, the role of the Comptroller was expanded to include an assessment of the novelty of the invention, based on a review of patents issued in the previous 50 years (Patent Office, 2000).

The framers of the US Constitution saw the promotion of technological development as essential to the wealth of the new republic. Indeed, the Federal Constitution of 1787 grants to Congress the right, “To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.” (Art.1, Section 8.8). This led to the elaboration in 1790 of the Patent Act, which specified that new inventions could be granted a patent for a term of 14 years following confirmation that the invention was indeed novel and useful.

In spite of the early experience of Florence and Venice, continental Europe was slow to adopt such restrictions on the monarchical award of monopoly privilege. Indeed the first continental country to adopt such a law was France in 1791. Germany followed suit in 1877, as did Switzerland in 1888.

The 1880s were decisive as far as patents were concerned. In 1883, many countries signed the Paris Convention on patents, which established the principles of ‘national treatment’, ‘right of priority’ and ‘special agreements’. “‘National treatment’ means that member states have to accord nationals of other member states the same advantages under their domestic patent laws as they accord to their nationals. ‘Right of priority’ means that a person applying for a patent has twelve months from the date of the application in any member country to apply for protection in all of the other member countries. ‘Special agreements’ can be made between individual member countries and these can be bilateral or multilateral as long as they do not contravene any other provision of the convention. The convention does not define what is patentable, set the duration of the patent or give guidance to patent claims or enforcement” (Henderson and Kane, 2001).

The Paris Convention can be seen as the result of an earlier period of globalisation. When international trade was risky and expensive and companies primarily produced for local markets, the fact that inventions could be copied without payment of license fees in countries where the invention was not patented was not much of a problem. However, as trade increased the costs in terms of lost revenue of not being able to patent an invention in many countries likewise increased. An easy means of patenting in many countries was seen as a desirable solution – and that is what the Paris Convention offered.

Likewise in the current period of globalisation the ability to copy inventions in places without patent laws, combined with relatively uninhibited trade, has led to widespread copying and illegal importation of on-patent inventions. Attempts to solve this problem have come in the form of vari-

ous codes for international harmonisation of patent law, first at the World Intellectual Property Organisation and then as part of the General Agreement on Tariffs and Trade (GATT).

Copyright

Copyright protects the published output of creative activities such as writing, painting, photography, filmmaking and music. As such it protects the expression of an idea rather than the idea itself. To qualify for copyright, a work should be fixed in a tangible medium of expression and should display originality (but not necessarily novelty of the kind demanded of patents). As a result, similar works may be copyright (for example, two photographs of the Eiffel Tower), whereas if two inventors have independently made a discovery, only one will be able to obtain a patent for the new invention.

Copyright emerged largely in response to the problems created by the invention of the Gothenburg printing press in 1450. Prior to that, copies of works had been made by hand – a laborious and expensive process. The printing press made copying cheap and simple and an industry grew up in the reproduction of texts. As competition amongst operators of presses increased, the profits available from reproduction decreased. In England, the operators of printing presses organised into the Stationers Guild, in order to demand the exclusive right to make copies of texts. Guild members in turn were allocated individual monopolies on the printing of particular works. This system no doubt provided some incentive to creativity, but its primary justification for the Sovereign was as a means of censorship. When protection of the Stationers Guild's monopoly ended, Guild members lobbied hard for a new law to protect them from competition. Initially they tried to argue that such restrictions were needed by government as means to control free speech. This failed, so they changed tack and argued that it was the author who really needed protecting. This argument was persuasive and so was born the first modern copyright statute – the 1710 Statute of Anne, which created a temporary exclusive right in literary works.

In the US, copyright, like patent, is derived from the Constitution. In Europe, the justification for copyright is somewhat different, though the result is essentially the same.

As with patents, copyright law has changed over time in response to various pressures. During the 19th century, increasing trade and decreasing printing costs led to widespread copying of works in countries in which the works were not copyright. As a result, in 1886 officials from around the world convened in Berne to agree an International Convention for the Protection of Literary and Artistic Works. Amended many times since, the Berne convention grants to authors of qualifying works “the exclusive rights of translation, reproduction, public performance, broadcasting, adaptation, and arrangement of their work for a term of the author's life plus 50 years” (Bastian, 1999, at 445).

During the 20th century, the invention of new technologies led to new demands for protection of creative works. Photo-lithography enabled high-quality colour reproduction of art works and led to demands for protection of such copies. The electrostatic photocopier enabled very cheap reproduction by amateurs of all manner of printed material, and so led to demands for specific legislation relating to such copying. The phonograph and other technologies for audio reproduction, including the cassette tape, led to demands for protection of recorded (as opposed to printed) musical works. Digital storage and transfer technologies – including the CD, DVD, MP3 and TCP/IP – have likewise led to demands for new legislation to protect the creators of the original works. These demands were typically met through amendments to national legislation and were incorporated into international agreements such as the Universal Copyright Convention (1952), the Berne Convention (as amended, 1986) and the TRIPs agreement (1994).

Originally it was necessary to register a work in order to acquire copyright protection but this requirement has now been abolished in many countries; it is replaced in the Universal Copyright Convention by a requirement that persons seeking copyright protection give notice by the use of a © symbol on their work.

Trademarks

Trademarks protect the use of a distinguishing symbol or name associated with a particular product. The more a particular product is known and associated with attributes desired by the consumer, the more valuable the trademark becomes. Without trademark protection, other companies have an incentive to free-ride on the reputation effects of distinguishing names or symbols, which discourages firms from investing in reputation, and hence from producing quality products.

Trademark originated in the common law of England as a means of preventing fraud (Merges, 2000, at 2208). By enabling the producers of trademarked goods to recover damages from impersonators, trademark serves the interests of both producers and consumers.⁷ Protection of brands through trademarks ensures that firms' investments in reputation are protected. As a result, companies have stronger incentives to develop products that meet consumers' demands for characteristics such as quality, safety, price and durability because they are able to communicate these characteristics through their brands. Consumers benefit because they are able to use the information proxy provided by brands to identify products that suit their desires, rather than having to wade through swathes of information each time they purchase a product.

The ethics of intellectual property

Palmer (1990) finds four distinct lines of argument employed in favour of intellectual property: moral desert (labour) theories; personality theories; utilitarian theories; and theories derived from conventional property rights (so-called 'piggy-back' theories). We briefly consider each of these.

Moral desert (labour) theories

John Locke argued that the right to private property derived from the assertion that "every man has a property in his own person" (Locke, 1698/1988, p.287). From this, Locke deduces that the fruits of a man's labour belong to him: "Whatsoever then he removes out of the State that Nature hath provided, and left it in, he hath mixed his *Labour* with, and joined to it something that is his own, and thereby makes it his *Property*" (Locke, 1698/1988, p.288). In this scheme, intellectual property would seem to follow naturally, since the individual must surely be permitted the fruits of his mental as well as his physical labour.

Objecting to the moral desert theory, however, William Leggett points out that "if you assert an exclusive right to a particular idea, you cannot be sure the very same idea did not at the same moment enter some other mind" (cited by Palmer, 1990, at 829). The problem is that if two rights claims are equally valid but for the fact that one claimant has managed to get to the patent office, or publish his article, or trademark his name ten seconds before the other, then where is the justice?

But there are parallels in the world of tangible property. Consider the case of two people drilling for oil on neighbouring properties. One happens to hit oil ten seconds before the other, but both have actually hit the same well. Who owns the oil? According to the moral desert theory, each party should own some portion of it, since both have invested their labour and other resources in its discovery. But how should ownership be divided? To deal with such problems, Locke created a proviso in which he limited the extent of property that may be taken into ownership by any individual, so that enough was left for others. In fact Locke held that each man should be entitled to whatsoever he could make use of. But of course he was writing in an era when there were still technical limits on the extent to which any individual could by his own labour convert land to agricultural usage. An alternative means of deciding how to divide contested property is given in his social justification for the proviso: "He that has as good left for his Improvement, as was already taken up, needed not complain ..." (Locke, p.291). In other words, it might plausibly be argued that a Lockean interpretation would divide the receipts from a simultaneously discovered resource equally amongst the discoverers (unless of course a prior agreement over division had been made). Another interpretation of the proviso would be to accept the justice of limits of breadth and time on intellectual property, so that even though a new invention be made individually, the exclusive rights of marketing

products based on it should be limited in scope and time, so as to enable others who might have been thinking along similar lines to develop their inventions side-by-side and in procession.⁸

Personality theories

Personality theories, and specifically those of Kant and Hegel, derive from the claim that an individual's personality is intrinsically linked to his thoughts and ideas as they are expressed in external phenomena. Thus for Hegel, "It is only through the development of his own body and mind, essentially through his self-consciousness's apprehension of itself as free, that he takes possession of himself and becomes his own property and no one else's"⁹ If one's artistic expressions are synonymous with one's personality, then they are deserving of protection just as much as the physical person is deserving of protection, since in a sense they are a part of that physical person.

Such personality theories have been employed to justify the existence of authors' inalienable 'moral' rights in their works. Thus, in French law, artists retain rights of disclosure, attribution, integrity and retraction (Palmer, 1990, p.841). Palmer (1990), however, roundly criticises such theories as being ontologically inconsistent, pointing out that if a work of art were part of an individual's personality then it would cease to exist when its creator died. Since works of art do not spontaneously cease to exist upon the death of their creator, it is clear that such works are not dependent upon the personality of the creator. As regards whether an individual's personality would cease to exist if all his creative works were destroyed, we cannot say for sure, but it seems rather implausible.¹⁰

Concerning the French '*droit de suite*' rule, which is justified by such personality theories and under which the creators of a work of art are remunerated each time the work is sold, Palmer points out that this merely results in likely future receipts from sales being incorporated (at a discount) in the original price – resulting in a lower price than would otherwise result. Ironically, such a rule discriminates against poor, unknown artists and thereby actually discourages artistic endeavour – quite the opposite role to that conceived for IP by the Venetians!

Utilitarian theories

Utilitarian theories, such as those of Bentham and Mill, assume that the objective of society should be the attainment of the greatest good for the greatest number. Utilitarianism is the ethical theory employed by many economists. The outcome of any policy is evaluated in terms of its overall impact on the wealth of society (wealth being a proxy for happiness), taking into account any externalities (negative or positive) that might pertain. Unlike other ethical theories, utilitarianism is not prescriptive with respect to the desirability of IP; rather it calls for an empirical evaluation of the costs and benefits arising from particular forms of IP. In particular the benefits, in terms of stimulating innovation, creativity and reputation building, must be weighed against the costs of patent races, monopolistic pricing, innovation-suppression etc.¹¹ A brief review of such analyses is presented in chapter 2 below.

Piggy-back: From property and contract to intellectual property

In principle exclusive contracts could be an alternative to copyright and patent: all one need do is ensure that the person purchasing one's work agrees not to copy or resell it without providing specified consideration to the creator and imposing a similar restriction on the subsequent purchaser.¹² Then, if this contract is breached, one simply sues the person with whom one originally contracted. The main problem with this approach is that it may be difficult to identify the person who purchased the copy that was ultimately used as the basis for reproducing copies. In English common law, contracts may not generally be enforced against third parties (this is called the rule of 'privity' of contract), so unless the chain of sale can be identified it will be impossible to sue anyone. This problem is especially acute in an era in which physical goods may be converted into electronic form, sent across the world, reproduced and sent back for sale in the original market.

In such circumstances one can see why (intellectual) property rights emerge as an institutional method of lowering transaction costs. A parallel case is the emergence of the restrictive covenant in England. Consider the situation where A agrees not to develop a field in return for some considera-

tion from B, creating a contract between A and B. What happens when A then sells his land to C? Under the English law of contract, B may only enforce the contract against A, not against C. This is because contracts create rights *in personam* not rights *in rem* – they are enforceable against the people who make the contract, not against the owners of the property that is their subject. But what if A has in the meantime died or moved away and cannot be found? In that case the contract cannot be enforced against A. However, in a series of cases in the mid-19th-century it was decided that as long as C had been given notice of the restriction by A, then B could obtain an injunction against C to prevent breach of the agreement.¹³ In other words, a right *in rem* – a property right – was created from a contract.¹⁴

Another way in which the common law sometimes gets around the problem of privity of contract is by permitting actions in tort. Consider the case in which a good has been bought by A and given to B; B has then been injured as a result of using the gift. In such cases, the courts have held that C, the original producer of the good, may be liable to B even though there is no contractual chain.¹⁵ One can imagine a situation where the common law could be used in this context to enable parties whose works have been copied in violation of a contractual agreement, even if the copier has no contract with the originator of the work. Consider the following situation (which is assumed to take place in the absence of copyright protection): A records a song and R agrees to publish it as a CD in return for which A will be given a royalty of 20 per cent of gross sales revenue from the CD. The CD is packaged in cellophane with the following restriction placed on it: “Opening this package constitutes agreement with the following: this CD may not be copied other than for personal, non-commercial use”. Now, B buys a copy of the CD and puts it on his computer’s hard drive. B then hooks up to Gnutella (a distributed network on the Internet which enables direct copying from computer to computer) and opens the file containing the song to other computers connected through the network. C then downloads the song to his hard drive, presses copies of it onto 1000 CDs and sells them on his website for half the price of copies made by R.¹⁶ As a result, R sells 500 fewer copies than he otherwise would have done, creating a loss for both R and A. In principle R would have an action against B in contract. But B may not be identifiable, in which case R might sue C directly in tort, arguing that C owed R a duty of care to check the legitimacy of the tracks he downloaded before deciding to burn them onto a CD. This would be especially true if it was common practice to put advisory notices on CDs restricting their legitimate copying.

Either way, the law might be used to prevent illegal copying. Some commentators have noted that no such ‘common law’ copyright has ever existed for published works. That may be so but it is also not a reason on its own for arguing that common law copyright should not exist. The common law has often failed to protect rights in spite of protestations that their protection would be a good thing.

One objection to piggy-back theories is that they make implicit assumptions about the size of certain transaction costs, which may or may not be correct. What they are actually saying is that the benefits of being able to enforce certain kinds of contracts against third parties are so great that it is worth creating a new institution to enable their enforcement. In other words, there is an implicit utilitarianism at work; but whereas true utilitarianism would seek to evaluate the costs as well as the benefits, piggy-back theories merely presume that the benefits are greater than the costs. However, piggy-back theories may be rescued by another approach to evaluating the costs and benefits of certain institutions, namely institutional economics (see Chapter 3).

Social contractarian theories

Another theory of justice that is employed to justify conventional property rights (but rarely if ever intellectual property) is that of the social contract. Such theories (which go back at least to Hobbes) use the artifice of a pre-social state of nature in which people must agree to the institutions under which they are to exist. A modern instance of this, which pertains particularly to some of the criticisms that have been levelled at producers of intellectual property, is that elaborated by John Rawls.

In *A Theory of Justice*, Rawls (1972) proposed that policies be evaluated in terms of their effect on the poorest member of society. According to some analyses, there are currently more than 800 million people around the world who live on less than \$1 a day. Of those, a large proportion suffers from chronic malnutrition. Clearly it is worthwhile evaluating the impact of IP policy on those people. Like utilitarian theories (and ironically given his claim to deontological imperialism), Rawls's theory of justice in fact requires empirical evaluation of the consequences of intellectual property rights in practice.

Conclusion

Several theories have been put forward that might be used to justify intellectual property. Of these, personality theories most unambiguously support IP but are deeply flawed. While moral desert theories also seem to lend significant support; purely legalistic 'piggy-back' theories also seem to lend strong support but rest to some extent on assumptions of the relative size of transaction costs and therefore might better be seen as a species of utilitarian theory where assumptions have been made about the nature of institutional evolution and the likely size of transaction costs; meanwhile utilitarian and social contract theories require empirical evaluation.

- 1 We omit mention here of the problematic cases of states owning property; such ownership has its historical antecedents in the ownership of property by kings and princes, who asserted their dominion by force. Needless to say it is possible for states to exclude people from property over which they claim dominion, but in modern states there exist serious principal-agent problems which undermine many of the potential advantages of property held by persons or groups with greater vested interests.
- 2 <http://www.britannica.com/bcom/eb/article/4/0,5716,60174+1+58705,00.html?query=patent>. However, a similar exclusive right had been granted to cooks in Greece over 2000 years ago (Frumpkin, 1945).
- 3 'Patent' was also the term used to denote land granted by a monarch.
- 4 For example, the monopoly on the production of playing cards granted to Edward Darcy was rescinded in *Darcy v Allin (The Case of Monopolies)* 11 Co Rep 84.
- 5 Statute of Monopolies 21 Jac.1.c3. (1623).
- 6 "...the patentee must by an instrument in writing describe and ascertain the nature of the invention and the manner in which it is to be performed" (Patent Office, 2000).
- 7 In the law of contract, impersonation is a form of fraud and voids any contract. Consider the case where merchant M impersonates Merchant X, branding his products with a mark that looks remarkably similar to that used by X. A consumer, call him B, then buys the goods from M thinking that they are made by X. B has clearly been defrauded but both B and X lose: B intended to buy X's goods but did not in fact do so and as a result X lost a potential sale. The contract between M and B is void, but by convention M would have no case – because contract does not protect third parties. However, this convention was broken by judges who realised that the owner of the brand, M, would have more incentive to protect that mark than would the purchasers. As a result both the legitimate owners of the trademark and the consumers of brand goods are protected from fraud.
- 8 Of course there is of necessity something arbitrary about such time limits, but no more so than time limits imposed on the acquisition of real property by means of adverse possession, or the limits of time imposed on actions that may be taken in response to torts, or indeed the time limits imposed upon those seeking to argue that they have acquired an easement through continued right.
- 9 Hegel, G (1952) *Philosophy of Right*, tr T Knox at 47, cited by Palmer *op cit*, at 838.

- 10 The idea that personality comes into being through some process of interaction between the individual and the outside world is not entirely mad. David Hume posited the similar view that a person is essentially the bundle of his experiences. In the past century psychologists have discovered much about what forms personality. It is now widely recognised that an individual's underlying 'personality' has a strong genetic component, while the way in which that personality is expressed and the specific characteristics that make up the person are determined by the interaction between the human being and his environment. In this context an individual's personality is likely to be affected by the way in which people react to his creative works, but only an extremely sensitive egotist would believe that his creative works deserved protection from misuse on the grounds that this would adversely affect his personality!
- 11 A distinction may be made between 'act' and 'rule' utilitarianism, with the former favouring a macroscopic assessment of each act in terms of its overall consequences and the latter favouring the creation of clear rules which are believed (presumably on the basis of some evidence) to result generally in a better state of affairs. The epistemic implausibility of 'act' utilitarianism means that most discussion are directed towards a rule-based approach. However, some economic analyses seem to take an 'act' approach (see Chapter 3).
- 12 Palmer (*op cit*) notes that this idea derives from Kant but was also employed by Hegel and also more recently by Murray Rothbard.
- 13 *Tulk v Moxhay* (1848) 2 Ph 774; in later cases it was decided that the counterparties must also have other property interests in the vicinity for the contract to be enforceable: *Formby v Barker* (1903) 2 Ch 539.
- 14 Against this proposed justification for intellectual property, Palmer argues that such rights might circumscribe the individual's right to remember a story or at least repeat it out loud. This, he points out, would impose restrictions on that individual's freedom. But it does not necessarily follow that memory of a work is an infringement of copyright in that work. The use of memory is an essential part of comprehending artistic works, so the act of remembering must therefore be considered a part of the right acquired by anyone licensing copyright material for their own use and also the rights disseminated through broadcast or performance. However, it does indeed follow that a story may not be repeated, and were it to be repeated through public broadcast (for example) without payment of royalties to the creator this would be an infringement. Since both the right to remember and the lack of right to repeat are conventions widely known to the public, and since the act of listening or reading is itself a voluntary act, all that can be said is that people voluntarily assume restrictions on their own subsequent action by engaging in certain activities. This of course applies far more widely than merely to intellectual property. The act of walking up a path towards a person's house (which may be seen as a public easement) is taken on the understanding that any deviation from the path may be actionable as a trespass.
- 15 The basic condition for liability is if the original producer is held to owe a duty of care to all subsequent users of the good, and that there was not any reasonable chance that the good was interfered with (*Donoghue v Stevenson* (1932) AC 562).
- 16 The example could be made more complicated by including technological restrictions on copying, but it is not clear that such restrictions would fundamentally undermine the argument – they would merely complicate it by necessitating some explanation as to how the technological restrictions were circumnavigated. It is worth remembering, for example, that in order for the human ear to perceive music it will always be necessary at some stage to produce an analogue signal. Such an analogue signal can be converted back into a digital signal of extremely high quality, using readily available and very cheap devices, and transferred onto a computer hard drive.

3 The economics of intellectual property

David Hume argued that property is a social ‘convention’ that emerges from enlightened self-interest operating in a social framework of reciprocity.¹ This insight has been followed by contemporary economists such as Armen Alchian (1951), who argued that institutions such as property rights and contract are favoured over alternative institutions because they enable the societies which have them to thrive more successfully, so that other societies either copy the institutions or stagnate and wither. There are no doubt many reasons why some institutions are successful and others less so, but a minimal condition for success would seem to be that the institution solves what economists call ‘incentive compatibility’ problems.

Solving the incentive-compatibility problem

The patent system has been the one key, pervasive institution in capitalist economies addressed to the problem of creating incentives for innovation (Kitch, 1998).

Incentive-compatibility problems arise when human nature is at odds with a particular desired end. In the case at hand it is presumed (on the basis of much evidence) that human nature is self-interested and that, in the absence of some institution restraining this urge, certain individuals will profit from the inventions, art or good name of others without payment (the so-called ‘free-rider’ problem).²

To see this, consider the case of resource conservation. In the absence of property, competition over the use of resources would result in excessively rapid depletion of those resources (this is the so-called ‘tragedy of the commons’³). Property solves the problem by giving resource-owners incentives to use the resource in such a way as to maximise discounted returns. If people know that they will be able to benefit from a resource in the future they will be less likely to degrade it today.

Likewise, intellectual property is said to solve the incentive-compatibility problem created by a lack of rights in the fruits of one’s mental labour, which otherwise would result in the under-provision of such labour. In other words, because people realise that they will be able to benefit from the future income deriving from their intellectual endeavours, they are more likely to engage in those endeavours.

Trademark is a particularly good example of an institution that creates appropriate incentives. By granting the user of a particular name or symbol a unique right to use that name or symbol in a particular context, a trademark creates an incentive for the owner of the name or symbol to build up a reputation for his brand. At the same time, by preventing people from selling inferior copies under the same brand, trademarks protect consumers from being ripped off. Often, the value of a company that markets consumer goods is largely embodied in its trademarks; they are among its primary assets.

Copyright and patent protection likewise can be justified on the grounds that they solve the incentive-compatibility problem. By conferring an exclusive right to a particular idea or expression, patents and copyright encourage artists and inventors to develop their creations. Meanwhile, consumers benefit because artists are encouraged to produce more than they would if they were not entitled to the receipts from their work.

Comparing institutions

In the absence of any form of IP protection, the knowledge associated with knowledge-based goods may be appropriated without payment to its creator. This would make it more difficult to reap sufficient return on investments in knowledge creation and thereby undermine the incentives to produce it in the first place. The extent of under-provision of knowledge will depend on many factors, including: the ease with which the knowledge itself may be appropriated; the ease with which the

physical good may be reproduced; the extent to which the creator of the knowledge is able to reap higher returns for his product because of its brand name; and the degree to which the product is regulated. The last factor is worth a special mention because many classes of product must undergo stringent testing before they are marketed. In the absence of intellectual property protection this would in principle leave ample time for competitors to acquire samples of the product and reverse-engineer it so that as soon as regulatory approval was given, bootleg copies would be on the market. It is difficult to overstate the effect this would have on incentives to innovate in markets with such regulation.

As we noted in the Introduction, mankind has over the past few centuries been incredibly inventive, with consequent benefits (and sometimes costs) for society. No doubt much of this innovation would have taken place without IP protection. However, some societies have experienced more rapid technological development than others. Nobel prize winning economist Douglass North (1980) argues that a significant part of the explanation for this difference is the presence of strong intellectual property rights in countries with rapid technological development, compared to weak IP rights in countries with slow technological development. Below we discuss alternative drivers of innovation, but first we consider some of the possible adverse effects of IP protection.

Creating scarcity from abundance?

The alleged monopoly effect of IP

While IP solves the incentive-compatibility problems associated with the appropriation of knowledge, it does so by creating temporary exclusivity. This has led to accusations that IP results in artificial scarcity. Hence the derogatory remark occasionally made that intellectual property creates scarcity out of abundance. In recent times, pharmaceuticals, software and music have in particular been subject to this criticism. But how valid are these criticisms? Below, we examine the arguments primarily within the context of patents – but many of the arguments may be readily extended to copyright, trade secrets and other forms of IP.

It is true that when a state grants a patent it is providing the inventor with temporary exclusivity over the patented product or process. Likewise, copyright effectively provides the creator of an artistic work with exclusive control over his or her creation. But does this matter?

Arguments in favour of the granting of (temporary) exclusivity as an inducement to innovation go back at least to the Venetians. One of the 20th Century's most vocal proponents of patents was the Austrian economist Joseph Schumpeter, who argued that economic development was driven by a 'perennial gale of creative destruction', in which new, better, more efficient technologies replaced old, inefficient ones. He argued that although patents offer temporary shelter from this gale, without them there would be no gale at all (it would at best be a light breeze).

What of the accusation that these exclusive rights create monopolies? There are several responses, the first and most general of which is simply that all property is in some sense a "monopoly". If A owns a car, B cannot also own it (although, as with a patent, he might be able to buy or licence the car from its owner). More pertinently, if A invents a process for manufacturing porcelain and does not share it with anyone else, then A has a monopoly on the use of that process. The monopoly is of course created by the fact that A owns the property in which he produces his porcelain and is able therefore to exclude potential competitors from seeing his process. Since few people now disagree that private property is a good thing, it is difficult to see how this monopoly could be considered a bad thing. So it is rather odd that when the monopoly is protected as intellectual property rather than through secrecy, suddenly there is much excitement about its legitimacy.⁴

Arguments against such monopolies tend to rest on comparisons with an ideal state of the world in which no firm has any power to affect prices. According to the neoclassical model of perfect competition, monopolies are assumed to be bad because they raise the price of goods above the marginal cost of production, restricting output to a level below that which would pertain under 'perfect' competition. But perfect competition is a mirage, relying on assumptions of complete information and perfect rationality. In reality, economic actors do not have full information and they

rarely behave in a purely rational way.⁵ Indeed, most economic activity only occurs because there are information asymmetries which drive the discovery process. Under perfect competition, there will be no patent and no monopoly, but also no innovation.⁶

Even accepting the neoclassical framework, however, the impact of the patent system is more complex than the comparative static analysis implies. For a start, the temporary exclusivity obtained by the patentee is unlikely to be a pure monopoly. Patented products generally compete with substitute goods. For example, a new anti-retroviral medicine to combat HIV will face competition from other anti-retrovirals already on the market, as well as from alternative treatments for HIV. The availability of substitutes, and therefore the extent of the “monopoly”, will to a large extent depend on the scope of the patent. If the patent is very narrowly defined, it will be easier for innovators to develop closely-related products without infringing the patent – in other words, a result closer to that yielded by so-called perfect competition.

Moreover, the patent system itself encourages competition by supplying the market with information about inventions. Because patentees must disclose information about their invention in order to obtain a patent, other individuals and firms are able more easily to invent around the patent and so develop imitation or even improved products, which then compete with the initial innovation. Some economists argue that such ‘inventing around’ is wasteful because it results in duplication of effort. A broader patent can alleviate this by allowing the patentee to exploit all minor modifications of his or her invention. Others argue, however, that narrower patents improve competition and increase consumer choice, with the duplication of effort associated with ‘inventing around’ being a necessary evil (Silbertson & Taylor, 1973). New innovations may even curtail the effective life of a patent, especially where a second product is an improved version of the first (Scotchmer, 1991). For example, Lanjouw (1998) found that over half of computer patents, whether commercialised or not, are worthless within ten years of the application date. Moreover, patents are typically filed some time before the innovation is ready for the market place, which further shortens the effective patent lifespan. Of course this may mean that patent protection is too weak. For example, in the case of products that are heavily regulated, a 20-year patent might be halfway gone by the time a product comes to market. In that case, perhaps the effective life of a patent should begin from the time the product achieves regulatory approval. Below we discuss problems with attempting to optimise patent length and breadth.

The extreme-case scenario is one in which there are no close substitutes for the patented product and potential innovators have not yet ‘invented around’ the patent. Even in that case, however, the amount of the patented good supplied might be close to the amount that would be supplied in a perfectly competitive market. This would be so if patentees were able to price-discriminate – that is, to sell to each person at the price he or she is willing to pay. The main difference between monopolistic and competitive supply in this case is that the ‘consumer surplus’ would be diminished – but not the quantity supplied. One interesting feature of this is that those willing to pay the most would ‘lose’ the most relative to the situation in a competitive market; but those willing (or able) to pay the least – but still willing to pay more than the marginal costs of production – would pay the same as they would under perfect competition. The issue of price-discrimination is discussed in greater detail in Chapter 4.

Alternatives to IP

While IP is often thought of as essential to innovation, the reality is that there are other ways of solving the incentive-compatibility problem created by the appropriability of knowledge. These include public funding of research, procurement by public agencies, prizes, trade secrets and various other more or less innovative mechanisms (Glennerster and Kremer, 2000; Gallini and Scotchmer, 2001). We now discuss some of these.

Public funding of research and development

Public funding of research ostensibly solves the incentive-compatibility problem by providing a direct financial incentive to innovators. Research grants are perhaps the most common means of disbursing public funding. These are typically disbursed by agencies, whose remit is to award money to the most deserving research. Of course in many cases it is difficult to see what commercial applications any piece of research might have, so the decision is made on essentially aesthetic grounds.⁷ Even where commercial applications are apparent, the funding body may or may not award grants according to the likely commercial viability: the problem is that commercial viability is rarely top-most in the minds of those who sit on grant-awarding bodies, who typically take the view that funding of science should look beyond the merely commercial. While there may be good reasons for funding non-commercial research, direct funding is often not the best means of achieving desired results. Consider the example of US Agency for International Development (USAID) funding of research into a vaccine for malaria described eloquently by Rachel Glennerster and Michael Kremer (2000, pp.37-38):

USAID decided in the 1980s to finance three teams seeking a malaria vaccine. One team developed a candidate vaccine, but only two of nine volunteers tested were protected from malaria, and the tests indicated that the vaccine created side effects. Those results, mixed at best, did not prevent USAID from issuing wildly optimistic statements. In 1984, the agency claimed that there had been a “major break-through in the development of a vaccine against the most deadly form of malaria in human beings. The vaccine should be ready for use around the world, especially in developing countries, within five years” (cited by Desowitz, 1991, p.255). Fifteen years later, the world is still waiting for a malaria vaccine.

Early work by a second team yielded disappointing results but, not surprisingly, the principal investigator argued that his approach was still worth pursuing and requested an additional \$2.38 million from USAID. The expert consultants assigned to review the project recommended against funding the research but James Erickson, USAID’s malaria vaccine project director, told the USAID Office of Procurement that the expert panel “had endorsed the scientific methodology and the exceptional qualifications and experience of the researchers” (Desowitz, 1991, p.258). Once the grant was awarded, the principal investigator transferred grant funds to his personal account. He was later indicted for theft.

Although outside evaluations of the third team’s progress called it mediocre and unrealistic, Erickson arranged full funding for the project. The principal investigator and his administrative assistant were later indicted for theft and criminal conspiracy for diverting money from the grant to their personal accounts. Two months before the principal investigator’s arrest the Rockefeller Foundation gave him a \$750,000 research grant, and on the day the investigator was arrested USAID announced it was giving him an additional \$1.65 million for research.

By 1986 USAID had spent more than \$60 million on its malaria vaccine efforts, with little to show for it. Nevertheless, because USAID believed that there would be many candidate malaria vaccines suitable for testing, it tried to obtain monkeys as test subjects for those vaccines. Erickson arranged for a contract to acquire monkeys to go to an associate who paid him a kickback. Erickson eventually pleaded guilty to accepting an illegal gratuity, filing false tax returns, and making false statements.

USAID had arranged for independent oversight of the project by the American Institute of Biological Science (AIBS). Erickson and the AIBS-assigned project managers were lovers.

Glennerster and Kremer conclude that “Although the USAID project is an extreme example of waste, fraud and abuse, it illustrates some important points about government-funded research: First, recipients of government funding have incentives to be overly optimistic. Second, government-funded project directors have incentives (aside from embezzlement opportunities) to fund un-

promising research. Third, because the recipients of government subsidies are paid before delivery, they may be tempted to divert resources away from the search for a vaccine” (p.38).

While critical of direct public funding of research, Glennerster and Kremer suggest some possibly more fruitful alternatives, including prizes, patent buy-outs and pre-commitments to purchase a certain quantity of the product of research. These options are considered below.

Procurement by public agencies

Procurement by public agencies acts as a means of stimulating investment by guaranteeing a market to the producer of a particular product. This method is commonly used in defence contracting, where secrecy concerns typically prevent the utilisation of patents. Very often the combination of government secrecy and scientific illiteracy amongst the relevant decision-makers in government can lead to huge expenditures on inferior or absurd technologies; the space shuttle (and manned space flight in general) and the proposed x-ray lasers of the initial strategic defence initiative are examples in point (Park, 2000).

For other technologies, where secrecy is not of prime concern, government procurement may be more effective in stimulating the development of useful new products. This is perhaps particularly true of pre-commitments either to purchase products that meet clear criteria or to buy-out patents on products that meet such criteria. Certainly these solutions are likely to be more effective than direct funding of R&D because they are more incentive-compatible.

But difficulties remain. How does one establish the desired objective? Governments are, after all, notoriously bad at identifying the kinds of products that people want. Supposing, however, that a clear objective can be identified – such as the development of a new vaccine for TB, HIV or malaria – how does one then specify appropriate criteria? This is not at all clear and, as the example below relating to the similar issue of establishing prizes demonstrates, the process can be quite fraught.

Prizes

Prizes were a common mechanism for encouraging invention in the Soviet Union. While this no doubt worked to some extent, it is questionable whether it encouraged the right amount of the right kind of investment. The problem with prizes – as with government funding in general – is that they do not necessarily relate to peoples’ wants: how does the prize committee establish the commercial value of the invention for which they are awarding the prize? One effect of this is the tendency to corrupt those responsible for deciding what criteria should be applied to potentially-qualifying inventions.

A famous example of such a prize was the £20,000 offered by the British Government in 1714 to the inventor of a device for establishing the longitude of a ship (Sobel, 1996). The reason for the prize was the huge loss of life that resulted from the inability to know precisely one’s location at sea. A tragic example related by Dava Sobel in her book ‘Longitude’ concerned the 2000 sailors from the Royal Navy who perished in 22 October 1707. For a wealthy seafaring nation such as Britain such losses were not only tragic; they were unacceptable.

The prize committee was initially favourably disposed to an idea from John Harrison. But the head of the committee, the astronomer Royal, Maskelyne, was part of a competing consortium and he intervened, obstructing Harrison’s proposal by changing the requirements of the design. Although Harrison eventually won the prize, many lives might have been saved if he had won the prize sooner and his device had gone into production.

Of course, all this is not to dismiss these alternative ways of encouraging research. Indeed, prizes, purchase pre-commitments and patent buy-outs, whether funded by the public purse or by charities, are to be lauded as far superior to the alternative of direct public funding. In chapter 4 we consider more specific examples of these approaches in the context of the highly-charged debate over access to essential medicines.

Speculative investment

Another alternative to patents, which does not rely on public funding, has been proposed by Jack Hirschleifer and involves betting on the consequences of an innovation. So, for example, the manufacturer of a new technology that is expected to lead to an increase (decrease) in demand for a particular mineral or chemical might buy very large quantities of call (put) options on that mineral, to execute shortly after the announcement of the introduction of the technology. While perhaps appropriate for certain technologies (a new method for extracting oil, for example), this might not be particularly useful for technologies that result in only a small change in demand for the chemical in question; if the expected change in price is less than that required to cover the cost of purchasing the option, the purchase would not be economic.

Trade secrets

The trade secret, still commonplace, was before the establishment of the modern patent system the only realistic means of protecting new technologies from appropriation. This worked, after a fashion, when scientific knowledge was at a much less advanced stage, because of the difficulty of identifying the methods by which goods were produced or even their composition. Whether it would work today is an open question. In its favour, it is now arguably easier to secure property and thereby prevent invasions of privacy. In addition, the courts have generally taken a favourable view regarding trade secrets. As a result, it will be easier to prevent the knowledge underlying innovative technologies (especially processes) that are used only within a business from being divulged. However, it is now very easy to reverse-engineer and hence copy most products, especially in the fields of chemicals, pharmaceuticals and biotechnology.⁸

A further problem with the trade secret is that the knowledge held in secret is liable to be lost. This was a particular problem historically. Society, having no knowledge of the secret aspects of the invention, was deprived of a valuable base for further innovation and economic development. Knowledge was not disseminated. In contrast, patent systems require an inventor to share the knowledge behind the invention. Today, most inventors aim at patenting their inventions and thus disclosing them to the world.

Alternatives in context and perspective

Clearly, then, inventions and artistic works could be encouraged by means other than conventional forms of IP. But by comparison with these other methods, patents, copyrights and trademarks seem remarkably cogent and simple. In a world of well-designed IP rights, the benefits of producing the innovation or artistic work are directly linked to the benefits that accrue to the public.

How important is IP?

Having said that, in any particular case we do not know whether an invention would have occurred or an artistic work would have been created in the absence of IP, because there are of course other incentives in operation.

In the context of inventions, for some firms the first-mover advantage obtained through developing a new product or process may be more important than the granting of a patent. Kitch (1998) points out that the patent system was designed to protect individual inventors rather than firms (which nowadays are the agents that engage most in R&D activities). Unlike individuals, firms are able to develop and market their inventions without dealing with third parties, and they can benefit from a head start once the invention is introduced.

A survey of R&D managers by Levin et al. (1987) found that, except for a few industries, patents were not generally regarded as one of the more important mechanisms of appropriation, with lead time, learning curves and service efforts being regarded as more effective in protecting innovation than the patent system (in Besen, 1998).

Patents are, however, regarded as very important in some industries. In particular, the chemical and pharmaceutical industries attach more significance to patents because their products are

easy to imitate. These industries also generally make “stand-alone” products (e.g. a medicine), whereas other industries make complex products and only take out patents on a few parts. For example, rather than patent a whole jumbo jet (which would probably not be permitted), Boeing typically takes out patents only on a few component parts; but since those parts are crucial for the functioning of the jet, they ensure that others cannot legally copy the aircraft.

Empirical work by Edwin Mansfield (1986) suggests that patent protection is most important in promoting innovation only in the same few industries. Mansfield also found that patent protection is more important for product than process innovations, confirming the view that trade secrecy is relatively more important for processes. Patent infringements are of course also more difficult to detect for process than product innovations. However, firms actually do patent a large proportion of their inventions – Mansfield’s study yielded an estimate of 50-80 percent – which suggests that firms themselves must see some value from patenting.

While abolishing the patent system might have little effect on some industries, in others abolition might lead to a “live-and-let-live” oligopoly, or a “cat-and-mouse” situation where each firm invests in R&D only to the extent that this will allow easy imitation of other firm’s innovations.

In the context of creative works, we probably all know of artists or musicians who work long hours for little reward simply because they love their craft. But in spite of the trite words of Lennon and McCartney, love alone is not enough. Indeed, Samuel Johnson was probably more accurate when he said, “No man but a blockhead ever wrote except for money” (Boswell, 1776, Vol.vii, chapter iii). Historically, many great artists and musicians such as Tchaikovsky were able to engage in their craft only because they were supported by benefactors.⁹ Others would write or paint to commission.¹⁰ Yet others, including even great composers such as Bach, supplemented their income by teaching. While it is still common for artists and musicians to have benefactors, or to support themselves through teaching or cooking,¹¹ or even to rely on welfare, many more artists are today able to support themselves directly through their craft. As a result, today’s artists are less likely to feel compelled to produce flattering portraits of their benefactors or commissioners – be they bishops or merchants – and are able therefore to express themselves more freely.

The great transition in art that has taken place during the course of the past 150 years may in large part be a response by artists to the shift in market incentives. Some change has come from an increase in demand – the result of the huge increase in wealth that has occurred over the last century. Improvements in reprographic technology have also contributed; photolithography now enables almost perfect reproduction, thereby enabling hundreds, or even thousands of people to own essentially the same piece of art. But without copyright, artists would not be able to control those who copied their work, so the value of the original would in most cases decline significantly. With copyright, artists can sell their works directly to the public without worrying about illegal copying. In other words, today’s art – like it or loathe it – is largely dependent on copyright.

The optimal length and breadth of IP protection

Given that patents and other forms of intellectual property are desirable, what is their optimal length and breadth? Consider the case of patents. In principle, according to the utilitarian calculus employed here, a patent should be just broad enough, and last just long enough, for the profits earned by the patentee to repay the cost of developing and marketing the invention, including of course the costs incurred in developing products that do not come to fruition.¹² If protection were extended for a longer period, or its cover broader, the greater choice and cheaper prices that could have arisen from competitive supply would be unnecessarily delayed. Conversely, if protection extended for a shorter period of time, or was narrower, there would be too little innovation and the particular innovation in question might never be invented (Besen, 1998).

In practice, however, it would be impossible for the patent authorities to tailor each patent individually, so that each patentee receives the relevant and unique efficient rate of return. That is why patent systems use a one-size-fits-all approach, treating all inventions alike.¹³

In addition, there are positive externalities to R&D, such as spillovers to other industries and the acquisition of knowledge in the economy, which cannot be captured by the price system. Thus the benefits to the consumer may in fact be much larger in the long run than is implied by the standard neoclassical analysis. Even a patent that yields the hypothetically efficient rate of return to the patentee may therefore result in a sub-optimal level of investment in R&D.

The issue of patent breadth has only recently received attention in the literature. Broad protection means that a patent holder has exclusive rights to develop and market “adjacent” innovations (Besen, 1998). Breadth can also take the form of greater freedom granted to the patentee to exploit the patent, for example through exclusive territories and tying practices. As mentioned above, the scope or breadth of a patent can have an impact on the availability of substitutes for a patented product, and therefore on the demand for and price of that product.

Generally speaking these arguments militate in favour of patents being longer and broader than might be considered strictly necessary according to the static neoclassical analysis. However, this may occasionally lead to awards that are excessively broad or excessively long, so it also seems desirable that there should be provisions for overriding a patent if it is considered that the exclusive rights it confers are so broad that technological innovation is stifled. This is actually what we see in practice: authority to grant patents is vested in administrative bodies (such as the US Patent and Trademark Office, or the UK Patent Office), with discretion to alter patents vested in the judiciary. For example, the gasoline automobile was under patent when Henry Ford began mass-production of inexpensive motor-cars. The cartel which controlled the patent had not been willing to grant Ford a licence, because its members were interested only in high-margin, high-priced cars. Ford began mass-producing cars anyway and was sued by the automobile cartel, but the cartel lost the case; the judge ruling that the patent was too broad (Cole, 2000). Of course, even if the cartel had won, Ford would have been able to start production shortly thereafter since the patent was granted in 1895; he would just have had to wait an extra four years. By contrast, imagine what might have happened if there had been no patent protection at all. In that case it may have been many more years before a motor-car was even invented, not to mention the many consequent inventions that might never have taken place at all.

Copyrights generally provide narrow and long-lived protection, while patent protection tends to be shorter and broader. The protection of copyright is narrow because it covers “expression” rather than the underlying ideas, which means that they do not generally deplete the opportunities available to other artists (Friedman, 1998). Trademarks may be renewed indefinitely, unless the distinguishing brand name or packaging becomes generic. For example, in many countries “Aspirin” and “Thermos” lost their trademark protection because they came to be considered to be generic terms (Besen & Raskind, 1991).

Patent pools

Whereas Henry Ford suffered because the patent on the motor-car was too broad, problems also arise when patents are too narrow, making them unworkable on their own. This situation has been described as a ‘tragedy of the anti-commons’. One solution to this problem is for a group of competing firms to allow each other to use their respective patents, subject to certain restrictive clauses, through either patent pools or cross-licensing agreements. Of course, this kind of collusive behaviour can create barriers to entry for new firms that are not party to the agreement and can make it difficult for smaller firms to compete, resulting in technical cartelisation of an industry. The problem is how to know when such an arrangement is necessary in order for the industry to function effectively and when it is merely being used as a means of excluding new entrants and smaller players.

An alternative way of coping with narrowly specified patents is for a firm to acquire “unnecessary” related patents. In some cases, a firm may not work a patent at all, meaning that consumers will not benefit directly from the innovation (although they may arguably benefit from the firm’s other products, which might not otherwise be produced for lack of sufficient return on investment).

In most patent systems there are laws against non-working behaviour, however, which is generally referred to as “patent abuse”. For example, the courts may force a patentee to licence its patent to other firms. The issues of patent pools, cross-licensing agreements and patent abuse will be the subject of a future paper.

In search of an optimal level of R&D

The process of knowledge creation leading to product development may be divided into three stages: basic research, invention, and innovation. Basic research refers to the building blocks of knowledge required for an invention to take place. Invention is the process by which a new product or process is developed. Finally, innovation involves making the invention economically viable and marketable, a step which can of course be unsuccessful.

Patents may only be taken out for inventions (the second part of the chain). This means that the output of basic research may not become patentable if it is not developed into a potentially commercially-viable and useful product or process. For example, although Hertz was the first person to conceive of transmitting wireless signals through the atmosphere, it was Marconi, whose research was based on that of Hertz, who took out the first radio patents (Maclaurin, 1949). Basic research may therefore provide significant benefits (externalities) for inventors, for which the researcher receives no payment. This may result in the level of basic research being below what it might have been in the presence of rewards to the researcher.

Where the output of basic research is readily patentable, the scope of the patent becomes important – a broadly defined patent may not allow subsequent innovators to develop new products and processes based on the initial research. This would tend to encourage basic research at the expense of later innovations. Conversely, a narrowly-defined patent will allow innovators to better utilise the knowledge inherent in previous research, at the expense of those who have undertaken this research. Some (Arrow, 1962; Scotchmer, 1991) have argued for greater government involvement in, and support for, basic research as a way of overcoming this problem.

However, Demsetz (1969) points out that Arrow’s conclusions were based on the “nirvana” approach of perfect competition, where everyone has the same information and there are no transaction costs. Demsetz argues, as we have argued above, that perfect competition is unattainable and therefore not a good standard of comparison. What should be compared are two real-world situations – in this instance, one where government funding is provided for basic research, and one where it is not. He accuses Arrow of presenting “the grass is always greener” fallacy because Arrow assumes that where there is “market failure” the government will always do better than the market.

This is not to say that government funding does not have a role to play in promoting basic research. However, it is impossible to say what is an “optimal” level of basic research and therefore impossible to draw any hard conclusions as to whether the patent system is inefficient or efficient, or whether it encourages the “right” amount of R&D or not.

Notwithstanding Arrow’s view and Demsetz’s counterargument as to whether patents lead to an “underfunding” of basic research, there is a polar-opposite view, namely that patents may lead to an over-investment in R&D. The so-called “race to patent” by firms can lead to a duplication of research. Several competing firms may conduct R&D into the same area in an attempt to patent the resulting invention first and thereby obtain a monopoly on subsequent innovations, excluding their competitors from the market. This may not be “socially efficient” in the sense that the resources channelled into this activity by the losing firms could have been put to more productive uses. But of course without the rivalry the R&D might not have been undertaken at all! On the other hand, patents can also help to promote co-operation between firms (and thereby prevent duplication) because they enable firms to share knowledge without being concerned whether this will lead to imitation. As always, the picture is not clear cut.

We have already discussed alternatives to government funding in the context of inventions that would otherwise be patentable. These alternatives would of course also operate even if no patent could be obtained, as with the output of basic research. Moreover, an additional mechanism

would come into play if government funding were reduced and patents on downstream technologies were available. First, firms might set up secret research laboratories investigating non-patentable technologies so that they would then have first-mover advantage in developing derived and patentable products. Second, firms would also be likely to invest in collaborative basic-science projects that would benefit whole swathes of industry. They might do this partly because of possible future collaborative efforts, and partly for the public cachet – and consequent improvement in brand identity – attached to such projects.

Conclusion

The discussion in this chapter shows that IP is generally desirable. It is particularly important for those products and processes that require large investments in research, development and marketing but for which the costs of copying are relatively low. Chemicals, pharmaceuticals, and biotechnology each rely heavily on patents. The music, film, book, art and software industries all rely heavily on copyright. Meanwhile, all manufacturers and sellers of brand goods (which is most manufacturers and most sellers) rely on trademarks and servicemarks to guarantee the identity (and hence brand-associated characteristics) of products.

There are of course drawbacks to IP, including temporarily higher prices of the protected goods, a reduction in the number of goods directly derived from those that are patented,¹⁴ the legal and administrative costs involved in enforcement, and so on.¹⁵ These drawbacks have led several commentators to conclude that patents and other forms of intellectual property are not desirable. However, the problem with focussing on these drawbacks is that in doing so one often forgets that the inventions and creative works might never have come about but for the existence of IP.

It is all very well to criticise the excessively broad application of patent to the internal combustion engine or aeroplane wing control (which was patented by Orville Wright) but if there was no patent protection how much longer would we have had to wait for the car and the aeroplane? Perhaps more importantly, without the stimulus of patent protection, would we have had all the wonderful synthetic chemicals and pharmaceuticals that make our lives and the lives of our loved ones so much better? Without copyright protection, would we have enjoyed the explosion of music, art, literature and film that we have experienced over the course of the past century? Without trademarks and servicemarks, how much more complicated would our lives be, constantly battered with confusingly similar marks?

In sum, were we to abandon or significantly diminish our system of intellectual property rights, we might gain in the very short term through lower-cost products, but the cost in the medium-to-long-term would be felt in terms of fewer products, as well as higher expenditures on trade secrecy and other means of protecting knowledge, which might well increase the cost of products.

1 Writing shortly after Locke, David Hume argued that private property was ‘a convention enter’d into by all the members of society to bestow stability on the possession of (such possessions as we have acquir’d by our industry and good fortune)’, (Hume, 1739/ p.?). His reasoning was: (1) that such goods may be taken by force and transferred to others; (2) that the utility of such goods did not diminish greatly on being so transferred (thereby giving thieves an incentive to take them); (3) that there is at the same time inevitably a limited supply of such goods; so (4) that it is therefore in the common interest of society to create such a convention. This is not, it should be stressed a contractarian argument. For Hume, a convention is a rule that emerges and is followed because it is beneficial to all the members of society. This derives from his view that our understanding of the world is introspective and that we behave in a self-interested but reciprocal manner towards one another. Thus: “I observe, that it will be for my interest to leave another in the possession of his goods, provided he will act in the same manner with regard to me. He is sensible of a like interest in the regulation of his conduct ...”.

2 The amount of money spent litigating patents, copyright and trademarks is an indicator of the truth of this proposition: in other words, even with IP protection people attempt to copy works; the likely extent of such behaviour in the absence of IP protection must be huge. (As later sections show, there is also a thriving business in copying of IP- protected material in countries without adequate IP laws.)

3 See Hardin (1968).

- 4 Indeed, some of the more intellectually appealing criticisms of intellectual property such as
Meiners and Staaf (1990) do not argue against monopoly *per se* for this very reason. Rather
they argue against the creation of ‘artificial’ monopolies, which result from the seemingly ra-
ther arbitrary allocation of property rights in inventions that result from patents.
- 5 Lacking full information, each person must use rules of thumb to decide how much infor-
mation to acquire.
- 6 As Demsetz (1969, p. 238) notes, “...modern analysis has yet to describe efficiency in a
world where indivisibilities are present and knowledge is costly to produce. To say that pri-
vate enterprise is inefficient because indivisibilities and imperfect knowledge are part of life,
.... is to say little more than that the competitive equilibrium would be different if these were
not the facts of life”.
- 7 The authors are grateful to Sebastian Payne for this observation.
- 8 Meiners and Staaf (1990) cite the example of Coca Cola as a product that has been protected
by trade secret for over 100 years. But Coca Cola is oddly more complex than many pharma-
ceuticals, in that it contains mixtures of highly-complex, naturally-occurring compounds. The
exact contents might therefore be very difficult to identify. By comparison, pharmaceuticals
are often single compounds, the component elements of which may be readily identified using
mass spectroscopy or gas chromatography. Likewise a new genetic variety of a cultivar may
be readily identified using polymerase chain reaction (a process patented by Abbott Laborato-
ries).
- 9 Tchaikovsky’s benefactor was the wealthy Nadezhda von Meck.
- 10 Many of Rembrandt’s most famous works were commissioned: even *The Nightwatch*, which
departed dramatically from convention and is important for its use of light, was a commission
from Captain Cocq.
- 11 Julian Schnabel, now a multimillionaire artist and filmmaker, throughout his 20s supplement-
ed his income by cooking (Peterson, 2001).
- 12 The riskiness of R&D activities means that the cost of development is not simply what the
historical accounting records suggest. Only a small proportion of a firm’s innovations may ac-
tually reach the manufacturing stage, and the expected rate of return firms receive for their
successful innovations, as determined by the patent, must reflect this risk.
- 13 Interestingly, patents were originally granted for 14 years, which was the time taken to gradu-
ate two generations of apprentices. Nowadays, the usual patent life is 20 years from filing
(David, 1998).
- 14 “If later innovators cannot freely build on the work of others, or must pay to do so, they may
be less likely to engage in inventive activity themselves” (Besen, 1998).
- 15 For example, the legal fees arising out of a battle between Kodak and Polaroid cost Kodak
\$100 million (Cole, 2000).

4 IP and the global economy

From the foregoing it is clear that protection of intellectual property rights creates dynamic incentives to innovate, with consequent net benefits to society. However, problems arise in a world in which there are many nations with different policies towards intellectual property. In this chapter we discuss some of those problems and some of the solutions that have been proposed or put into effect.

International protection of intellectual property

In a world of many countries, each with its own legal system, enforcement of IP rights becomes more difficult. If one country does not offer protection of particular kinds of IP, manufacturers in that country will be able to produce copies of products embodying creations that are protected by such IP elsewhere without paying the IP owner.

Consider, for example, brand goods such as Rolex watches. Development of the brand 'Rolex' was made possible by protection of the name 'Rolex' through a trademark originally acquired by Hans Wilsdorf.¹ The trademark enabled Wilsdorf to market his brand without fear that others would be able to free-ride on his investment by also selling 'Rolex' watches. As Rolex grew into a global brand, however, entrepreneurs in countries where trademarks are not adequately protected began making copies. Many of these watches are now exported to countries where the trademark is protected, such as the US and UK. As a result the value of the trademark brand is diluted, if for no other reason than that the exclusivity associated with owning a Rolex is undermined by these cheap copies.

While the economic consequences of permitting illicit copies of Rolex watches may not be great, the implications of brand dilution more generally are very serious indeed. One problem is that companies manufacturing unlicensed copies of a product will not have the same incentives to ensure product quality. In the case of pharmaceuticals this can have very serious consequences, with people being sold drugs that do not contain the same active ingredients as the brand pharmaceutical.

In a recent scandal, hundreds of thousands of fake birth control pills branded with Schering's name were sold in Brazil. The pills, produced in a test run at the German pharmaceutical company's own plant in Brazil, contained only flour and should have been destroyed. But it seems that corrupt employees took the pills and sold them illegally. Many women who took these pills subsequently became pregnant. The scandal led to an investigation of the illegal sale of pharmaceuticals in Brazil, which uncovered the disquieting fact that up to ten per cent of all pills on sale are either fakes or legitimate medicines that have expired. Even fake heart and cancer drugs were found on sale and several deaths have been linked to the consumption of fake medicines.² While the problem can to some extent be addressed with better, more secure, less easily copied packaging, the underlying cause was a lack of sufficiently strong laws protecting the trademarks of the manufacturers. Had those laws been in place, Schering would have been able more easily to prevent the sales of fakes – thereby protecting both its own brand and the interests of consumers.

A similar problem arises in the context of patents and copyrights. Millions of copies of products are made legally in jurisdictions in which patents or copyright are not adequately protected. Many of these are then exported to markets in which patents and copyrights are protected. The result is to reduce the value of investing in the development of IP-based products, which in turn means that fewer such products will be produced.

Consider, for example, a music CD produced legally, but without payment of royalties to the owner of the copyright, in a country without adequate copyright protection. If the CD is then exported to and sold in the UK, the copyright holder loses out. Aside from the strong moral argument that the creator of the music has been defrauded, there is the question of the long-term impact on creativity. Most musicians earn a relatively poor living from their art. What drives many of them on is the belief that one day they will make it big and sell hundreds of thousands of CDs. However, if

they know that their music will be ripped off by pirates and their income from sales of legitimate CDs consequently reduced, their incentives to carry on producing music will likewise be diminished.

The Internet poses a particular problem in relation to copying of music. Distributed network systems such as Freenet and Gnutella (and Napster until it was successfully sued by the RIIA) enable people to share files across the Internet without paying royalties to the copyright holder. While this activity is currently mostly confined to countries with strong IP laws, and so can be limited by legal enforcement,³ it will soon expand into other countries, where enforcement may be more difficult or even impossible.

Implications of lack of IP protection in poor countries

While it is legitimate and important to be concerned about the impacts imports of bootleg copies of CDs and medicines have on the incentives of artists and pharmaceutical companies, the problems for would-be IP creators in countries without adequate protection are even worse. Because they are unable adequately to protect their products, people in these countries (and we mean large parts of the so-called ‘developing’ world, as well as a few pockets in the ‘developed’ world) are discouraged from developing novel products in the first place and are instead encouraged to copy products developed elsewhere. Some see this as an important part of the ‘catch-up’ that must happen in ‘developing’ countries (e.g. Juma, 2000). While there may be some benefits to local industries engaging in copying of foreign IP, these must be weighed against the various costs, including: lower levels of local innovation/creativity; less foreign investment in IP-based industries; and the loss of indigenous talent (without local investment in IP-based industries and without the incentive of possibly acquiring patents locally, many talented and inventive people will simply move to jurisdictions where they can better use their skills – and be better connected to the knowledge-industry infrastructure which uses those skills). Consider the experience of India over the past three decades.

Until just over 30 years ago, India had strong intellectual property laws – modelled on Britain’s system. Then, in 1970, Indira Gandhi enacted legislation removing patent protection from pharmaceutical and agricultural products. Speaking to the World Health Assembly in 1972, Mrs Gandhi proclaimed, “The idea of a better ordered world is one in which medical discoveries will be free from patents and there will be no profiteering from life and death.” But in spite of thirty years of patent-free production, over 70 per cent of the Indian population still cannot afford even basic pharmaceutical products (Lanjouw, 1998). The main consequence of the 1970 Act was to stifle product innovation and discourage foreign investment. Indeed, as Dr RA Mashelkar, Director of the Council for Scientific and Industrial Research, pointed out recently, only fourteen new pharmacological molecules have been developed in the past forty years in India, and 11 of those were developed by CSIR (Mashelkar, 2001). To be sure, generics producers such as Cipla benefited, and India has become a net exporter of pharmaceuticals, but how much larger might those exports have been if companies had been developing new, patented drugs?

India’s information technology industry has been less badly affected by the lack of product patent protection. In part this is because computer code is protected by copyright; in part it is because encryption makes it easier to keep the source code secret. Indeed, the growing IT industry has been the most dynamic sector in the Indian economy over the past decade. In 1990, the IT industry produced \$150 million; in 2000, this figure was close to \$6bn, including around \$4bn in exports.

The IT industry will continue to expand over coming years for several reasons. First, India will remain a far cheaper place to source IT expertise than most other parts of the world. Second, nearly 30 million people in India speak English. Third, many of these people are acquiring IT skills at private training companies such as NIIT, where a month-long course costs only a fraction of what it would cost in the UK or US.

Expansion of the Indian IT industry will also be driven by synergies with other industries – particularly biotechnology. Bioinformatics, or the application of databases and computer algorithms to biological information, will be among the most important technologies over the next few dec-

ades. It is bioinformatics that underpins the decoding of the human genome. And it is bioinformatics that will enable the development of ultra-targeted pharmaceuticals and third-generation biotech crops. Even without local patent protection, bioinformatics companies have been sprouting in India – relying on the possibility of patenting pharmaceuticals in the US and elsewhere. Ranbaxy Laboratories and Nicholas Piramal have announced initiatives aimed at developing drugs using bioinformatics. Meanwhile, four computer scientists recently announced the formation of a bioinformatics company in Bangalore called Strand Genomics.

These new ventures are exciting, but compared to efforts already underway in the US and elsewhere, they are modest. US companies are already spending about \$20bn a year on bioinformatics – that's four times the total revenue of India's IT sector. As with pharmaceutical research more generally, inadequate patent protection is discouraging investment in the Indian bioinformatics industry.

Recent research suggests that IP protection has net benefits to even the poorest societies (Maskus, 2000).

Solving the problems of poor enforcement of IP

There are several possible solutions to these problems, each with specific advantages and disadvantages. The simplest solution is to bar imports of unlicensed copies of IP-protected goods, enabling the owners of IP to sue firms selling illegal copies. The main advantage of this solution is that it can be implemented domestically without any action by any other country. There are many disadvantages, however. First, it is only a realistic solution if sales of the product are readily observable, which might be the case for products sold through retail outlets in the importing country. In such cases, the IP owner can sue the retailer, wholesaler or importer. However, where products are sold directly to the consumer (for example, via mail order or through the Internet) from manufacturers or retailers in the country of origin, the IP owner has nobody to sue, so merely banning imports of illegal copies will be ineffective. As the number of such sales increases it will become increasingly difficult to enforce patents and copyright without extra protection. The problem is likely to be particularly acute in the field of copyright protection because, as noted above, much copyright material may be distributed electronically in encrypted form across the Internet at very low cost. Second, simply barring imports does not stop the manufacture of unlicensed copies in countries without appropriate IP protection, so reducing the returns on creative/inventive activity and presumably reducing the level of such activity.

An alternative solution is for countries without adequate IP protection voluntarily to implement higher levels of protection. This has the twin merits of being lower-cost than attempting to identify imported unlicensed IP-protected goods and creating better incentives locally. The main drawback is that protectionist interests are likely to slow down the shift towards stronger IP protection. Local industries that currently benefit from the lax protection of intellectual property (such as Brazil's music-copying industry and India's drug-copying industry) are likely to oppose enhanced protection because it will reduce their otherwise illicit profits.

The third solution, and the one that is increasingly favoured, is the elaboration of international treaties on the protection of IP. This process began in the late 19th Century with the Paris and Berne conventions (see Chapter 1) and continued throughout the 20th Century. The early treaties tended to rely upon the mutual benefits of protecting IP for its own sake. Thus copyright on the printed word in particular fared well because nearly every country in the world has aspiring authors. However, where there were protectionist interests lobbying against the introduction of strong IP rights, these countries either didn't sign the agreements or, having signed them, didn't ratify them.

The problem with the early treaties was that they were essentially unenforceable – they were little more than gentlemen's agreements. The solution to this problem? Create an enforceable agreement. In the past, international treaties with bite tended to rely upon the threat of war as an enforcement mechanism. But for war to be a credible threat, it needs to be used occasionally. In the more sophisticated world of the 1980s, war was no longer part of the diplomatic vocabulary and if a

Thai company was stealing MGM's property, the Pentagon wasn't about to send in the B2s. No, the enforcement mechanism of the modern world is the threat of trade sanctions. And the forum for creating legally-permissible trade sanctions was the General Agreement on Tariffs and Trade (GATT), which started a new round in Punta del Este, Uruguay, in 1984. Various IP-based companies successfully lobbied for the inclusion of an agreement on IP protection in the Uruguay Round. The result was the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), which was signed by all the members of the GATT at the conclusion of talks in 1994.

The GATT TRIP

In the GATT, deals are hammered out in a *quid pro quo* fashion. Tariff reduction in the GATT has always been conceptualised in this way, perhaps understandably because the negotiators will have been under strong pressure from vested interests in their countries to maintain tariff barriers. In a way, GATT has provided an excuse for liberal trade ministers to do what they really wanted to do, namely reduce tariffs, which they knew would be economically beneficial to their countries. Likewise, when TRIPs was being negotiated, the *quid pro quo* for poor countries signing up was that tariff and non-tariff barriers to agricultural exports from poor countries would be reduced.⁴ The trade ministers of poor countries probably realised that protection of intellectual property rights was in the long-term best interests of their country regardless of any change in access to rich country markets. Indeed, without access to rich-country markets, intellectual property rights might be even more important because they offer a means – through technological innovation and technology transfer – to escape the mire of agricultural subsistence. However, in order to sell this idea – and get around the propaganda of the producers of bootlegged intellectual property back home – it would be necessary to present it as a victory in some other way. For countries that are predominantly agricultural, greater access to rich country markets obviously offers the potential for significant increases in export earnings and general improvements in earnings from agriculture.

Both developed and developing countries have been slow to fulfil this informal *quid pro quo*. For their part, the developing countries accuse the rich countries of not opening up their agricultural markets quickly enough (Oloko-Onyango and Udagama, 2000). Meanwhile, developed countries have taken action against developing countries for failing to tighten up their intellectual property regimes in accordance with TRIPs.

There is now a growing acceptance of the need to reduce the distortions to agricultural markets in developed countries, which suggests that reform will occur relatively swiftly (Pickard, 2001). Meanwhile, debate over the merits of TRIPs, especially in the context of pharmaceutical product patents, has become very heated, as we discuss in Chapter 4.

The impact of TRIPs

What has TRIPs achieved? First, TRIPs has embraced the national treatment and most-favoured-nation treatment clauses as regards IP. This means that foreign IP holders have the same rights in a signatory country as national IP holders. And all foreign IP holders are treated equally. Second, TRIPs has extended the availability of patent protection to all inventions in all fields of technology. This is important for industries critically dependent on strong IP regimes. For example, before TRIPs was signed in 1994, some 25 developing nations (of the then 98 members of the GATT) excluded pharmaceutical products from patent protection. Third, TRIPs sets a uniform minimum enforcement period for patents of 20 years.

Although not all the provisions in TRIPs have yet been fully implemented, perhaps the most important achievement is the introduction of the WTO multilateral dispute settlement procedure. This is clearly superior to a unilateral threat mechanism such as Section 301 of the American Trade Act (*supra* note 30). There are at least two main benefits. First, the TRIPs enforcement measures provide for effective and binding international obligations both internally and at the border. An associated benefit of multilateralising the dispute-settlement process is that it may prevent arbitrary unilateral actions, not least by the USA. Also, whereas unilateral threats inevitably raise the pro-

spect of abuse by domestic vested-interest groups, this is not so likely under TRIPs. Even though Section 301 and TRIPs are substantially similar, they will be implemented in fundamentally different ways. Disputes arising in the TRIPs context will be resolved by WTO tribunals, whose arbitrators will be drawn from a wide pool of professionals from neutral countries. As a result, it is much less likely that a dispute under TRIPs would merely pander to the whims of local interests. In other words, the rule of law would prevail.

In addition to patents, Article 20 of TRIPs protects trademark owners in signatory countries. National governments cannot impose special requirements that might impair the identifier role of a trademark. Special labelling requirements relating to relative size of a trade or brand name, packaging colour (which might obfuscate the trademark), and so on are prohibited.

TRIPs is still in the early stages of its existence. One major unresolved issue is the definition of patent exhaustion. Another is the patenting potential of biotechnology. There is also ambiguity in respect of certain details of enforcement. For example, Article 42 establishes that countries must have 'fair and equitable procedures' for dealing with infringements of IP. But these words have no generally accepted meaning, are subjective and have yet to be interpreted by legal precedent in the TRIPs arena. The TRIPs Council and the WTO Dispute Settlement Body still have much clarification to do in each of these areas.

A major difficulty, however, remains the perceived unfairness of the negotiations leading up to the TRIPs agreement. That perception has been enhanced by an issue barely discussed at the start of the negotiations in 1984: the HIV/AIDS pandemic and particularly the role of patented and trademarked products in controlling the progression of HIV. This issue is discussed in more detail in Chapter 4.

The clear trade-off in the Uruguay Round was that the developed countries 'got TRIPs' in exchange for granting the developing countries access to rich world markets, particularly for textiles and agricultural products. To the extent that most countries in the developed world have not yet implemented their side of the bargain, it is understandable that trade ministers in the developing world will find it more difficult to persuade their fellow politicians of the urgency of implementing their TRIPs commitments.

The perception that both free trade and TRIPs are a developed-world conspiracy is, of course, only increased by the conflicting messages coming from rich-country NGOs. On the one hand they oppose TRIPs. For example, HealthGAP (an alliance of mostly rich-country NGOs such as Ralph Nader's Consumer Project on Technology and Act UP New York, a gay rights group) argues that TRIPs denies the poor access to life-saving medicines at affordable prices. But on the other hand they argue for trade protectionism by way of non-tariff measures. For example, environmental NGOs (including other Nader-affiliated groups) demand a widening of GATT Article XX to embrace non-product-related production and process methods (such as the methods by which tuna and shrimp are caught). Perhaps the message from this is: NGOs in rich countries no more represent the interests of the people than do the heads of generic pharmaceutical companies in poor countries.

IP and developing countries

In countries without patent protection there are often powerful interests pushing to keep things the way they are. For example, manufacturers of copies of patented chemicals and drugs benefit from being able to sell their compounds without paying any license fees to the patent holder. Furthermore, these firms know that when the patent expires they will have a first-mover advantage in terms of selling on the global market (Lanjouw, 1998). These companies are aided in their lobbying endeavours by other organisations with seemingly less self-interested motives. For example, numerous NGOs have lobbied against the introduction of IP for pharmaceuticals around the world, arguing that the introduction of IP protection would drive up the price of pharmaceuticals. Some groups even argue that it is in the economic interests of a country not to have an IP system.⁵

The combination of self-interested producers of generics and these 'altruistic' NGOs has been a powerful force in discouraging patent protection in many countries. This is unfortunate because

the evidence suggests that patents actually encourage international dissemination of knowledge (Eaton and Kortum, 1996). Maskus (2000) argues that companies will be less likely to engage in joint knowledge-oriented projects with firms in countries without intellectual property protection. Perhaps most importantly however, countries that have weak intellectual property laws are denying themselves the possibility of profiting from the development of new technologies. Since most wealth in the developed world is now based on the creation and dissemination of knowledge, the result is that these countries are denying themselves the opportunity to benefit from a significant part of this wealth – limiting themselves, essentially, to those industries that do not rely on intellectual property rights for the protection of investments in knowledge.

Maskus (2000) estimated the impact of TRIPs on international flows of economic activity. The results are shown in Table 1.

Table 1: Estimates of Impacts of TRIPs patent changes on international flows of economic activity (Millions of 1995 US Dollars)

Country	Net patent rents	Mfg imports	High-tech mfg imports	FDI assets	Unaffiliated royalties and licensing fees
US	5760	233	-3	n.a.	n.a.
Germany	997	2304	-18	-1084	92
Switzerland	28	35	-1	-94	0
Austria	-28	102	-2	-256	2
Ireland	-61	100	-2	-245	13
New Zealand	-68	45	-1	-76	4
Portugal	-110	605	95	89	n.a.
Greece	-149	382	53	47	n.a.
Netherlands	-222	133	-3	-1380	29
Spain	-436	2070	319	-313	43
Japan	-555	918	-21	-2326	719
UK	-684	272	-5	-1257	26
Canada	-1294	754	-12	-2188	63
Panama	0.4	16	n.a.	284	
Israel	-83	30	5	6	0.6
Colombia	-97	2927	479	1093	
South Africa	-143	154	21	23	10
Rep. Korea	-326	2732	588	248	356
Mexico	-562	5749	1519	3182	136
India	-665	1465	146	128	58
Brazil	-1172	3125	627	3219	114
Argentina	n.a.	1150	196	662	59
Bangladesh	n.a.	130	14	n.a.	n.a.
Chile	n.a.	2017	276	975	n.a.
China	n.a.	15379	2585	631	n.a.
Indonesia	n.a.	6628	667	1805	166

Source: Maskus, 2000, p.142

What this table shows starkly are the static costs to most developing countries of implementing stronger patent regimes: there are outflows to patent-holders both directly in the form of licensing and indirectly in the form of imports of manufactured products. These static costs explain much of the reticence shown by developing countries towards implementing TRIPs. Governments tend to have a relatively short time horizon and if all they see are large negative effects, they are not likely to be hugely enthusiastic. However, Maskus (2000) argues that it is unnecessary to have such a gloomy attitude because although there are negative effects there will be offsetting positive effects. He points to research by Gould and Gruben (1996) which shows that countries that combine stronger IP protection with more open trade increase their economic growth rate by approximately 0.66 per cent per year compared to countries that only enhance their IP protection. Let's consider what the net impact might be on India if it combines a more open economy with strengthened IP:

In 2000, Indian GDP at factor cost was US\$229.737bn.⁶ An increase of 0.66% of GDP would amount to US\$1.5bn in the first year. The net static cost of IPR protection (given as the sum of columns 1, 4 and 5 minus columns 2 and 3 in Maskus's table)⁷ is around US\$2.1bn. In other words, in the first year of stronger IP protection India would suffer a loss of around US\$0.6bn. However, in year 2, India would gain around \$2bn – and that gain would increase year by year. Over 30 years, India's net gain in GDP would be around \$46bn. In other words, average income would rise by over 20 per cent.

Conclusion

Globalisation is a good thing: increased trade leads to increased wealth. However, without concomitant improvements in protection of intellectual property, the incentives to produce the knowledge that underlies much of modern wealth creation will be diminished. Rich countries gradually adopted strong IP protection, as IP-based industries in those countries matured to the point of shifting from copiers to innovators. But this process does not seem to be taking place in many poor countries, especially in the context of pharmaceutical products. As trade barriers fall, the adverse consequences of having bootleg industries in poor countries increases.

There are likely to be long-term benefits for developing countries that offer stronger protection to intellectual property rights. Adopting a patent system may help to promote technology transfer through licensing agreements. It may also encourage product development as opposed to reverse engineering in domestic industries. Technology transfer may have spillover effects onto other domestic industries. Furthermore, a strong patent system may help to encourage foreign investment. Innovation by multinationals to serve local needs (e.g. developing of drugs to combat tropical diseases) may also be spurred by the protection which is conferred by the patent system (Lanjouw, 1998). Of course the extent to which these benefits can be realised may depend on factors such as the level of skills of locals. But the existence of intellectual property protection is likely to improve this situation too, as companies will have incentives to train people both directly, on the job, and indirectly by sponsoring people through college courses. Moreover, people who acquire skills are less likely to leave the country if there are jobs in the local industry.

The benefits of IP protection to developing countries will take some time to come through, while the costs (in terms of higher prices pharmaceuticals) will be felt immediately. In principle, the opening up of developed country markets to agricultural products and textiles that was agreed as a *quid pro quo* for TRIPs would be such a boon to developing countries that it would far outweigh these short-term negative effects. But developed countries must play their part in this by opening up their markets. Since this is in the interests of the people of the developed world (who will benefit from lower-priced goods and increased economic growth), it should be feasible. But the vested interests are again combining their forces with apparently 'altruistic' groups to oppose the removal of trade barriers. Labour groups, farmers, textile manufacturers and environmental groups line up in support of restrictions on more open trade, often in willing concert with each other.

1 For a brief history of the Rolex brand, see www.rolex.com.

2 <http://www.corpwatch.org/trac/corner/worldnews/other/193.html>, accessed 22-8-01.

3 There are now several technologies which enable IP owners to identify illegal sharing of their products across networks.

4 In addition developing countries were also threatened with a 'stick' in the form of Section 301 of the American Trade Act of 1974. Section 301 was introduced in 1984 (the year the Uruguay Round of trade negotiations began) and identifies annually foreign countries that deny adequate and effective protection to IPs. There are 3 categories of such countries – in order these are: Watch, Priority Watch and Priority Foreign countries. Countries on these lists which refuse to protect IPs can be subject to pressures ranging from persuasion to sanctions.

- 5 For example, in a country where a patent system exists, domestic production of the product would either be undertaken by a subsidiary of the patentee firm or by a local firm under licence from the patentee firm, so profits and/or royalties would be repatriated abroad. Alternatively, production would take place abroad and the product would be imported into the country. Either way, countries in which firms tend to imitate rather than innovate would therefore appear to have less to gain and more to lose from a patent system. Of course this is a very short-term perspective, since it presumes that the existence of a patent system will not stimulate the creation of patents and shift the economy away from imitation. One of the reasons firms in countries without patent systems tend to imitate rather than innovate is that they do not have adequate means of protecting their innovations, so rather than risking capital on innovating they choose the lower-cost route of imitation. Even so, people from countries with inadequate patent systems still innovate – but they tend to patent their inventions overseas (Edelman, 2001).
- 6 From <http://www.indiainfoline.com/econ/andb/nia/nia3.html>, which gave GDP as 10818.3bn Rp; using the current exchange rate as of 28-8-01 (47.1 Rp/\$ according to www.oanda.com), that gives US\$279bn.
- 7 Of course this estimate has wide bounds, but it is useful for purposes of demonstration: even if the net static cost is twice that figure (which is unlikely), the dynamic benefits still make IP protection worthwhile.

5 The development trilemma: Patents, price discrimination and parallel imports

As we noted in Chapter 2, development requires at least the protection of private property and application of the rule of law. Yet even these minimal requirements are lacking in many developing countries. Perhaps under such circumstances it seems rather irrelevant to discuss the protection of intellectual property. After all, if the average citizen is unable to protect even his or her own land or to enforce contracts in a court of law, what use is some hypothetical ability to protect intellectual property? Actually, it turns out to be quite a lot of use. A recent survey found that many inventors from developing countries patent their inventions in the US (Edelman, 2001). This suggests that there is considerable latent demand for patent protection in developing countries. If those countries had a cheap, reliable system of patent protection, it seems reasonable to suppose that this demand might be galvanised into more invention. The benefits for the wider community in developing countries are twofold: a more vibrant local industry and products that are more relevant to the desires of the local people.

Moreover, with better patent protection, innovators from outside would be encouraged to engage in joint projects. Rather than surviving on the leftovers from the R&D of developed countries, producing chemicals and pharmaceuticals invented by others, firms in developing countries would become the inventors and legitimate partners of developed-country inventors, engaging in complementary research and development

Countries such as Brazil have, not least in their hinterlands, large numbers of as-yet-unscreened plants, vegetables and other sources of substances that may have therapeutic potential. There are stocks of untapped knowledge about some of these substances existing in oral folklore and the minds of ‘traditional healers’. Yet without incentives to capitalise on these assets they may remain untapped or – particularly oral and folk traditions – be lost altogether if the small, localised and often tribal communities in which they are embedded become submerged in the larger, anonymous nation-state.

Another example is South Africa, which has similar potential coupled with existing and large clinical-research assets, both in terms of physical and human capital. For decades, pharmaceutical firms have carried out disproportionate amounts of clinical-trial activity there. The country has a large tertiary medical sector and clinical access to both first and third world diseases.

Yet another country with complementary R&D potential is India. Sharing some of the characteristics of Brazil and South Africa, it has also a large, sophisticated and well-developed manufacturing sector that could readily exploit chemical and pharmaceutical inventions and discoveries.

In sum, in those developing countries which currently have industries that copy foreign IP without payment of royalties, stronger protection of IP would lead to a larger research-and-development-based local industry, which in turn would lead to economic growth.

But critics argue that introducing stronger IP protection in developing countries, as with IP in developed countries, is likely to lead to higher prices for those products that are protected. The concern is heightened by the importance of some of those products to people in developing countries. Specifically, of course, we are referring to the drugs used to combat deadly diseases such as malaria and AIDS. However, the reality is that if patent holders are able to price-discriminate they will be willing to sell those drugs at whatever price the buyers are willing to pay – as long as their costs are covered. Moreover, as we have noted above, potential inventors without patent protection have less incentive to develop their ideas.

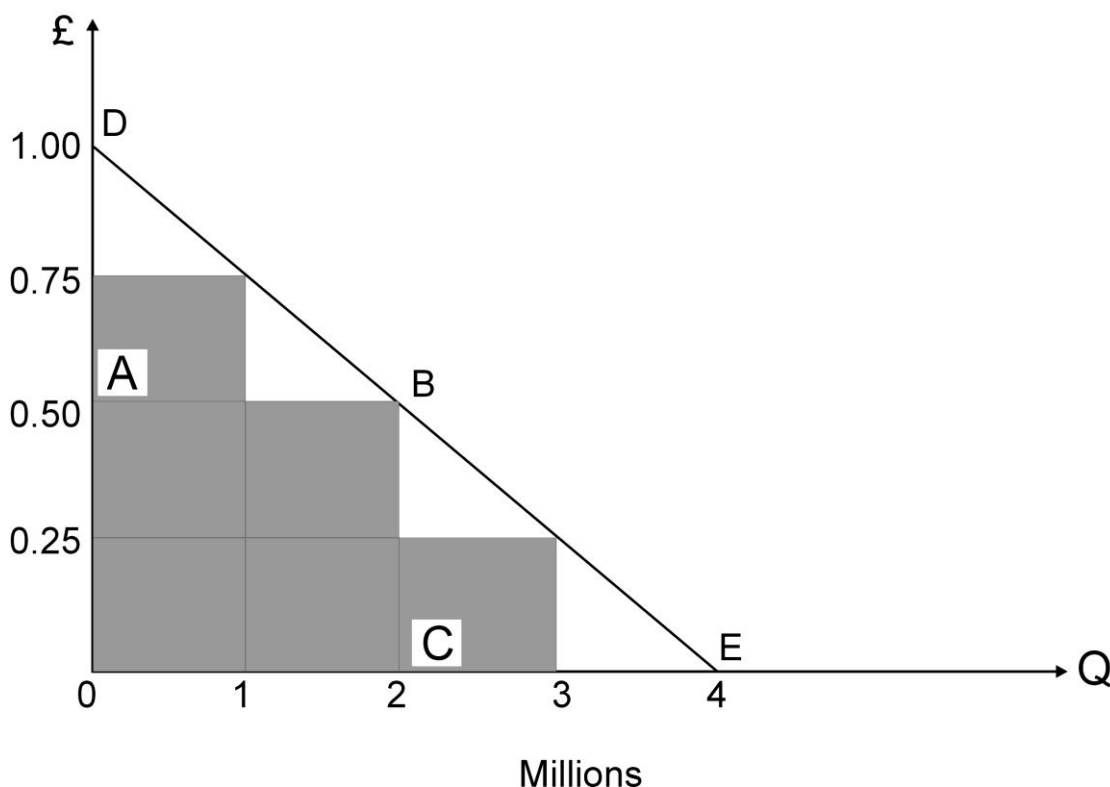
Price discrimination

But what is this ability to price-discriminate? The word is technical and has no pejorative meaning. It simply indicates that a product is being sold at different (non-marginal-cost-related) prices. It can

be justified on welfare grounds in that it enables firms to offer products at prices that otherwise they would not offer. If a firm is unable to price-discriminate it will set only one price – and that is likely to be higher than the price that many consumers would be willing to pay. Price discrimination is economically desirable where marginal production costs are very low (as in pharmaceuticals) or close to zero (as in the provision of a service such as the ability to cross a river on an already-constructed bridge).

The economic impact of price discrimination can be seen in Figure 1 below. DE represents the demand curve for a medicine. Assume zero marginal production cost. There are three different market segments with differing levels of willingness or ability to pay. These different segments each have the same volume potential of, say, a million units. The profit-maximising price and output level for the firm is to sell 2Q units at 0.5 pounds per unit. Sales and profits (since there are no costs) would be equal to the area ABCO and, provided this area exceeded the expected innovative costs of product development, the firm would conduct the R&D and produce and sell the product as described.

Figure 1



Consumers would also receive, ‘free’ as it were, welfare benefits equal to the so-called “consumers’ surplus” triangle ABD.

There are two welfare defects in this situation, however. First, if the innovative costs exceed ABCO (i.e. 1 million pounds) the product would not be developed at all despite the fact that, at output level C, total welfare (producers’ revenue plus consumers’ surplus) equals ODBC, i.e. 1.5 million pounds. Second, total possible gross consumer welfare is not restricted to ODBC but is equal to the whole area under the demand curve – ODE, i.e. 2 million pounds.

A single uniform price of 0.5 results in a ‘deadweight-loss’ of BCE. But no firm will produce 3 million units to avoid this. To sell these extra units it would have to reduce price to 0.25 and achieve a resulting income of only 0.75 million. The firm *would* invest up to 2 million pounds in R&D, however, if it could practice price discrimination. This is because, say, it would sell 1 million

units to the least price-sensitive segment at 0.75; a similar number to the next segment at 0.5; and another 1 million units at 0.25 to the most price-conscious market. It would then earn revenues equal to the shaded area in the figure – a number approaching 2 million pounds.

In short, price discrimination enables the firm to service people who otherwise could not afford to purchase; it enables it to expand its output beyond the physical level it would select if limited to choosing a uniform, profit-maximising price; and since the discriminatory alternative is more profitable, it brings into the firm's choice-set R&D projects which it would otherwise not consider.

The Office of Fair Trading (1999, para 4.15) describes the process as follows:

There are many areas of business where (price discrimination) is a usual and legitimate commercial practice. For example ... in industries where there are large fixed costs and low marginal costs (the cost of supplying each additional unit of output is very small compared to the initial investment to set up the business). In most markets, undertakings are normally expected to set prices equal to their marginal cost but in industries with high fixed costs an undertaking which did so might never be able to recover its fixed costs. It may therefore be more efficient to set higher prices to customers with a higher willingness to pay. In general, price discrimination will not be an abuse in such industries if it leads to higher levels of output than an undertaking could achieve by charging every customer the same price.

Price discrimination thus benefits all. Poorer people less able or unable to pay the normal, uniform profit-maximising price gain access they otherwise would not. Today's medicines, for example, can be made available more cheaply. Producers reap greater profits to incentivise further research to develop tomorrow's medicines more quickly. And a portion of these additional profits comes from the better-off who have the most obvious revealed desire to purchase innovations (as indicated by their willingness to pay) and who tend (sometimes, but not always), to have altruistic feelings towards the poor and less privileged.

The ability to practice price discrimination depends, of course, on the ability to preserve market segments as distinct markets. This requires, in innovative markets, the presence of a degree of exclusivity – either in the form of patents or other forms of IP. In our simple example, with zero marginal costs, competition would drive the price to zero in each segment if there was no intellectual-property protection.

By extension, the ability to practice discriminatory pricing also depends on lack of arbitrage or leakage between segments. The firm can only charge the different prices in the segments if it is not possible for a third party to come along and buy cheap in the one segment, and sell dear in another ('sell dear' certainly, but at a lower price than the existing firm is currently charging).

So the truth of the matter is that patent protection combined with price discrimination enables higher rates of economic development through research-and-development-based industry, as well as low priced essential medicines.

Ideally, companies would be able to segment markets precisely according to each individual's willingness to pay. In practice the costs of attempting such segmentation would be prohibitive, so simpler solutions are employed. These typically entail segmenting markets by country and then segmenting each country according to several categories, such as private buyers, corporate purchasers, charitable purchasers and government purchasers. But the twist in the tail is the threat of parallel imports, which would undermine the ability to segment markets by country.

Preventing parallel imports

Parallel trade is the exporting or importing of a product through channels other than those authorised by the owner of intellectual property. Thus parallel trade occurs even if no compulsory license is granted in the country of importation but imports continue notwithstanding. One remedy open to the patentee is then to ask government in the importing country to enforce the patent in the import market.

Another remedy, but less clear-cut, is for the patentee in the exporting country (often the same, or an associated firm to the one being commercially damaged by the imports) to challenge the right of the exporter to resell to the importing country (the exporter having presumably obtained legitimate legal title to the goods through purchase, for example, in the exporting country.) This involves challenging the belief that the product, if legally acquired by the exporter in the country of origin, can be legally resold in the importing nation. This belief, that international resale is everywhere and always legitimate, is the doctrine of international patent exhaustion.

And here the TRIPs agreement is of no assistance. Article 6 of TRIPs states that for “the purpose of dispute settlement...nothing in this Agreement shall be used to address the exhaustion of intellectual property rights”.

The issue is contentious and unresolved. Some argue that parallel importation is a normal competitive practice arbitrating away price differentials. Governments in importing countries should therefore ignore the practice. They argue that local laws, in either the importing or exporting nation, which deny the principle of exhaustion are equivalent to protectionist trade barriers. In support of this argument, the “first-sale doctrine” can be used. That is, once ownership has been transferred, the patentee has already received full value for the patent. Resale is then no concern of the patentee. The patentee has “alienated” or “exhausted” his exclusive rights to control product distribution once he has placed it in the main stream of commerce.

Legally a counter-argument is made that Article 28 of TRIPs specifically recognises the right of a patentee to prevent unauthorised sale of both domestically produced and imported versions of their products. A bar on parallel imports of identical products acquired from a sister company is simply a logical application of the patentee’s right to be the exclusive importer or domestic producer.

But the question that interests us is not so much the legal argument against parallel trade but rather the economic arguments for and against it: under what conditions should such trade should be permitted and under what conditions should it not? For example, we know that much of the sound and fury surrounding the debate on parallel trade of medicines within the EU is misplaced. The arbitrage process there – intra-EU trading – is due in the first instance to artificially-induced price differences brought about by varying national price-control regimes existing side-by-side within a legally-defined, single international market.

Parallel trade within the EU is thus easy to explain, although not necessarily to condone. It is perverse to have differing price controls within one (allegedly single European) market. It is the individual controls resulting from member states each wishing to direct their own individual social and health policies which are the problem, not the pricing behaviour of the manufacturers, nor the marketing behaviour of the wholesalers doing the international trading. The economist’s view then is not to condemn parallel trade within Europe, but to condemn the price controls that give rise to the arbitrage possibilities. These price controls have nothing to do with the price discrimination and intellectual property issues with which this paper is concerned.

Parallel importation or trade in the rest of the world is more problematic. Most countries are indeed economically segmented one from the other in a way not found in the politically-determined, so-called common market of the EU. The market conditions that affect price determination do indeed vary between non-EU countries. But, and this can apply to European markets also, it can be difficult to understand at first sight that market conditions can also vary within countries.

In South Africa, for example, the government is essentially a “monopsony” (single) purchaser for the bulk of the market (some 66% by volume). Patent-holders practice price discrimination within the total national market in order to recover the proportion of development overheads attributable to the whole mainly from the much wealthier private market alone. Only the presence of patent protection, backed by Article 28 of TRIPs and coupled with the identifiability of more than one market segment (government and private) with differing price sensitivities, enables this to be done. In short, absence of parallel importation, coupled with patent protection, facilitates disproportionately large purchases by government on behalf of poorer members of the population.

One example of successful price discrimination of this sort is for bronchodilators. The public sector benefits quite clearly from domestic price discrimination. About 80 percent of South Africa's population relies on (mostly unpriced) care through the government sector, while the remaining 20 percent relies on a private-sector system much like that of the United States. The price discrimination between these sectors works to the advantage of low-income patients. Prices are higher in the low-volume private sector and lower in the high-volume public sector. Government purchases account for 66 percent of industry volume but only 33 percent of revenues, while the private sector generates volumes and values of turnover in a reversal of these proportions. For example, for the asthma inhalant Ventolin the South African private sector pays 28.99 rands while the state sector pays 5.66 rands. The world average price is 22.86 rands. (Reekie, 2000).

This system, which has grown up over the years in middle-income countries such as South Africa, depends on patent protection, absence of illegal imitation, and absence of parallel importation from countries where third parties can buy and import to the higher price segments from abroad. In the EU context it means removal of differentiated national price controls (given that movement of goods is free within the EU area and hence WTO obligations are met). In other countries, it requires enforcement of TRIPs and application of non-exhaustion of patent protection at the international level.

So there we have an example of how patents, properly protected from parallel imports, can help alleviate poverty. But that trilemma is not always so easily resolved.

AIDS in Africa

South Africa is mired in a health crisis: the rate of HIV infection is approaching 22 percent of adults, including more than one in five pregnant women; UNAIDS estimates that some 500 000 AIDS-related deaths have already occurred; the current annual toll of 200 000 represents 40% of all deaths; it is expected to peak at 600 000 by 2006. Yet for political reasons AIDS is not a notifiable disease, so these figures are open to dispute. Nevertheless, that the problem is enormous seems now to be generally accepted. At the end of 1992, 4.2 million South Africans were HIV-positive; more than in any other country.

What can be done? The most effective therapy yet developed against HIV is a cocktail of three drugs, each of which acts in different ways. But triple drug therapy is far from an ideal solution. It requires a regimen of between 3 and 20 pills per day, for life. Failure to stick to the regimen leads to resistance. Long-term, it has serious side effects, including liver failure, kidney failure, nausea, diarrhoea and a body-distorting redistribution of fat. That means the incentive to stop the therapy is great. Plus, resistance eventually catches up with most people, which means that if you have HIV the chances are you will still die of AIDS. Unless, that is, new medications can be produced.

But most people in South Africa do not have access to triple-drug therapy. Most don't have access to any drug therapy. And this situation is not likely soon to be remedied by the government. For one thing, total spending by government on health is actually budgeted to decrease by 2003/04: from 11.1% to 10.8% of total government expenditures. But even if the government increased its spending on drugs, it would still have to get the drugs to the people who need them and ensure that the drugs were taken correctly. Clearly the private sector and/or foreign governments are going to have to play a role here.

Providing drugs to combat HIV:

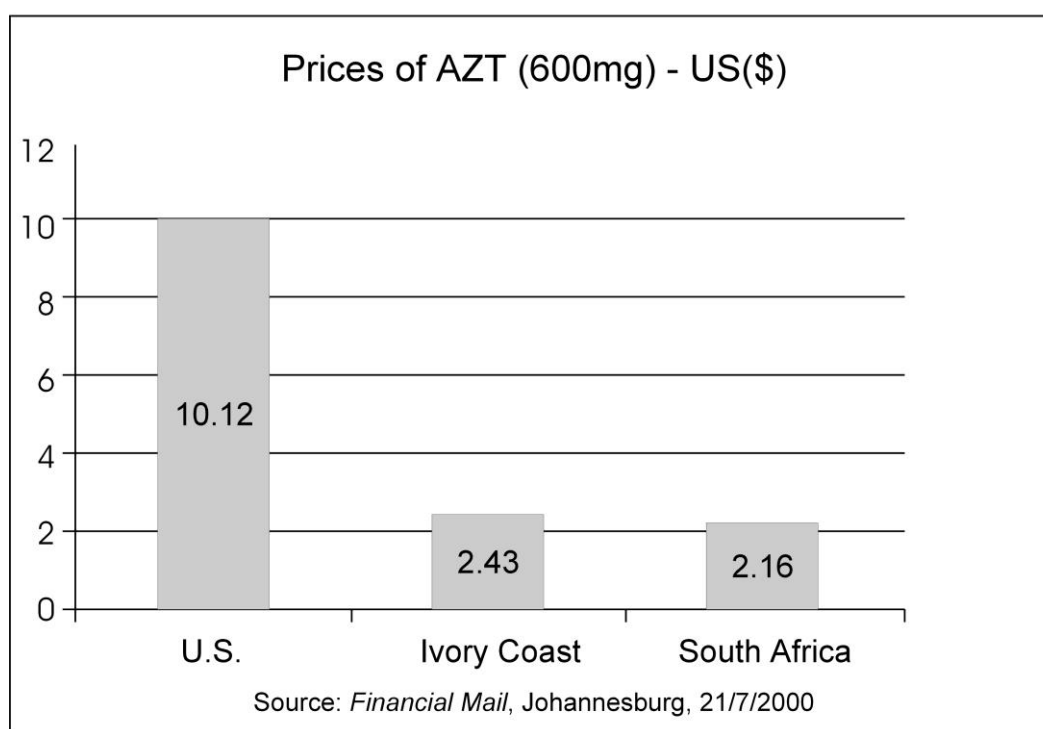
The role of price discrimination and donations

One way to ensure low-cost provision of drugs is to ensure that pharmaceutical companies are able effectively to price-discriminate. Spontaneous price discrimination stems from enlightened self-interest but is often misunderstood against the emotional backdrop of a health crisis on the scale of the South African AIDS epidemic.

In recent months the South African government and NGOs such as the Treatment Action Campaign have accused AIDS drug manufacturers of price-gouging. In truth, South Africans already pay some of the lowest prices found anywhere in the world. And, within South Africa, public-sector drug prices are a fraction of those the private sector pays. Moreover, in many ways the nation's government is exacerbating the crisis by threatening price controls and permitting a pharmacy "cartel" that keeps retail drug prices far above competitive levels (Reekie, 1997).

South Africa not only benefits from domestic, but also from international, price discrimination (see Figure 2). South African prices for AIDS drugs are already well below those in the United States and other developed countries. For example, while US consumers pay \$10.12 for AZT, the South African government pays \$2.16 (albeit for policy reasons the quantities purchased by government at that price are tiny). For Didanosine the US:SA price differential is \$7.25 vs \$2.80. South Africa also pays less for both drugs than the Ivory Coast, another sub-Saharan country: \$3.48 vs. \$2.80 for Didanosine, and \$2.43 vs. \$2.16 for AZT (Reekie, 2000).¹

Figure 2



Even at these prices the South African government cannot afford to treat more than a fraction of all those affected with AIDS. In response, pharmaceutical companies have offered to reduce their prices or even give away their drugs as long as the medications are distributed in a controlled manner.

However the SA government has until very recently refused or been ambivalent about accepting gifts of AIDS drugs from drug companies, arguing that accepting the donations would divert resources from other disease areas. The SA Health Minister stated that even if anti-AIDS drugs were available at marginal cost the Department could not afford the delivery mechanisms, testing procedures and medications for maintenance of these lives "saved" (*The Citizen*, Johannesburg, May 2000).

Glaxo Wellcome (now GSK) offered the drug "Retrovir", which lowers mother-to-child transmission of HIV, at a preferential price and also offered several thousand treatments free of charge. Bristol-Myers Squibb has committed \$100 million to women and children with HIV/AIDS in five Southern Africa countries including South Africa. Pfizer and Boehringer Ingelheim (Germany) also offered to donate AIDS medications. These and several other similar offers were rebuffed

by the government. The reasons, for example, were that the Boehringer offer was “only” for five years and Pfizer’s offer had a “time limit”.

These actions raised the question of whether the government has either the power or the will to treat AIDS. President Mbeki’s prolonged period of policy uncertainty about the linkages between AIDS and HIV were certainly puzzling to many. And of course it has been policy over the past several years for the public sector to expand primary care and cut back on expensive curative or palliative medicine. AIDS is apparently no exception.

As a corollary, the growing AIDS epidemic in sub-Saharan Africa could be worsened by giving the medications in areas with inadequate health-care infrastructure to monitor precise distribution and dosage. There are dangers in indiscriminate distribution of HIV/AIDS drugs. The US Centre for Disease Control (CDC) recently found that 75 percent of participants in the United Nations AIDS program in Uganda had drug-resistant HIV strains. By contrast, in the US – with good monitoring – only about 10 percent of patients harbour HIV strains resistant to AZT. If the drugs are dumped into an unsupervised setting in Africa without vigilant monitoring, virulent, drug-resistant strains of HIV could emerge to threaten AIDS patients worldwide.

There are, however, other ways to practise price discrimination, involving private sector buyers rather than government. Several drug firms in South Africa now offer their anti-AIDS medicines to large employers such as the mining houses. These firms can purchase drugs at price levels close to those offered to – and often rejected by – government. They have large labour forces at high levels of risk. They also have the clinical infrastructure to monitor and administer medicine consumption. They have the incentive to minimise their health care costs as employers. And of course this incentive includes the avoided indirect cost of losing labour through illness or death, with ensuing recruitment and training costs.

Selling at rock-bottom prices to large employers avoids the problem of undesirable arbitrage and clinical misuse of medicines. There is no reason, after all, why individual South Africans of an income or wealth level equal to that of rich Europeans or Americans should pay substantially less for medicines than they do (unless the costs of managing the price differences exceed the benefits). And it is only the largest employers who have the necessary medical infrastructure.

Controls on supply of medicines are also necessary in order to prevent parallel importing. And that highlights the trilemma that has existed in South Africa for the last several years.

The Medicines and Related Substances Act

Under the *Medicines and Related Substances Act*, passed in 1997, the Minister of Health was empowered to authorise the importation of particular branded products sourced overseas without the authorisation of the holder of the South African patent and/or trademark. A legal battle ensued until April 2001 as to the meaning of the wording of the Act. The international and local pharmaceutical industries challenged the validity of the Act and only after 4 years of debate was that challenge withdrawn.

The essence of the debate centred around two key questions. First, whether the Act merely endorsed the right of government to over-rule IP protection in states of national emergency (a right which exists elsewhere in the country’s legal framework), or whether it had more general application. Secondly, whether the Act refers to compulsory licensing or to parallel importation. If the Act refers to compulsory licensing then that also is provided for elsewhere in the country’s legislation. The *Patents Act* provides for the issuing of such a license on a case-by-case basis. Indeed, earlier this year Cipla, India’s third largest pharmaceutical manufacturer, asked the patent authorities for permission to supply the country with eight low-cost generic copies of patented antiretroviral drugs.² The request for the compulsory licenses was made on the grounds of ‘patent abuse’ and patent holders’ failure to supply the relevant products on ‘reasonable terms’.

In the eyes of the pharmaceutical industry, the contentious Act was redundant as far as states of emergency or compulsory licensing were concerned, so industry opposed it. Industry also opposed the Act on the grounds that it could be interpreted as permitting parallel importation of pa-

tented products purchased more cheaply elsewhere and resold into South Africa. Commercially this was not a major issue for the industry - since, as already pointed out, the bulk of the drugs sold in the country, including AIDS medications, are already sold at world-best prices. Why then the long-standing battle and sound and fury from the Pretoria court-room which echoed round the world?

The answer comes from the power of precedent. If the disputed Act refers to parallel importation and is implemented then a TRIPs signatory (South Africa), while ostensibly recognising its IP obligations under Article 28, would explicitly be drawing on the failure of Article 6 to define what is meant by patent exhaustion. South Africa's argument would be that after initial sale by a patentee, the rights of the patentee are exhausted. If that view were to be upheld then international price discrimination would become almost impossible to practice. Other countries would follow the South African precedent.

If it became impossible to practice price discrimination, then there would be uniform prices worldwide. The actual price level would fall somewhere between the 'perfectly competitive' price (where profits are close to zero) and the monopolistic price. In both cases the funds available for R&D would be significantly reduced; in the first case they would be close to zero; in the second the loss would depend on how far the uniform price level was below the maximum price that could be changed under a discriminatory pricing regime. In the former case, poor people would pay approximately the same as under a discriminatory price system, but rich people would pay considerably less. In the latter case, the price would be higher than what the poor would pay under price discrimination, but lower than what the rich pay. It seems difficult to avoid the conclusion that either way the outcome would be uniformly bad for the poor of the world but that the rich might not do too badly, especially from the second scenario (prices fall but not enough to undermine all R&D expenditure).

The South African case was therefore crucial not only for the pharmaceutical industry but for all of us who depend on it for the flow of future innovations.

The outcome of industry's withdrawal from the case in April 2001 depends now on the construction of the regulations and the evolution of practice that will now flow from what is regarded (by government also) as an imperfectly drafted Act. Certainly government intends to stick to its TRIPs obligations. But these are ambiguous.

But why did the SA government fight so hard if it had little to gain in terms of prices paid? One can only speculate. But possible reasons include the policy ambivalence of the President, who doubted the HIV:AIDS linkage. There was a long-standing lack of trust between the industry and the Health Department (which culminated in a successful appeal to the ombudsman, the Public Protector, by industry claiming that the then Minister, Dr Zuma, had made several 'misleading statements' about industry pricing policies). Thirdly, government was aware that it could not finance the delivery and monitoring of clinical delivery and patient compliance even if medications were made available at zero cost. The industry was useful in diverting public attention from an inability to deliver.

Promoting access and technologies for the developing world

Products and prices

There are problems in marketing antiretroviral drugs for use with HIV/AIDS in poor countries. But at least the medicines are there and research continues. The R & D continues, of course, because there is a market in richer nations. Biotechnological research into improving plant productivity, resistance to disease and to pests also proceeds apace – because there is a market in richer nations. The poor may benefit, certainly, but transferring the technology does have its problems. Let us look first at access to products, and second at access to technologies.

Access to products is to a large extent a function of the prices at which those products may be sold. If the prices available in all segments of the market are insufficient to cover the costs of inno-

vation, then while we may get today's medicines more cheaply, we may not get tomorrow's medicines at all. There are three main groups of pricing proposals available for debate:

1. Compulsory licensing combined with international patent exhaustion and hence parallel importation (this policy is typified by *Medicins sans Frontieres'* Campaign for Access to Essential Medicines);³
2. 'tiered pricing' (as defined by, for example, Oxfam);⁴ and
3. discriminatory pricing.

The spontaneous and free application of discriminatory pricing made possible by patent protection in the absence of parallel importation has been the subject of the discussion in the previous few pages. "Tiered pricing" may appear to present a middle way. The Oxfam document defines tiered pricing. It involves a system or systems where countries or groups of countries call for tenders for medicines for use in their state health-care agencies. To avoid reimportation of the medicines so purchased into markets in richer countries, differential packaging or formulations would be encouraged. Rich-country copyright laws or regulatory agencies could then be used to prevent parallel importation.

Superficially this merely sounds like a planned alternative to spontaneous, market-driven price discrimination. But what are the differences? Tiered pricing would impose uniformity across countries in pricing and in product availability (only products called for on tender would be available). Spontaneous discrimination allows for different prices between richer and poorer patients within any one country – according to the health-care-provision system chosen by the patient. And it allows for a choice of products within and between countries. If groups of countries are involved, then national health care policies are also subordinated to the group, just as individual patient and doctor choices would be diminished if the system were country-specific. South Africa is a good example of spontaneous discrimination. All therapies are available, and for the poor the state sector can provide at world-best prices, while in the richer private sector downward price pressures are exerted by insurers. Various competitive methods exist. These range from total freedom of choice by patient and prescriber to restricted but voluntarily-adopted formularies or insurance cost-containment schemes such as limits, coinsurance and copayments.

A tiered pricing system precludes such operational flexibility and would be cumbersome and insensitive to demand-side variations by time or place. Private tendering and negotiation between patients (and their agents, such as insurers, doctors, hospitals and local health administrators) is more likely to be equitable between richer and poorer patients, and will avoid the political gridlock which can occur about which therapies to 'allow' for tender and which to preclude for the country or countries in the tiered price system.

And, of course, spontaneous price discrimination depends on the international legal framework of patents. A tiered price system would overthrow the value of patent protection – since there would be no sales of patented products to protect for those products which did not make it into the list of products for which tenders were called.

What of compulsory licensing? Article 31 of TRIPs sets out a number of constraints on its use. In addition, of particular importance to pharmaceuticals is Article 27.1. It talks of patent rights as "enjoyable without discrimination as to the place of the invention, the field of technology and whether products are imported or locally produced".

This effectively bans the granting by national patent authorities of compulsory licenses for local manufacturers where requirements for local sale can be met by imports (ie. the patent is being "worked", even if there is no local manufacture).

Most national governments agree with this interpretation of Article 27.1 although failure to so agree lay at the heart of the Brazilian complaint to the WTO Dispute Resolution Procedure. Article 68 of the Brazilian patent law requires patent holders to manufacture locally, in default of which compulsory licenses may be awarded.

The US Trade Representative, Robert Zolleic, wrote in his 2001 “Special 301 Report” that “Article 68 is unrelated to health or access to drugs, but instead is discriminating against all imported products in favour of locally produced products. In short, Article 68 is a protectionist measure intended to create jobs for Brazilian nationals”.

This criticism was rejected by the Brazilian Health Ministry. But at the WHO Annual Assembly in Geneva on 21 May 2001 the Brazilians failed to gain support from others. They had to continue arguing their case in front of the WTO Dispute Resolution Panel on their own.

The Brazilian and South African cases are thus threatening – even if only at the margin – the minimum standards of patent protection mandated by TRIPs. To avoid further erosion, legal clarity and stronger levels of international consensus are obviously required.

Meantime, as legal contention continues, participants in the debate need better to understand the economic and social benefits of spontaneity in price discrimination.

Technologies

Next we look at access to technologies for the developing countries. The problem is that the benefits are often incidental and haphazard - they spill over as a consequence of developed world demand. How then can R & D be targeted at the distinctive challenges that face poor countries?⁵

Public-private partnerships

One solution is to have public-private partnerships. These rely on the incentives of private partners (who are acting out of goodwill) to boost their reputation in order to invest in the right technologies.

One such example is the development of ‘Golden Rice’, which has higher levels of Vitamin A. Many millions of people in developing countries suffer from Vitamin A deficiency, which can cause blindness and even death. The main cause of the deficiency is the impoverished diet on which the people live. So it was thought that if the main staple of that diet, rice, could be enhanced to express a gene that would produce naturally higher levels of Vitamin A, then the incidence of Vitamin A deficiency might be reduced. Golden Rice was developed in Zurich by Ingo Potrykus and Peter Beyer. Their work was supported by the Rockefeller Foundation, the Swiss Federal Institute of Technology and the EU – in partnership with Zeneca. Because of this partnership, Zeneca was entitled to IP rights in Golden Rice. In addition, Monsanto holds IP rights in some of the technologies involved in developing the rice. Realising the humanitarian and public relations implications of golden rice, Zeneca agreed to waive its rights for non-commercial use, in return for which it received an exclusive license for commercial applications. Meanwhile, Monsanto simply donated its intellectual property.

The benefit of public-private partnerships over standard forms of government investment is that the private partner has an incentive to ensure that the product is developed in an efficient manner and in fact does something that society perceives to be valuable. In other words, the private partner acts as a check on untrammelled government corruption and incompetence.

Guaranteed public procurement

Another way of stimulating the development of new drugs for developing countries is for government or private-sector charities to offer a pre-commitment to purchase drugs. Such an idea was proposed by Jeffrey Sachs of Harvard University, who wrote in the *Economist* (24th August 1999):

Recent advances in biotechnology, including mapping the genome of the malaria parasite, point to a possible malaria vaccine. One would think that this would be high on the agendas of both the international community and private pharmaceutical firms. It is not. A Wellcome Trust study a few years ago found that only around \$80m a year was spent on malaria research, and only a small fraction of that on vaccines.

The big vaccine producers, such as Merck, Rhône-Poulenc’s Pasteur-Mérieux-Connaught and SmithKline Beecham, have much of the in-house science but not the bottom-line motiva-

tion. They strongly believe that there is no market in malaria. Even if they spend the hundreds of millions, or perhaps billions, of dollars to do the R & D and come up with an effective vaccine, they believe, with reason, that their product would just be grabbed by international agencies or private-sector copycats. The hijackers will argue, plausibly, that the poor deserve to have the vaccine at low prices – enough to cover production costs but not the preceding R & D expenditures.

The malaria problem reflects, in microcosm, a vast range of problems facing the HIPCS in health, agriculture and environmental management.

The solution Sachs proposed in 1999 was to change the latent demand of poor countries into effective demand. To do this, rich countries could guarantee a selling price to innovators for designated new products – say malaria vaccines – that fulfil a particular scientific protocol. Poor countries could be asked to contribute some proportion of that selling price. A commercial market would thus be guaranteed for the innovator, providing research incentives but requiring no outlay by governments until the discoveries were available.

Sachs argues “there is no escape” from this private-public cooperation and that the World Health Organisation (WHO) and Food and Agricultural Organisation (FAO), both arms of the United Nations, should be lead players in putting his proposals into practice.

The questions, of course, remain. The incentives would fall into place for researchers, certainly. But what would be the cost in terms of diverted scientific resources? What discoveries would be foregone? Discoveries in health and biotechnology are not necessarily of use only to developed or non-developed nations. But priority-setting by outside agencies might result in R & D being only directed at the needs of one type of country. Project choice might reflect the preferences of bureaucrats rather than those on the ground. And there is something paradoxical about non-profit-motivated bureaucrats determining *ex ante* what consumers in poor countries allegedly want at the end of, say, a ten-year R & D period. Nevertheless, Sachs concludes, “the global regime of intellectual property rights requires a new look”.

- 1 The former price is the UNAIDS-negotiated figure for Ivory Coast; the latter is the tender price made to win the small South African government purchase order.
- 2 *Wall Street Journal*, 9/3/2001.
- 3 See “Recommendations to the European Commission for Discussion at the June 2001 TRIPs Council on Health and Access to Medicines,” Paris: MSF, 27 May 2001.
- 4 See “Tiered Pricing and Access to Medicines: Some Critical Questions”, Oxford: Oxfam, May 2001.
- 5 Of course, this begs the question as to the opportunity cost. Redirecting scientific and technological efforts to distinctively developing-world problems means less will be directed at rich world market demands.

6 The future of intellectual property

The number of patents issued in the US has increased over the past decade and this may reflect an increase in the pace of technological innovation. However, there is reason to be cautious about the prospects for this to continue. As this paper has shown, the patent system is now under threat from a combination of vested interests, such as the manufacturers of generic pharmaceuticals, and from ‘altruistic’ groups of NGOs.

In addition, new technological innovations pose their own challenges to the current system of intellectual property rights. In this final chapter we briefly survey some of the arguments that have been proposed in the context of these new technologies.

Electronic searches

Patents have always required disclosure. However, discovering what patents had in fact been registered was never costless. Resources were used in time-consuming searches of the records. Since the advent of the Internet, however, the records of the United States Patent and Trademark Office can be searched with little effort from one’s own home or office, and anyone in the world can easily download copies of granted patent specifications. Disclosure has therefore become more costly to the patentee.

On the other hand, the lower cost of searching means that it is easier to discover whether an idea has already been patented. As a result, the overall costs of applying for a patent are reduced and it is easier to discover in which areas it is worthwhile to focus research. There are even web sites that enhance this process: bountyquest.com for example is essentially a marketplace for ideas, enabling people with information on the status of inventions to sell this information to those who are willing to pay for it.

Electronic databases might also offer a solution to the vexed problem of how to compensate people with knowledge that is unpatentable but nevertheless useful. For example, people in poor countries who have been using a particular plant to treat a certain ailment might have knowledge that would be of enormous benefit to people throughout the world. However, without a means of protecting that knowledge from expropriation, the people have little incentive to make it public. Responding to this problem, RA Mashelkar of the Centre for Scientific and Industrial Research in Delhi and colleagues at the WIPO have proposed a database for indigenous knowledge. This would hold information given by indigenous people about all sorts of technologies. If the knowledge is used by a commercial enterprise, then the indigenous people would be given an agreed fee.

Notwithstanding the moral arguments in favour of such electronic databases, there is some evidence to suggest that screening according to the existence of ‘indigenous knowledge’ does not actually increase the chances of finding biologically active material.

Encryption

Some commentators have argued that new technologies can replace copyright and patent (Cole, 2000; Friedman, 1998). Friedman (1998) states that we are moving towards a world of strong privacy, due to innovations in encryption and consequent developments such as digital signatures and digital cash. In this environment, firms and businesses are able to do business with one another anonymously, meaning that identifying perpetrators of IP violations is more difficult. It is impossible to monitor whether a user of an electronically available publication is forwarding the publication to friends by email (which would be a violation of copyright), or whether he is merely printing out a copy for his own personal use (c.f. Cole, 2000, who discusses the problem of running off physical copies). Friedman (1998) argues that firms will need therefore to move towards other kinds of (privately provided) protection for their intellectual property, notably technological protection. In spite of much enthusiasm in libertarian circles, uptake of digital cash has so far been very slow; largely this is because of the greater convenience of using credit cards. As new forms of online banking

emerge it seems likely that micropayments from bank accounts will be the payment mechanism of the future for low-value online services, in which case tracing remains a simple process.

Nevertheless, music and film industries have both felt threatened enough to develop encrypted music-distribution systems. The music industry sponsored the development of the digital rights management system (DRMS), which offers a proprietary system for distributing digital music that ostensibly prevents copying. In a similar move, the film industry has developed a standard called DivX, which also ostensibly prevents copying. Unfortunately, DRMS has been made redundant by the development of MP3, a format that is sufficiently compressed to enable copying across networks at realistic speeds, combined with the creation of peer-to-peer network software such as Napster and Gnutella. As a result, millions of people have converted their CD tracks to MP3 format and are sharing them across the Internet. So long as the music industry continues to sell unencrypted CDs, this kind of copyright infringement is likely to continue. Meanwhile, DivX never even got off the ground because while it was still in beta testing it was reverse engineered by hackers and posted on the Internet.

For the time being, technology is not the solution: the only realistic means of protecting widely dispersed artistic works is through prosecution of copyright infringers. Indeed the most sensible investments in technology from the perspective of producers of knowledge that may be distributed across the Internet would seem to be those that enable more effective monitoring of people who are infringing copyright. The International Federation of the Phonographic Industries, which represents the global music industries, recently announced that it was testing software that would enable it to identify and prosecute people illegally copying songs over the Internet.¹

Electronic publishing of texts

A novel alternative means of profiting from artistic works was recently essayed by Stephen King, who posted chapters from a story online but threatened not to release the final instalment until three quarters of all those who had downloaded the first two instalment had donated \$X to Mr King. While such a scheme may work for widely-sold authors such as Stephen King, it is not clear that it is an ideal means of distributing works by lesser known names. The problem is that marketing of such a scheme is costly, so for lesser-known novelists (who might otherwise benefit from the cost advantages attendant to Internet publishing). In its defence, however, Mr King did not intend for this to be an alternative to the printed book. The idea was to reinvigorate the serialised novel, a format that was very popular in the 19th Century, using modern methods of distribution.

The reality is that for the time being at least people seem to like the convenience and feel of books printed and bound professionally. Ironically, web sites seem to be spurring the creation of printed works. The owner of www.darwinawards.com, for example, recently released a book containing many examples of such awards, even though most of the material is freely available on the web. In a similar vein, Internet book retailers such as Amazon.com and Bol.com offer a much wider variety of literature than is available in most bricks-and-mortar retailers, and thereby increase the sales volume of these books.

Where Internet provision of material may be a realistic alternative is in the field of technical and academic inquiry. Already several web-sites specialising in the delivery of such material have emerged (including jstor.org, nexis.com and northernlight.com).

Software and network industries

An argument has also been made that weaker intellectual property protection should be granted to innovations in the so-called “network” industries. The value of belonging to a network tends to increase with the number of members of the network, hence these industries often exhibit increasing returns to scale, and thus tend towards a natural monopoly or a single standard. A commonly cited example is Microsoft’s Windows operating system, which has a virtual monopoly over the operating-systems market. The more people that use Windows, the more the network of Windows-users benefit – because of the gains from compatibility. It is arguable that intellectual property protection

gives the dominant firm in such markets too much power, and that no or weaker protection would result in greater competition, and thus better standards. Hence some economists have recommended making the Windows source code available to the public as part of the antitrust remedies against Microsoft. Leibowitz and Margolis (1998), however, argue that ownership of a network through intellectual property rights allows for the owner to appropriate the value of the network effects. If he or she is not able to receive any of these benefits, the network provided may be too small. Further, if one network or standard is owned, while a superior one is not, the owned standard may prevail in the market-place over the unowned one.²

Another issue is the intellectual property protection of software and semiconductor chips. Software is made up of mathematical algorithms which, as ideas and not products, are not patentable. Would the patenting of algorithms prevent other programmers from using such algorithms in their programmes, and would this constitute overprotection (Besen & Raskind, 1991) and result in a stifling of innovation? In the US, computer programmes are now patentable, but with the provision that the patent must be on the process and not the algorithms. Copyright protection is in fact granted to software but, as has been mentioned before, copyright legislation does not protect against the utilisation of ideas by others. For example, when software company Lotus sued other software companies for infringement of copyright, alleging that they had copying the Lotus 1-2-3 menu tree, the case hinged on whether the menu tree was an expression or an idea (Friedman, 1998).

New forms of intellectual property

As new technologies develop, so demand for and very often the nature of intellectual property protection changes. As we noted above, copyright for books was only necessary when a cheap means of copying books was invented. Likewise with recorded music and film. While it may be true that in some cases industries will begin to rely more on technological protection of their IP, other industries will rely on new types of IP and new methods of identifying infringers of that IP.

In the nineteenth century, patents offered chemists incentives to invent new molecules that would have useful industrial applications. In the twentieth century, patents did the same for molecules with medical applications. In the twenty-first century, patents will provide the incentives for discovery of not only new industrial and pharmaceutical chemicals but new strands of genetic material with uses in all manner of biological organisms, from marrows to man.

¹ Edward Taylor (2001) 'Music Firms Snoop on Napster Users,' *Wall Street Journal Europe*, February 16-17, pp.1, 6.

² It has been argued that too great an emphasis has been placed on network effects in the Microsoft antitrust case, and that insufficient attention has been given to the highly competitive nature of the software business. In this view, the contestability of the market mitigates against potential inefficiencies arising from the Windows monopoly.

7 Conclusions

This *Monograph* began by arguing that property and the rule of law are the foundations of all economic activity. We pointed out that ownership of property provides individuals with the incentive to make investments by ensuring that the owner will reap any benefits that come from such investments. Property ownership also enables individuals to benefit from exchange, thereby increasing the incentive to make investments. Meanwhile, the rule of law ensures that property and transactions are appropriately enforced.

These points apply equally to intellectual property (IP), which creates incentives to develop new technologies and creative works. Just as property rights in land create incentives to improve that land, so property rights in the products of the intellect provide incentives to develop better products. Knowing that one's inventions can be protected provides an initial stimulus to invention. Once a product has been invented, patents act as security for investors (such as banks or venture capitalists), enabling the inventor to invest in further development, manufacture and marketing of their product. Likewise, knowing that one's musical recording can be protected provides an initial stimulus to investing in that recording – or, more importantly given its time consuming nature, in writing the music upon which that recording is based.

In Chapter 3, we presented a discussion of the moral arguments relating to intellectual property and suggested that IP could be justified from various perspectives. However, it was argued that the more persuasive justifications for IP were premised on empirical claims. In other words, it was suggested that IP is justified if it enhances economic development. In that context, we argued that IP has provided incentives to produce many of the most important inventions, artistic creations and brands that have underpinned much of the economic development that has taken place in the past century and a half.

While alternatives to IP exist, these are problematic and would be inadequate for protecting many technologies and kinds of creative works. Most chemicals and pharmaceuticals are costly to develop but easily reverse engineered. Likewise, music and literature may be copied very easily, but (in most cases) take time and effort to produce. Developing a brand is also a costly exercise and yet most logos and packaging may be relatively easily copied.

In Chapters 4 and 5, we pointed out that many developing countries still have weak IP protection, especially in the realm of product patents. While this is to a large extent a reflection of the state of development of the technology sector in those countries, we have argued that strengthening IP protection would nevertheless be very beneficial to those countries. It would stimulate local invention and encourage overseas IP-holders to engage in joint projects and investments. In addition, talented and knowledgeable people would be less likely to go overseas in order to use their skills.

One concern is that vested interests in many countries have slowed down the transition to stronger protection of product patents. Manufacturers of copies of pharmaceuticals that are on-patent elsewhere oppose the introduction of product patents on the grounds that their industry will suffer. These vested interests are in many cases supported by activists who seek to reduce the cost of drugs. To succumb to these pressures however would, we have argued, be extremely short-sighted. Introducing product patents generally will give incentives for pharmaceutical and biotechnology companies, both local and foreign, to invest in higher value-added research and development. The long-term benefits both economically and on the health of the population of such investment are likely to be far greater than the short-term cost of more expensive pharmaceuticals.

We argued, further, that trade liberalisation has also been a fundamental driver of economic development, enabling consumers and producers alike to benefit from being able to trade with one another more freely across borders. This creates a virtuous circle, ensuring that entrepreneurs develop the products that people want in an ever more efficient manner. In turn, this leads to economic growth, which benefits all sectors of society, especially the poorest (in contrast to heavily regu-

lated trade, which tends to benefit the wealthy and entrenched interests – such as members of labour unions – at the expense of the poor).

However, without concomitant agreements on international protection of IP, trade liberalisation tends to weaken IP protection by making it easier to import copies of IP-protected goods that have been produced without a licence from the IP-owner in countries without adequate IP protection. As a result, returns on investment in innovation are reduced. The long-term effect is to reduce the incentive to produce new items of IP.

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) in principle solves this problem by preventing unlicensed manufacture of patented products. But delayed implementation of some key elements of TRIPs is undermining its effectiveness. These delays seem to be driven in large part by the combination of vested interests and ‘altruists’ who seek cheaper drugs and oppose the introduction of IP protection for plant varieties.

The future of TRIPs

We argued in Chapters 4 and 5 that it is in the long-term interests of all countries to create IP systems that conform with TRIPs as soon as possible. In particular, the circumstances under which compulsory licensing will be permitted must be narrowly construed to comply with TRIPs. TRIPs provides clear guidelines as to when a compulsory license may be awarded. These include the failure of a company to work its patent and states of emergency. If countries permit compulsory licensing beyond these specific criteria in the context of ‘essential medicines’, there is a risk that patent owners will no longer be able to price-discriminate and world prices will fall to the lowest level offered by generics manufacturers. This will effectively destroy the value of the patents and eliminate incentives to invest in the development of new ‘essential medicines’.

Failure fully to implement TRIPs may undermine the system as a whole, aggravate trade relations, and delay progress in other key areas such as the development of improved protection for geographical indicators and indigenous knowledge. It may also undermine the chances of swift reform of agricultural subsidies.

The future of IP

Whereas the short-term future of IP protection in a global context is uncertain for political reasons, some have argued that the longer-term future of IP is uncertain for technological reasons. We discussed claims that new technologies undermine the need or justification for IP. While there are points of agreement, there is little indication that a revolution is imminent: the speed with which hackers are able to reverse engineer software, for example, suggests that we are some way from replacing copyright with strong encryption. Meanwhile, especially in the context of swingeing product regulations, it seems highly improbable that patents could realistically be withdrawn without causing a dramatic reduction in inventiveness.¹

This *Monograph* has attempted to cover a great deal in a short space. Much detail was inevitably left out and it is hoped that future monographs will fill in some of these gaps. In particular, such burning issues as copyright law in the digital economy, business method patents, and *sui generis* protection for indigenous knowledge, would seem to merit monographs of their own.

1 Regulations undermine the capacity for firms to keep their discoveries secret and create long delays between product development and marketing in key industries such as medical devices and pharmaceuticals.

8 Summary

Property and the rule of law are the foundations of all economic activity.

Ownership of property provides individuals with the incentive to make investments by ensuring that the owner will reap any benefits that come from such investments. For example, a farmer who owns his land will have more incentive to invest in soil conservation. It also can act as security against loans, enabling those investments to take place. Property ownership also enables individuals to benefit from exchange, thereby increasing the incentive to make investments. Meanwhile, the rule of law ensures that property and transactions are appropriately enforced.

2. Intellectual property (IP) has underpinned much of the world's economic development that has taken place in the past century and a half.

From Thomas Edison's light bulb to Orville Wright's airplane, patents have provided incentives to entrepreneurs to invent new technologies. Meanwhile, copyright provides incentives to all manner of cultural achievements, from works of fine art to Hollywood blockbusters. Finally, trademark protection creates incentives for companies to brand their products – enabling them to create differentiated products with characteristics desired by consumers.

3. IP creates incentives to develop new technologies and creative works.

Just as property rights in land create incentives to improve that land, so property rights in the products of the intellect provide incentives to develop better products. Knowing that one's inventions can be protected provides an initial stimulus to invention. Once a product has been invented, patents act as security for investors (such as banks or venture capitalists), enabling the inventor to invest in further development, manufacture and marketing of their product. Likewise, knowing that one's musical recording can be protected provides an initial stimulus to investing in that recording – or, more importantly given its time-consuming nature, in writing the music upon which that recording is based.

4. Alternatives to IP exist but are problematic and would be inadequate for protecting many technologies and kinds of creative works.

Before the invention of formal IP systems, people attempted to protect the products of their intellect through other means. Perhaps the commonest method was secrecy. Still used today, secrecy has the advantage to the inventor that others are unable to utilise the knowledge unless they are able to 'reverse engineer' the product. This makes secrecy a powerful mechanism for protecting investments in novel processes. However, it is less useful for protecting novel chemicals and biological organisms, because means now exist that can easily and inexpensively identify the constituent components. For creative expressions, likewise, digital technologies enable copying can to be effected with incredible accuracy and ease.

5. Without IP protection, there would be less incentive to develop new technologies, especially in the fields of chemicals, pharmaceuticals, biotechnology and software.

We do not know what technologies will be important in the future, but is it worth taking the risk of not having them just because some current technologies can be protected without IP? Even in those fields for which secrecy offers a significant inducement to invention, patents would still be desirable because they lead to wider dissemination of knowledge. This is because the details of all patented inventions are made available to the public and may be used freely after the expiry of the patent (20 years after filing).

6. Many countries still have weak IP protection, especially in the realm of product patents.

Strengthening IP protection would be enormously beneficial to those countries.

Strengthening IP protection would stimulate local invention and encourage overseas IP-holders to engage in joint projects and investments. In addition, talented and knowledgeable people would be less likely to go overseas in order to use their skills, often acquired at the expense of the state.

7. Developing-country governments must not give in to local vested interests, such as the manufacturers of generic pharmaceuticals, who oppose strengthening of IP.

In many countries, vested interests have slowed down the transition to stronger protection of product patents. Manufacturers of copies of pharmaceuticals that are on-patent elsewhere oppose the introduction of product patents on the grounds that their industry will suffer. These vested interests are in many cases supported by activists who seek allegedly cheaper drugs. To succumb to these pressures, however, would be extremely short-sighted. Introducing product patents generally will give incentives for pharmaceutical and biotechnology companies, both local and foreign, to invest in higher value-added research and development. The long-term benefits, both economically and on the health of the population, of such investment are likely to be far greater than the short-term cost of apparently more expensive pharmaceuticals.

8. Trade liberalisation has also been a fundamental driver of economic development, enabling consumers and producers alike to benefit from being able to trade with one another more freely across borders.

Trade liberalisation enables individuals to engage more freely in mutually beneficial exchanges. Like all such exchanges this creates a virtuous circle, ensuring that entrepreneurs develop the products that people want in an ever more efficient manner. In turn, this leads to economic growth, which benefits all sectors of society, especially the poorest (in contrast to heavily regulated trade, which tends to benefit the wealthy and entrenched interests – such as members of labour unions – at the expense of the poor).

9. However, without concomitant agreements on international protection of IP, trade liberalisation tends to weaken IP protection by making it easier to import copies of IP-protected goods that have been produced without a licence from the IP owner in countries without adequate IP protection.

As a result, returns on investment in innovation are reduced. For example, imports of CDs manufactured without a license in countries in Southeast Asia undermine the profitability of the original producers of the music. Similarly, imports of on-patent pharmaceuticals produced by generics manufacturers in India reduce the profitability of the pharmaceutical companies that developed the drugs. In both cases the long-term effect is to reduce the incentive to produce new items of IP, be they music or medicines.

10. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) in principle solves this problem by preventing unlicensed manufacture of patented products. But delayed implementation of some key elements of TRIPs is undermining its effectiveness.

Responding to powerful local lobbies, especially manufacturers of generic pharmaceuticals and left-wing ‘consumer’ groups, governments in some countries have been slow to implement TRIPs and have retained broad rights to compulsorily license products. The effect of this is to discourage investments in development of pharmaceuticals and related technologies. It is in the interests of consumers in less-developed countries to create TRIPs-compliant IP systems because inventors everywhere would then have stronger incentives to develop novel products for those markets.

11. All countries should create IP systems that conform with TRIPs as soon as possible. In particular, the circumstances under which compulsory licensing will be permitted must be narrowly construed to comply with TRIPs.

TRIPs provides clear guidelines as to when a compulsory license may be awarded. These include the failure of a company to work its patent and states of emergency. If countries permit compulsory licensing beyond these specific criteria in the context of 'essential medicines', there is a risk that patent owners will no longer be able to price-discriminate and world prices will fall to the lowest level offered by generics manufacturers. This will effectively destroy the value of the patents and eliminate incentives to invest in the development of new 'essential medicines'.

12. The TRIPs Council has much work ahead and should not be distracted by the emotive issue of AIDS.

In particular the TRIPs Council should focus its attention on issues such as creating *sui generis* protection for indigenous knowledge and clarifying the issue of geographical indications.

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