



research paper series

Internationalisation of Economic Policy

Research Paper 2002/21

Trade and the Globalisation of Patent Rights

By R.E. Falvey, F. Martinez and G.V. Reed

The Centre acknowledges financial support from The Leverhulme Trust
under Programme Grant F114/BF



Leverhulme Centre
for Research on Globalisation and Economic Policy

The Authors

Rod Falvey is Leverhulme Professor of International Trade in the Leverhulme Centre for Research on Globalisation and Economic Policy, University of Nottingham. Geoff Reed is Reader in Economics in the School of Economics, University of Nottingham and Internal Fellow of the Leverhulme Centre for Research on Globalisation and Economic Policy. Feli Martinez is a Research Fellow in the Faculty of Law, University of Leicester.

Trade and the Globalisation of Patent Rights

by

R. Falvey, F. Martinez and G. Reed .

Abstract

This paper examines the role of patent policy in the open economy. It begins by considering how the presence of patents affects trade in patentable products. A brief review of the general argument for patent protection is followed by consideration of the elements that comprise a patent system, and which determine “patent strength”. Attention is then given to how the existence of the global market influences countries’ choices of patent system. It is noted that the way patents are applied tends to push countries towards extreme choices, which may partly explain the pressure for some degree of international harmonisation that led to the minimum standards specified in the TRIPs Agreement. But even with these minimum standards, countries retain discretion over important aspects of their patent systems.

Outline

1. Introduction
2. The effects of patents on trade
3. The effects of trade on the choice of patent system
4. Conclusions

Non-Technical Summary

Patent rights are conferred by national governments and are valid only within the relevant national jurisdiction. In economic terms, a patent grants a successful innovator a (limited) monopoly in the use of that innovation. While this serves to encourage innovation, it is recognised that permitting some “imitation” is optimal, and the parameters of the patent system (including its enforcement) can be chosen so as to achieve a desired “patent strength” (i.e. the extent of imitation permitted by patent law). National patent systems therefore differ, reflecting different balances between the encouragement of innovation and the toleration of imitation, as perceived to be in the best interests of the country concerned.

The globalisation of the international economy has had an impact on intellectual property rights (IPRs). First, the growing importance of international markets for patented goods has led to pressure from innovators in developed countries for the same or similar levels of property right protection be provided in foreign markets as are provided at home. Second, the success of trade liberalisation has strengthened concerns that differences in the way national IPRs are established and enforced could lead to non-tariff barriers to trade.

This paper examines the role of patent policy in the open economy. It begins by considering how the presence of patents affects trade in patentable products. A brief review of the general argument for patent protection is followed by consideration of the elements that comprise a patent system, and which determine “patent strength”. Firms producing and selling in a world of uncoordinated national patent systems must decide in which markets to produce, to which markets to export and, correspondingly, in which countries to patent. These decisions will be influenced by the characteristics of the national patent systems, and in particular, the extent to which they provide a barrier to international arbitrage by other economic agents (parallel imports).

Attention is then given to how the existence of the global market influences countries’ choices of patent system. It is noted that the way patents are applied tends to push countries towards extreme choices, which may partly explain why one observed developed countries having such strong systems and developing countries such weak ones. Hence the pressure for some degree of international harmonisation that led to the minimum standards specified in the WTO’s Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), signed in 1994. But even with these minimum standards, countries retain discretion over the cost of patenting, the enforcement and functioning of their judicial systems, the stringency applied in the evaluation of patentability requirements, the extent of the patentable subject matter and, through competition policy, the exercise of patent rights. Nor does TRIPs restrict a country’s choice of principle of exhaustion, and hence whether to allow parallel imports. The paper concludes with a brief discussion of issues for the future.

1. INTRODUCTION

The argument underlying public policy intervention to protect intellectual property rights (IPRs – mainly patents, trademarks and copyrights),¹ is that, without such protection, competitive market systems fail to provide private agents with sufficient incentives to undertake investment in new ideas and information that have “public good” attributes. Where “imitation” has lower costs than “innovation”, imitating firms will gain an advantage over innovating firms, unless the latter can restrict the use of their innovation. We would expect limited investment in research and development (R&D) in such circumstances, and this provides the argument for strong IPR protection. On the other hand, once such an innovation is made, its public good character suggests that welfare is maximised if its use is limited as little as possible, providing an argument for weak IPR protection. Choice of IPR policy then reflects a balancing of these arguments.

IPRs are territorial rights, conferred by national governments and valid only within the relevant jurisdiction. Indeed, until the early 1990s, the economic literature mainly addressed normative concerns on Intellectual Property (IP) systems from an industrial organisation perspective with a focus on a closed economy. Similarly national IPR systems largely focussed on what was perceived to be in the best interests of the country concerned. Thus (developed) countries with many potential innovators had relatively strong IPR systems, while (developing) countries with few potential innovators had relatively weak systems. Over time there has been a general strengthening and broadening of IPRs in developed countries.²

The globalisation of the international economy has also had an impact on IPRs. First, the growing importance of international markets for patented goods has led to pressure from developed country innovators that the same or similar levels of protection be provided in foreign markets as are provided at home. Second, the success of trade liberalisation has strengthened concerns that cross-country differences in the way IPRs are established and

¹ See Cornish (1996) for a detailed description of IPRs.

² See Mazzoleni and Nelson (1998).

enforced could lead to non-tariff barriers to trade. Indeed the use of quantitative restrictions to protect IPRs is one of the limited exceptions allowed in the GATT (Article XX(d)).

There have been international agreements on IPRs since the nineteenth century. Until recently the main instruments of international law regarding the substantive protection of IPRs were the Paris Convention for the Protection of Industrial Property (1883) and the Berne Convention for the Protection of Literary and Artistic Works (1886). More recently concerns expressed by the US over international protection of IPRs led to their inclusion on the agenda of the Uruguay Round launched in September 1986. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) of 1994, which provides *minimum* standards on IPRs for World Trade Organisation (WTO) members, was the outcome.

Because the diversity of IPRs inhibits a coherent discussion of all of them, in this chapter we will restrict attention to patents, examining the role of patent policy in the open economy. Section 2 concentrates on how the presence of patents affects trade in patentable products. A brief review of the general argument for patent protection is followed by consideration of the elements that comprise a patent system, and which determine “patent strength” (i.e. the extent of imitation permitted by patent law and the way in which it is enforced). Firms producing and selling in a world of uncoordinated national patent systems must decide in which markets to produce, to which markets to export and, correspondingly, in which countries to patent. These decisions will be influenced by the characteristics of the national patent systems, and in particular, the extent to which they provide a barrier to international arbitrage by other economic agents (parallel imports).

Section 3 switches focus, and considers how the existence of the global market influences countries’ choices of patent system. It begins by noting that the way patents are applied tends to push countries towards extreme choices, which may partly explain why we observed developed countries having such strong systems and developing countries such

weak ones. Hence the pressure for some degree of international harmonisation that led to the minimum standards specified in the TRIPs Agreement. But these standards still leave countries significant discretion over important aspects of their patent policy. In particular, they do not restrict a country's choice of principle of exhaustion, and hence allow choice over whether to allow parallel imports. We therefore review the economic arguments for and against parallel imports, from a global and from a national perspective. The section concludes with a brief discussion of issues for the future. The final section provides a summary of the paper.

2. THE EFFECTS OF PATENTS ON TRADE

A patent gives the patent-holder a (limited) monopoly in the use of the patented innovation. This allows the patent-holder to constrain the production and sale of products that use that innovation, but only where a patent has been obtained and to the extent specified by patent law. Elsewhere the innovation is in the public domain, available to any who are able to use it. Because patenting is costly, innovations are rarely patented in all potential markets. As a result patents present a barrier to trade in products containing a patentable innovation. This is obviously the case between markets where the innovation is and is not patented, but can also be the case, depending on how the patent laws are specified, between markets where parallel patents exist.

2.1 The Economic Role of Patents

IPRs protect the application of ideas and information giving rights to the owners, inventors or authors. As such, IPRs are legal instruments to secure markets, and their exact content and the scope of the protection that they offer are legally determined and have evolved over time, and often differently, across jurisdictions. The main characteristic of all types of IPRs is that the rights granted are essentially negative. IPRs do not confer the right of exploitation of goods or services embodying IPRs, but rather give the IPR holder the right to prevent others from exploiting them without its license so as to guarantee the IPR holder a monopoly in the exploitation of its rights.

Even though the origin of patents can be traced back to the fifteenth and sixteenth centuries in some countries,³ with the Crown granting a monopoly in its jurisdiction to traders and manufacturers for the exploitation of their inventions, it was only in the eighteenth and nineteenth centuries that the main features of modern patents took shape. Developments in these centuries included the requirement of sufficient disclosure in the description of the invention, provision of adequate patent length taking into account the interest of innovators, imitators and consumers, extending patent protection to a wider range of innovation and improvements in the enforceability and administration of the patent system. These features nevertheless vary widely across countries, differences being more acute between developed and developing countries.⁴

To illustrate the market failure argument for granting patent protection, we consider the simplest case where R&D in a particular activity has resulted in the discovery of a new product.⁵ In figure 1, D is the demand curve for this product. Once the new product is available, social optimality requires that it be sold at a price equal to its marginal cost of production (MC) at point e . For simplicity we assume no fixed costs of production. From the equilibrium output Q^* that would result, society would derive maximum social surplus dP^*e . This solution would however provide each firm, including the innovator, with zero economic profits. Consequently, since R&D is costly, no firm will have an incentive to innovate (undertake R&D) as it could never recover its R&D outlays.

³ Dates differ by country. The earliest known English patent for invention was granted by Henry VI to Flemish-born John of Utyman in 1449, giving him a 20-year monopoly for a method of making stained glass not previously known in England. In Spain, the first patent (Real cedula de privilegio de invencion) was granted in 1522. The web pages of many National Patent Offices provide a brief history of patents in their territory.

⁴ See Rapp and Rozek (1990) and Sherwood (1997) for a rating and description of patent characteristics in developing countries.

⁵ Similar arguments and analysis can be used for other IPRs.

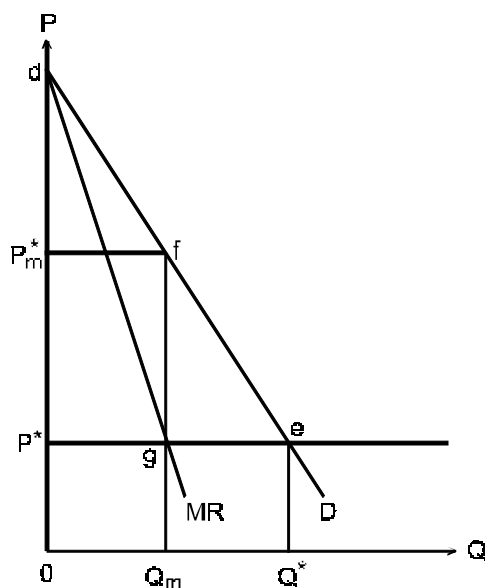


Figure 1: Patent protection under autarky

The usual solution to this problem is to grant the innovator a patent, thereby rewarding the development of new products by giving the innovator (or a licensee) the right to charge a monopoly price for the product for a limited period of time. Monopoly would result in a higher price P_m^* and a lower output Q_m . This outcome generates a dead-weight loss relative to the competitive solution of area fge .⁶ But compared to the situation of no innovation, society obtains a net gain of monopoly profit (equal to rectangle $P_m^*fgP^*$), plus the remaining consumer surplus (triangle dfP_m^*), minus the associated R&D cost. Once the patent expires the competitive solution prevails. An optimal patent system will induce the development of all innovations for which gains exceed the R&D costs.⁷ For those products that would be developed and sold anyway, the availability of patent protection simply reduces consumer surplus and raises monopoly profits, which nevertheless may encourage additional innovation.

⁶ This welfare loss could be avoided if the innovator is provided a large enough lump sum payment and the innovation instead is made freely available. A large literature exists on non-patent responses to this problem, such as state funding of R&D. For an introduction to this literature see Beath et al. (1995).

⁷ Ideally the monopoly would continue only for the time necessary for the expected discounted monopoly profits to cover the expected R&D costs. But the broad parameters of patent policy are not usually tailored to potential innovations in any particular sector, and it is likely that whatever the decision on patent length, the outcome will be to encourage too much R&D in some sectors and too little R&D in others.

Of course the direct rewarding of successful R&D activities is not the only role for patents in encouraging innovation. A patent may also help induce inventors to disclose their innovations, thus encouraging their wider use and placing the relevant knowledge (if not its use) in the public domain for the benefit of other inventors. Ownership of a patent may help inventors to obtain finance for the further investment necessary to develop and commercialise their innovation or allow others to undertake these activities, with their approval. Patents may also allow the “orderly development” of a new field in which there are likely to be many related innovations, by avoiding wasteful “patent races” over follow-on innovations. (Mazzoleni and Nelson, 1998).⁸

2.2. Patent Strength

In this simple illustration, the only policy decision to be made is whether to grant a patent of a certain length or not. But in practice the design of a patent system involves the selection of a range of patent characteristics that have been referred to collectively as *patent strength*. These characteristics include: (1) *patent length* – the appropriate duration of the period for which the innovator is given the monopoly (Northaus, 1969; Scherer, 1972); (2) *patent breadth* – the range of applications reserved for the innovator. Many innovations have potential application in a variety of product markets, where existing firms (often including the innovator) are already producing. In general it will not be optimal to reserve all these potential applications for the innovator (Klemperer, 1990; Gilbert and Shapiro, 1990); and (3) *patent height* – the extent to which the patent for today’s innovation, which may be the basis for subsequent innovations, also controls future improvements and developments (van Dijk, 1994).

⁸ In fact surveys of firms usually rate patents rather low among the factors affecting their competitive position and inducing innovation, except for some sectors, including pharmaceuticals and chemicals, where firms undertake considerable R&D (Levin et al., 1987 and Roland Berg Forschungs, 1995). In some industries, first mover advantages such as being first to set up production facilities and sales and service networks, and thereby being furthest down the relevant learning curve, are more important. In others imitation itself is also time consuming and costly or the information necessary to allow imitation can effectively be kept secret.

The strength of a patent system depends not only on how the law is specified⁹ but also on how it is administered. Patents are usually granted following a procedure involving a search and examination to confirm that the invention fulfils a set of patentability requirements. The invention must be, inter alia, *new* (i.e. not part of the existing state of the art), and involve an *inventive step* (i.e. not be obvious to a person skilled in the art). This granting procedure is open to interpretation, leaving countries some freedom to determine its scope and stringency, which may result in wide cross-country variations. Sometimes, national patent offices operate as mere registration offices, granting patents to applicants that submit applications fulfilling minimum formal requirements (e.g. filing a patent application and the payment of a filing fee) without any further substantial examination.¹⁰ But a granted patent only entails a presumption of validity and the mere existence of a patent does not prevent its infringement, it being the patentee's decision whether or not to attempt to enforce a patent. Often patent infringements are not brought into court because litigation costs are too high, the administration of justice is inefficient, it seems likely that the patent will be found invalid, or the parties involved reach a private settlement.¹¹

Countries therefore have to choose values for a range of characteristics in setting the strength their patent systems. As we note below, this implies that countries acting in

⁹ Patents protect embodiments of inventive activities, and inventions “offensive to public morals” can be excluded from patentability. There are wide cross-country variations in public moral standards and in the definition of “embodiments of inventive activities”, so that inventions patented in one location may not be patentable in another. The patentability of software and biotechnology are particular sensitive issues.

¹⁰ For example, the Spanish patent system was a registration system until 1986. Even then, the Spanish Law of 1986 only introduced an additional requirement that a search of the state of the art was to be conducted with the report of the state of the art to be published allowing two months for third parties to express their views. From 2001 an examination procedure has been introduced by which a patent examiner determines whether the patent application fulfils the patentability requirements in the light of the report on the state of the art. Still, this examination procedure is optional for the applicant but once requested it is binding. This situation is particularly interesting given that patent laws in all European countries have largely been harmonised.

¹¹ The usual defence of the alleged patent offender is to challenge the validity of the infringed patent in the first place. If the infringed patent is held invalid, further entry does not constitute infringement. Variations in judicial systems imply that a patent may be challenged and found totally or partially invalid in one jurisdiction and not in others. To illustrate the importance of Court decisions on patent validity in infringement suits, “of the 294 patents contested in all US Federal Appellate Courts between

isolation would and could choose to have different patent strengths, depending, *inter alia*, on the optimal balance for them between the costs of innovation and the costs of temporary monopolisation. Producers of patentable products must cope with an array of patent systems if their product is to be protected from imitation in the international market.

2.3. Patenting Strategies

Tradable products can be sold in many national markets. A firm selling a product containing a patentable innovation may wish to exercise the option of producing in some locations and exporting to others. Clearly the degree of competition this firm faces in each market will depend on whether a patent applies in that market, how strong it is and which firm holds it. In the absence of a universal patent, an innovator must decide in which markets to patent. This turns out to be a separate decision for each national market, a consequence of the two main principles governing the international trade in goods covered by IPRs as established in Article 4(bis) of the Paris Convention and Article 5 of the Berne Convention. These are the principle of *territoriality* and the principle of *independence*.¹²

The principle of territoriality implies that the extent of protection of IPRs, their establishment and transfer, as well as the means of redress afforded to the IPR holder, shall be governed exclusively by the laws of the country where protection is claimed. It also implies that the effect of an IPR is only valid within the boundaries of that country. Due to the principle of territoriality the strength of IPRs is nationally determined, and so differences in national IPR regulations can lead to cross-country variations in their

1966 and 1971, only 89 (about 30 percent) were found valid" (Earl W. Kintner and Hack L. Lahr, 1975, quoted in Choi, 1998, p. 1250).

¹² At present the only exception to the principles of territoriality and independence is the (European) Community Trademark, which, although it co-exists with national trademark systems, has once granted a unitary character for the whole EC and can be granted, transferred, revoked and expire only in respect of the whole of the EC. There is no supranational or universal patent. When multinational protection is desired, a separate patent application and granting procedure has to be pursued in each different state leading to independent national patents. See Martinez (2001) on this issue and on current proposals for a Community patent.

strength. An innovator will enjoy protection only in those countries where a patent has been obtained. In other countries the invention remains in the public domain and is of free use.

The principle of independence implies that patents applied for in various countries shall be independent of patents obtained for the same invention in other countries in terms of establishment, transfer and expiration. Therefore, the nullity, forfeiture, duration and the like of a patent in country A do not impact on a dual patent in country B.

An innovator does have the advantage of the *principle of priority* (Article 4 of the Paris Convention), which applies to industrial property rights granted upon registration (e.g. patents and registered trademarks). This principle allows an applicant to file in signatory countries external patent or trademark applications on the basis of a first application in one country and demand recognition in those other countries over a *priority year*, during which the applicant decides its optimum strategy. Under this priority registration system, if a patent or trademark application is filed in one member country, nothing which occurs within a twelve-month period that runs from the first filing will affect the right to a patent or trademark in other member countries (the patentability requirements will be determined by the *priority date*, which is the date of the first filing). After the priority year and once the invention has been disclosed in the public domain, anyone is free to copy, produce and market it, wherever patent protection has not been applied for. The patentee, however, can enforce any of its independent patents in each corresponding independent national court to prevent production in or importation to the protected markets.

Because of the principles of territoriality and independence, it is possible that an innovation could meet the conditions for patentability in one national market but not in another, and that even where patents are granted in different markets they will not be of the same strengths. We can consider the issues that arise when patents may or may not apply in two markets by returning to our simple illustration above. Figure 2 adds a second Country (B) to the analysis of the welfare economics of patent protection. The left panel

shows the market in Country B for the new product developed in the Country (A) from Figure 1. For convenience demand in Country B (D_b) is shown as more elastic than demand in Country A (D_a) at any common price.

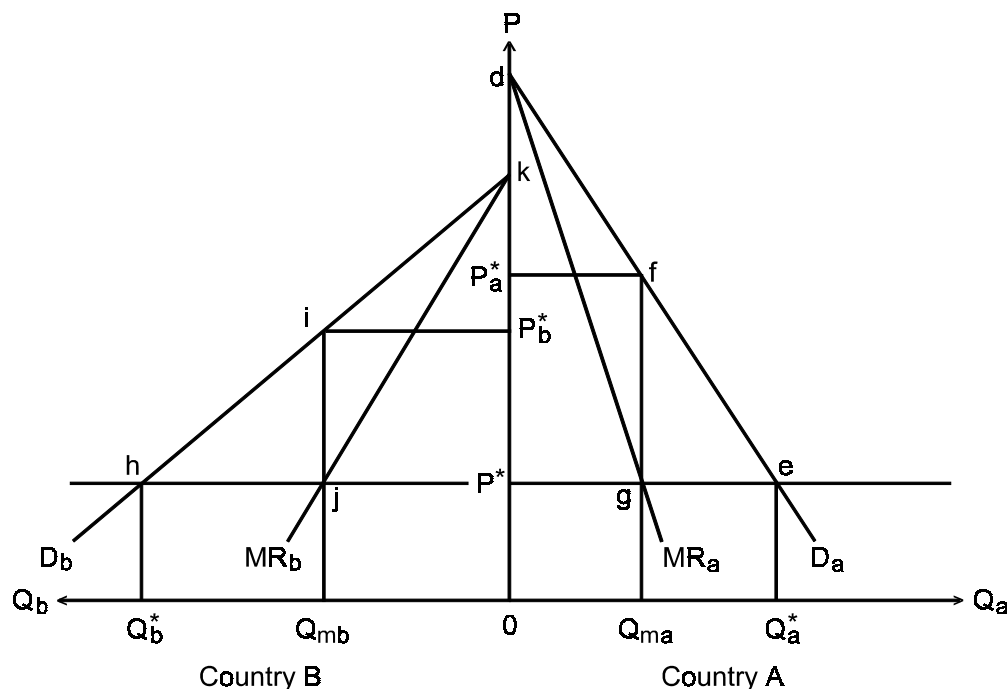


Figure 2: Welfare economics of product patents in a two-country model

Suppose that the innovator holds a patent in Country A and hence sells there the new product at the monopolist equilibrium price of P_a^* , but that Country B provides no effective patent protection at all. Assuming that imitation is costless and immediate, and imitators can produce a perfect substitute using the same technology as the innovator, the innovator would have to sell its new product in Country B at its marginal cost of production at point h. From the equilibrium output Q_b^* that would result in Country B, society in B would derive maximum consumer surplus kP^*h .

This solution provides zero economic profit for the innovator in Country B, but if the profits in Country A cover the R&D costs, this should not prevent the innovation. However, monopolist profits in Country B could provide additional incentives to develop new products that otherwise would not cover R&D costs.

If Country B provided patent protection, however, and if the innovator chose to take out a parallel or equivalent patent in Country B, it would in principle also enjoy a monopoly in Country B with equilibrium at point *i*. This outcome corresponds to the standard monopoly price-discrimination model, with the parallel patents generating the monopoly prices and segmenting the markets. The innovator would consequently charge a higher price (P_b^*) in country B than would arise under the competitive solution. With identical marginal costs of production, the monopoly price is lower in Country B than in country A because we have assumed a more elastic demand in country B.

The innovating firm clearly earns greater gross economic profits from the sale of its product if it patents in all markets. But patenting in each single country of the world would be extremely costly, and very seldom, if ever, is patent protection enjoyed world-wide. Even where there is a patent in the innovator's home market, external applications involve high additional costs, mainly in terms of extra fees to the foreign patent offices, external patent agent fees, translation costs and potential litigation costs to defend the external patents in the event of infringement. The usual strategy is to apply for patent protection in those countries where the applicant intends either to manufacture or market the invention and where the risk of imitation is high.¹³

¹³ Eaton and Kortum (1996) find that for OECD countries, a high cost of patenting relative to market size has a negative effect on the decision to patent. EC countries are likely to be targeted for patent protection, but even here coverage is far from universal. For illustration, the European Patent Convention (or Munich Convention) provides a unified granting procedure for awarding patents in States party to the Convention. When filing a "European" patent application, the applicant must indicate the States in which it wishes to obtain protection, paying a fee for each designated state. This procedure does not provide a supranational patent however. Once the "European" patent is granted the applicant receives a bundle of national patents, one for each of the designated states and hence, protection and jurisdiction of each independent patent will be circumscribed to the national territory. If the "European" patent is granted the applicant has to validate the "European" patent in each of the designated states, filing the respective translation and paying the validation fee in accordance to the requirements of each country. However, the average number of designated states – countries where the invention is protected – per "European" patent *granted* in 1999 was 7.46 out of 20 possible. In that year, "European" granted patents designated Germany in 98 % cases, Great Britain in 92%, France in 91%, Italy in 72%, the Netherlands in 52%, Spain in 50%, Sweden in 42%, Belgium in 42%, Austria in 37%, Denmark in 29 % and Portugal, Ireland, Greece, Luxembourg and Finland in less than 22% of the occasions (EPO 1999a, Table 7.4, pp.70-71). In the non-designated countries the invention remains in the public domain, adding complexity to EU intra-industry trade. Interestingly, Guellec and van Pottelsberghe de la Potterie (2000) find that the probability that a patent will be granted by the European Patent Office is maximised when six to seven countries are designated.

In addition to procedural fees, annual renewal fees and their changing rates over the length of the patent across countries influence the overall patenting strategy of the patent holder.¹⁴ These schedules are often progressive, which combined with value of the patent decreasing over time as its rivals imitate suggests that governments use patent renewal fees as a mean of shortening the effective length of patents.¹⁵ If the patentee stops paying renewal fees in a given country, it loses its right in that country.¹⁶ Thus firms tend to patent only in major markets, accepting the loss from the innovation being in the public domain in the others. Which markets they patent in will depend on the size of market and the number of potential imitators based there.¹⁷

Another factor which decreases the value of patents in a given market is the ease of availability of *compulsory licenses*. As applied to patents, a compulsory license is an involuntary contract between a patent holder and a third party authorised by the national authorities that entitles the licensee to exploit the patent for a fixed period of time during the patent life, upon the payment of a reasonable remuneration to the right holder. They are usually granted on the grounds of public interest, dependency,¹⁸ insufficient exploitation of the patent or to remedy anti-competitive practices. Firms taking out a patent in a country which grants compulsory licenses will know that its attempts to restrict supply to exploit its monopoly power could be undermined in this way.

¹⁴ For theoretical analyses of patent renewal fees as a patent-related policy instrument see Cornelli & Schankerman (1999) and Scotchmer (1999).

¹⁵ For instance, in 1999 renewal fees in Germany increased from 51.13 Euros in the first year to 1687.26 Euros in the twentieth year. See EPO (1999b) for further examples.

¹⁶ Cross-country variations in renewal fees may explain how equivalent patents may have different cross-country duration even if the term of protection is harmonised. Most studies on the impact of the cost of patenting on the propensity to patent omit renewal fees from their analysis. The statistical study by Sánchez-Padrón et al. (1996) focuses on these fees but the results are inconclusive on the extent to which renewal fees influence the decision to maintain patents in force.

¹⁷ For a more detailed analysis of this decision in a multi-country setting see Falvey et al. (2001).

¹⁸ Dependent patents are patents (second patents) for development and improvement innovations, which cannot be exploited without infringing another patent (first patent).

2.4. Parallel Imports

If dual patents¹⁹ allow the patentee to price discriminate internationally then the profits of the innovating firm will be maximised by charging different prices in different markets. If these price differences exceed the costs of shipment between markets then profitable arbitrage opportunities arise for third parties if they ship legally sold products in the low priced market for resale in the high priced market. This phenomenon is known as *parallel importing*.

Parallel (or grey-market) trade in goods covered by IPRs occur when those goods, which were intended for sale in one national market (say B), are exported or re-exported by a third party without permission of the original authorised seller (normally the IPR owner, subsidiary or licensee) from their original destination to another country (say A) with *parallel or corresponding IP rights* – e.g. equivalent patents or industrial designs – exploiting price differentials. These products are identical to legitimate products sold in A except that they may be packaged differently, and may not carry the original manufacturer’s warranty if the latter were restricted to apply only in B.²⁰

The legality of parallel imports depends on which of the three approaches to the *principle of exhaustion* is adopted by the importing country. The principle of exhaustion (or “first sale” doctrine) sets limits on the IPR holders in the exercise of their rights to control distribution of goods that have been placed on the market (first sale), either by themselves or by a third party with their consent. When a “first sale” takes place the IPR is considered to have served its purpose and therefore is exhausted. Hence, the effect of the IPR cannot be extended to acts such as use, assignment or lease of the product covered by the patent in question, with the patent holder losing rights to any royalty after the initial sale.

¹⁹ Equivalent patents in different jurisdictions, or patents over the same invention.

²⁰ It is important to distinguish parallel, or grey, imports, which are legitimate products authorised for original sale in the exporting country, from counterfeit or pirated goods which have not been produced with the innovator’s approval.

The three approaches to the principle of exhaustion differ on the first sale concept applicable. These approaches are:

(a) Territorial, national, domestic or narrow exhaustion. For this regime the relevant first sale has to be on the domestic market. Only if the goods covered by an IPR are placed on the domestic market by the IPR owner or by a third party with his consent (a subsidiary, an affiliated company or a licensee) can the IPR no longer be enforced within the domestic market. The IPR holder can block the importation of goods first sold abroad. Adhering to the territorial approach therefore has the consequence of partitioning international markets, which fully allows for international price discrimination by providing absolute import rights to the IPR holder. Any attempt by any trader to introduce commodities from a cheaper source covered by a parallel right in the importing country can be curbed by the IPR holder enforcing its right in the higher-price country.

(b) International or broad exhaustion. Under this approach a first sale anywhere on the relevant international market²¹ (by the IPR holder or his authorised agent) will preclude any attempt by parallel IPR holders to enforce their parallel IPRs to prevent an arbitrageur from marketing those goods in the patentee's domestic market. International exhaustion can be regulated with caveats or safeguards, such as not considering IPRs as exhausted when the first sale has been subject to national price controls or to compulsory licenses forcing sales at a fixed price, or when the first sale takes place in a country without parallel rights, or when parallel IPR owners have no legal relationship (e.g. the case of simultaneous innovation or sale of parallel rights).

(c) Regional exhaustion. This approach can be chosen by members of a regional trade arrangement (RTA) such as the EU. In the absence of RTA-wide harmonisation of IPRs, a balance must be struck between the protection of national IPRs and the free movement of goods. The outcome is a combination of the two approaches described above. International exhaustion applies within the integrated area, whereas territorial or RTA exhaustion applies with respect to countries outside. Under this regime, IPR holders in any country of the RTA would be legally barred from invoking their rights to prevent the parallel importation of goods that have been placed anywhere in the RTA by the IPR

²¹ This could be defined as the set of markets where the patentee enjoys parallel protection, or as the global market.

owner itself or a third party with its consent. However the first sale concept is limited to commercial activities taking place within the RTA. Therefore, holders of IPRs in any country of the RTA can invoke their rights to prevent the parallel importation of goods coming from a country outside the RTA. Again, there can be various regimes of exhaustion, subject to different caveats, within the regional approach.

In the absence of an international rule governing the principle of exhaustion (Article 6 of TRIPs²²), all WTO members are free to choose one among the three broad regimes of exhaustion pursuant to their own law.²³

2.5. Summary

IPRs arose initially as *private rights* under national law as part of a country's industrial policy, and therefore national differences in IP systems arose reflecting cross-country differences in economic development. Initially, when production was concentrated in one market, IPR protection in that market secured for the IPR holder control over the global market, as it could have full control over production and trade. However, the globalisation of markets, the spread of multinationals with production capacities in different jurisdictions, and the growing recognition of the importance of technology and international knowledge spillovers for economic growth, has brought the international dimensions of IPRs into prominence. In this section we have highlighted those features of patent systems important for trade in patentable goods – patent strength and parallel imports in particular.

Do strong IPRs encourage or discourage trade? In principle, the answer depends on the balance of two forces (Maskus and Penubarti, 1995): (a) the market power effect –strong IPRs give foreign patent-holders greater potential market power which they can exploit by restricting supply (exports) to raise price; and (b) the market expansion effect – strong

²² Article 6 of the TRIPs Agreement states: “For the purpose of dispute settlement under this Agreement, subject to the provisions of Articles 3 and 4 above, nothing in this Agreement shall be used to address the issue of the exhaustion of intellectual property rights”. Articles 3 and 4 deal with national and most-favoured-nation treatment respectively.

IPRs shift the demand curve facing the foreign patent-holders outwards, since they reduce imitation, which tends to increase their exports. Smith (1999) argues that weak IPRs may discourage foreign patent-holders from exporting if they suspect that exporting raises the probability of imitation.²⁴

3. THE EFFECTS OF TRADE ON THE CHOICE OF PATENT SYSTEM

It was noted above that, prior to the TRIPs Agreement, countries could choose the characteristics of their patent systems independently, and that differences in patent strength across countries had implications for trade in patented goods. Here we switch perspective and examine the implications of trade in patented goods for a country's choice of patent system. We begin by investigating whether, given the characteristics of patent coverage, the possibility of trade in patented products would tend to generate divergence or convergence of nationally chosen patent systems, relative to those chosen in autarky. We find that divergence is the likely outcome.

3.1 The Choice of Patent Strength

In choosing the “strength” of its patent system a country is trading off the encouragement of innovation that comes from a strong patent system against the benefits of the wider dispersion of that innovation (through imitation) that comes from a weak patent system. Here we investigate how this trade off, and therefore the final policy choice, is affected by the fact that a country acts not in isolation but as part of the global trading system.²⁵

Consider, first, a closed market where there are several firms each selling a differentiated product. Suppose one firm innovates (either improving its product quality or reducing its production costs) in a way that can potentially be imitated by its competitors. If the innovating firm patents its innovation, then the extent of (legal) imitation by the other firms will be determined by the strength of the relevant patent system. The stronger the

²³ Indeed, the current regulations differ in different trading blocks (Maskus, 2000).

²⁴ Maskus and Penubarti (1995), Smith (1999) and Fink and Primo Braga (1999) report empirical estimates that there is a positive relationship between strong IPRs and bilateral trade flows.

²⁵ A more formal analysis of the following discussion can be found in Falvey et al. (2002)

patent system, the lower the level of imitation and the higher the profit gain to the innovating firm. Stronger patent systems therefore lead to higher levels of innovation. But the welfare gain will depend on the average level of product improvement (averaged over innovator and imitators) in this economy. While high rates of innovation raise this average level of product improvement, low rates of imitation reduce it. In general some intermediate level of patent strength will be optimal, depending on the costs of innovation and imitation and the number of potential imitators.

In a global market, each country's decision on its optimal patent strength is influenced by the decisions of others. All countries have an incentive to encourage innovation wherever it occurs, but they also gain from higher levels of imitation in the products that they purchase. Given different balances of interest, however, one would expect countries with different characteristics to choose patent systems of different strengths. Interestingly, this diversity is amplified by the way in which one country's choice of patent strength impacts on other national markets. Suppose there are two countries as above. Each country's decision on its patent strength affects not only the extent of permitted imitation on sales in its market by domestic producers and foreign exporters, but also the extent of imitation by domestic producers for export. This is because a patent allows the patent-holder to prevent, for a limited period of time, the unauthorised *use, sale, offer for sale, importation or manufacture* of goods embodying the patented subject matter within the territory for which protection is granted, whether these goods are imported or locally produced (Articles 27 & 28 of TRIPs). Thus a government's choice of patent strength affects not only domestic production for domestic sale, but also *imports and exports*. Traded goods are subject to the patent laws of both the importing and exporting countries. Indeed the level of imitation embodied in traded goods can only be the *minimum* permitted in the two trading partners.

To see the implications of this aspect of patents, we first suppose that domestic patent strength applies only to *sales* on the domestic market. Traded goods are then only constrained by the patent strength of the country of destination. Each country chooses its sales-patent strength taking that of the other country as given, with producers allowed

different levels of imitation for domestic sales and exports, if the technology permits. All products for sale in the country with the weaker patent system would be likely to contain a higher level of imitation than those for sale in the other. Each country independently balances the (global) incentives for innovation against the average level of product improvement in its (national) market. Patent strengths will be weaker than if this decision were made co-operatively, because each country ignores the benefits of higher levels of innovation for its trading partners. Two identical countries will tend to choose identical sales-patent strengths. If countries differ in market size, the larger country will tend to have the stronger sales-patent, but the average global sales-patent strength may be little different.²⁶

In practice, however, traded goods are subject to the patent laws of both countries. If the innovating firm takes out a patent in one country, then another firm producing in that country can, without violating the patent, legally produce and sell a product improved (by imitation) to the extent allowed by the patent law in that country. This firm can also export this product to all countries with weaker patent systems, where the innovating firm has taken out a patent, as the improved product clearly does not infringe the patent in these countries. But if the imitating firm attempted to export its improved product to a country that has a stronger patent system and where the innovator has taken out a patent, its product, though legal in the source country, would infringe the patent in the destination country.

Returning to our example of two identical countries, say A and B, we can distinguish four types of products – those produced in A for sale in A (AA), those produced in A for sale in B (AB), those produced in B for sale in A (BA) and those produced in B for sale in B (BB). Where countries are identical in terms of numbers of firms and market size, the volume of sales of each type will be approximately equal. Suppose each country chooses its optimal patent strength taking the other's as given. If B's patent strength is relatively weak, A will tend to choose a stronger patent system, as otherwise the (global) incentive

²⁶ In the model used in Falvey et al. (2002) we find no change in the equilibrium expenditure-weighted average patent strength where patents apply only to sales.

for innovation is too low. Then A's patent strength will completely determine the level of imitation for sales in its market (i.e. AA and BA), and half the sales in B's market (AB). As a result, A's choice of patent strength has the major impact (in fact three times as much) on the incentives for innovation, and A will choose a stronger patent system than it would, say, if B had the same patent strength and patents only applied to domestic sales. Alternatively, if B's patent strength is relatively strong, then A will tend to choose a weaker patent strength than B, and indeed a weaker patent strength than it would if patents applied only to domestic sales. The outcome is that *even two identical countries* would not find it optimal to choose identical patent strengths. The only (pure strategy) equilibria involve one country with a strong patent system and the other with a weak one. The country with the weaker patent system has the higher level of imitation, the higher level of average product improvement, and is consequently the better off of the two.

This tendency to choose patent systems of different strength will continue where countries differ in market size and numbers of potential imitators.²⁷ Relatively small countries in terms of either criterion will tend to choose weaker patent systems. In these circumstances it is hardly surprising that we observe a global economy divided into two groups of countries. Developed economies, with large markets and where almost all of the innovation takes place, have relatively strong IPR systems in general. Developing countries have relatively weak systems, or none at all.²⁸ Almost all innovation is concentrated in developed countries, which already provide patent protection. If failure to provide such protection means that developing countries obtain those innovations of importance to them at competitive prices anyway, then they have no incentive to extend patent protection themselves. Any gain in consumer surplus from the few additional innovations that their providing protection would generate, would be more than offset by

²⁷ Zigic (1998) considers process innovation in a model of two firms, an innovator in the North and an imitator in the South. Under some circumstances the South may gain and the North may lose from enforcing stronger IPRs.

²⁸ More generally, there has been work on the implications of strengthening IPRs, in particular patents, in developing countries on innovation – Diwan and Rodrick (1991), Helpman (1993) and Mansfield (1986); on foreign direct investment and the transfer and licensing of technology – Ferrantino (1993), Maskus and Penubarti (1995), Lee and Mansfield (1996), Maskus (1997), Fosfuri (2000) and Taylor (1993); and on growth – Taylor (1994) and Gould and Gruben (1996).

the losses from the monopoly pricing of those they otherwise would have obtained at competitive prices (Deardorff, 1990, 1992).²⁹ Conversely developed countries would unambiguously gain from such an extension, so it is not surprising that the IPR-holders in developed countries, particularly in the US, have sought to extend developed country strengths of IPR protection globally.

3.2 International Agreements on Minimum Patent Strengths

Prior to the TRIPs Agreement, the World Intellectual Property Organisation (WIPO), which administers, among others, the Paris Convention and the Berne Convention, provided the main international forum for the discussion of the legal and administrative aspects of IP protection and the harmonisation of IP Law. However, these conventions lacked enforcement mechanisms and were mainly ratified by developed countries. In the late 1970s, developed country patent-holders attempted to amend the Paris Convention to establish minimum levels of patent protection world-wide. But the WIPO is a UN agency, and developing countries, which naturally opposed the changes, which they saw as not in their interests, had the votes to defeat them.

US firms with strong patent interests (e.g. pharmaceutical manufacturers) then combined with firms with strong copyright interests (e.g. publishing, motion pictures, recording and software-designing), all of whose products could be imitated or copied relatively cheaply, and successfully lobbied for US diplomatic support. This support took two main forms. One was bilateral action under section 301 of the Trade Act of 1974, as amended by the 1984 Trade and Tariff Act and the 1988 Omnibus Trade and Competitiveness Act. The 1984 amendment added failure to provide adequate IP protection to a list of “unreasonable practices” that could generate US Trade Representative (USTR) investigation and subsequently the imposition of trade sanctions. This was strengthened by the 1988 amendment, which added the Special 301 process, which required the USTR

²⁹ Where innovators are concentrated in developed countries, a further problem arises in providing incentives for innovations of particular interest to developing countries. If the resulting innovation becomes a public good freely available to all developing-country producers, then which developing countries will provide the patent protection that compensates the innovator? (Yang, 1998).

to name those foreign countries with the least adequate and effective protection of IPRs, and to announce an agenda for intervention (Stegeman, 2000). This bilateral action was accompanied by pressure for the inclusion of protection of IPRs on the agenda for the Uruguay Round of GATT negotiations, which were launched in September 1986. Other GATT members initially opposed this extension beyond traditional trade issues,³⁰ but conceded when it became clear that their inclusion was necessary for US participation.

The inclusion of IPRs in the Uruguay Round negotiations was important for the successful conclusion of TRIPs, because it allowed concessions between IPRs and other issues. Given the failure of the attempt to reform the Paris Convention, it was unlikely that if TRIPs had stood by itself it would have been accepted by the developing countries, although these countries were beginning to realise that the alternative would have been pressure (under Section 301) to conclude bilateral agreements with US, to ensure continued access to the US market.³¹ But the US and the EU never intended to make any serious concessions concerning their own IPR laws, so there was no question of reciprocity within the TRIPs. Instead the trade-off was better protection for IPRs, hence greater rents to developed country IPR-holders in developing countries, in exchange for improved and more secure access for developing country products in developed country markets. There was no noticeable opposition in the US or the EU to an agreement that would force the rest of the world to strengthen its protection of IPRs. This lack of opposition is consistent with the view that consumers in developed countries had limited access to imitated products anyway, and that multinationals from developed countries felt they had more to gain from stronger IPR protection in developing countries than from taking advantage of their weaker systems to imitate in and for those markets in competition with developing country firms.

³⁰ IPRs were one of three new issues, the others being trade in services and trade-related investment measures. The role of IPRs has always been recognised in the GATT, with the use of quantitative restrictions on trade to protect IPRs as one of the limited exceptions allowed under Articles XI(1) and XX(d).

³¹ With TRIPs, IPR-related actions under section 301 can continue, but they are subject to multilaterally agreed limits and rules.

The TRIPs is a multilateral agreement establishing unconditional obligations on all WTO members, prescribing minimum standards for protection of IPRs, including enforcement and due process requirements. At the same time the Agreement allows enough flexibility in the design of IPR systems to encompass the different public policy objectives underlying WTO Members' national systems, which include developmental and technological objectives (Preamble of the TRIPs Agreement, Recital 5).

These minimum standards apply to the availability, scope and use of IPRs in copyrights and related rights, trademarks, geographical indications, industrial designs, patents, layout-designs (topographies) of integrated circuits and protection of undisclosed information.³² The TRIPs Agreement recognises the applicability of the basic principles of the GATT, including most-favoured-nation (MFN) treatment³³ and national treatment,³⁴ and of the relevant international IP agreements and conventions. A significant aspect of the inclusion of TRIPs in the WTO package, rather than it being a stand-alone agreement, relates to dispute settlement. Under the WTO Understanding on Rules and Procedures Governing the Settlement of Disputes, members whose rights have been infringed under one agreement may be authorised to suspend obligations under a different agreement. This is likely to be important since offending countries are likely to have few patented innovations of national origin.

With respect to patents specifically, the TRIPs Agreement provides that "... patents shall be available for any inventions, whether *products* or *processes*, in *all fields of technology* ... patents shall be available and patent rights enjoyable *without discrimination* as to the

³² Article 39.3 of TRIPs provides that where the submission of undisclosed data is required as a condition of patent approval, the country shall protect that data against disclosure except where necessary to protect the public, or, where disclosure occurs, take steps to prevent unfair commercial use.

³³ Traditional IP Conventions were silent on the MFN principle, and consequently allowed the possibility of establishing bilateral or special agreements in IPRs with trading partners.

³⁴ Article 3 (1) of TRIPs reads: "Each Member shall accord to the nationals of other Members treatment no less favourable than that it accords to its own nationals with regard to the protection of intellectual property." GATT and traditional IP Convention provisions fundamentally differ in the interpretation of the national treatment principle. National treatment in the GATT applies to *goods*, requiring equal treatment of national and foreign goods, whereas in IP conventions it applies to *persons*, and requires no less favourable treatment between national and foreign applicants (Dhanjee and de Chazournes, 1990, and Meesen 1987).

place of invention, the field of technology and whether products are imported or locally produced” (Article 27.1). This increases the scope of patent protection available to any innovator in any WTO Member, particularly developing countries (which have traditionally barred certain classes of products from patent protection).³⁵

The fact that the TRIPs Agreement provides new international *minimum* standards for protection and enforcement of intellectual property law implies that no WTO member is obliged to provide for higher standards, although individual members are free to do so. It is recognised that members’ choices will depend on their current level of development and technological objectives. Developing countries³⁶ still have discretion over key elements of “patent strength”, particularly during the transition period (1 January 2005, 2006 for the least developed countries). For example, before TRIPs developing countries traditionally provided for shorter periods of patent protection than the *minimum* of 20 years from the filing date specified in the Agreement. However expiration dates of parallel patents across countries may still differ due to delayed implementation of the TRIPs obligation according to the transitional arrangements by developing countries (shorter periods of patent protection may last until 2005), and to individual states providing for longer periods of patent protection than 20 years. Even after the entry into force of the TRIPs Agreement countries still retain control over the cost of patenting, the stringency of the patentability requirements, the patentable subject matter (though

³⁵ “In 1988 it was established that at that time pharmaceutical products were not patentable in 49, food products in 35, chemical products in 22, pharmaceutical process in 10, process for the manufacture of food in 9 and micro-organism in 9 of a total of 92 Paris Union states” (Strauss, 1996, p. 174). Pharmaceutical products and processes only became patentable in Spain in October 1992, 6 years after its accession to the European Union in accordance with transitional arrangements. (Transitional provision 1.1 of the Spanish Patent Law 11/1986). Nevertheless, many countries upgraded their patent systems before the entry into force of the TRIPs Agreement: “...as of January 1995 ... fewer than 20 developing and least-developed country WTO Members excluded pharmaceutical products from the grant of patents and virtually all provided for process patent protection” (Watal, 2001, p. 8).

³⁶ The signing of the WTO Agreements in 1994 has generated a number of articles on policy options open to developing countries in the implementation of the WTO Agreements. See for example Correa (1998), Pacon (1996), Watal (1997) and Weissman (1996).

discretion here has been reduced as noted above), patent enforcement in their judicial systems and the exercise of patent rights through their competition policies.³⁷

3.3 Parallel Imports

One area where TRIPS might have adopted common international standards but did not, is in limiting the choice over principle of exhaustion so as to constrain parallel imports. That TRIPS allows each country to choose its own regime with respect to parallel imports was important for its acceptance by many developing countries,³⁸ as few developing countries restrict parallel imports. As noted above, parallel imports arise where international price differences generate arbitrage opportunities for third parties. Such price differences can arise from several sources (Maskus, 2000). In some cases the efficient distribution of a product may require the patent-holder to retain some control over activities in the distribution chain (i.e. through exclusive dealerships), in order to control product quality and to ensure wholesalers and retailers are rewarded for undertaking appropriate investments in marketing and service provision. Parallel imports are a channel through which unlicensed distributors can free-ride on some of these investments. In some countries it may be difficult to enforce a private contractual prohibition on sales outside the authorised distribution channel. Restrictions on parallel imports are then seen as a natural extension of the right to control distribution, although they may also permit collusion among exclusive dealers (Maskus and Chen, 2000).

Arbitrage opportunities may result from national price regulations established to achieve particular social objectives. These result in considerable price variation across countries, and allowing parallel imports would undermine the objectives of the regulation. Otherwise, arbitrage opportunities will arise if monopoly pricing in each market leads to international price differences of sufficient magnitude. We can infer the broad welfare effects of permitting parallel imports from Figure 2. The price will fall in country A and

³⁷ Although the existence of IPRs has to be respected, the exercise of those rights can be controlled by competition policies, and the TRIPS Agreement confers considerable leeway on WTO members to decide their competition policy for IPR-related matters.

³⁸ This freedom was confirmed by the Ministerial Conference at Doha in November 2001.

rise in country B. The firm will be worse off, since it would have charged a uniform price if that led to higher profits, as will consumers in country B. Consumers in country A will gain. Global welfare may rise or fall.³⁹ Further, in a world of many markets, the patent holder may prefer not to sell in small markets if parallel exports are a possibility (Malueg and Schwartz, 1994). A global regime of parallel imports may then reduce welfare in developing countries through higher prices and limited availability.

If this is the case, why do developing countries oppose restrictions on parallel trade? Some believe that their domestic prices are actually higher under price discrimination. Others see beneficial opportunities to parallel export. An option available to countries concerned that patented products will not be supplied to their market (possibly because the patent-holder is afraid of parallel exports), is to require compulsory licensing. As noted earlier, compulsory licences are usually granted on the grounds of public interest, dependency, insufficient exploitation of the patent or to remedy anti-competitive practices (TRIPs Article 31).⁴⁰ The TRIPs Agreement (Articles 7, 8 and Preamble) introduces new and more expansive concepts of the abuse and public interest exceptions as prerequisites of compulsory licences.⁴¹

³⁹ The results on whether global welfare is higher with or without parallel trade are ambiguous. Such a judgement is also complicated because each regime results in different distributions of benefits within and across countries. After reviewing the theory and the empirical evidence, Maskus concludes that “it is impossible to support on economic grounds either a global policy to ban parallel imports or a mandate that there be a free global regime in parallel trade. The best advice is simply to permit the status quo ante to continue, with each country or region selecting its own policy.” (Maskus, 2000; p. 1283). But see also Richardson (2002). In the context of examining the “European patent”, Van Dijk and van Cayseele (1993) show that if no international price discrimination is permitted, then it is optimal for patent strengths to be harmonised across countries; while if patent strengths differ, the prohibition of price discrimination leads to sub-optimal outcomes.

⁴⁰ See Julian-Arnold (1993) for a general discussion of international compulsory licensing.

⁴¹ For example, the protection of public health and nutrition, promotion of technological innovation, socio-economic and technological development and the international transfer of technology. As Watal (2000) shows, welfare gains to the country granting a compulsory licence depend crucially on the market share gained by the licensee, royalty payments and the elasticity of demand. Such gains have to be assessed against the risk that excessive resort to compulsory licensing could become counter-productive if it unduly inhibits innovation.

3.4 Current Issues

One area where price regulations and compulsory licenses are important issues is in patented medicines, where the trade-off is between providing an adequate return to the R&D investment of the patent-holder and providing “essential” medicines at affordable prices to the populations of developing countries.⁴² It was normal practice in some developing countries to exclude food, chemical and pharmaceutical products from patentability. The TRIPS Agreement requires that product patent protection be extended to these areas by the end of the transition period, but not necessarily before then.⁴³

Some developing countries view the local manufacturing of medicines as important for the functioning and development of their domestic health care systems, and are therefore very reluctant to allow patent holders to supply their markets through exports. While voluntary licensing or other voluntary agreements (e.g. joint ventures) have the advantage of the co-operation of the patent-holder, compulsory licensing can be employed on the grounds provided in TRIPs Article 31. This will not help those countries with limited manufacturing capacity in the pharmaceutical sector, however, and these markets could remain unsupplied if the patentee patents in all other countries with manufacturing capacities, as they would face difficulties in making effective use of compulsory licensing. Other countries resorting to compulsory licensing would have to do so primarily for their domestic market (TRIPs Article 31.f),⁴⁴ and so could not help their

⁴² While this is important in some instances, one should not exaggerate the extent to which patents are likely to restrict the availability of essential drugs to developing countries. Less than five percent of drugs on the WHO Model List of Essential Drugs are under patent protection anywhere in the world (Watal, 2001, p6), and approximately ninety five percent of essential pharmaceuticals that are off-patent are in the public domain, and can be produced freely by either local producers or the generic industry.

⁴³ However, they have to accept the filing of product patent applications (“mail box” applications) for pharmaceutical and agricultural chemical products from the date of entry into force of the Agreement. Once TRIPS is implemented the granting procedure for these applications will be continued, with the patentability requirements assessed as at the filing date of the mail box application. If patent protection is granted then, the patentee will enjoy protection for the remainder of the patent term, counted from the filing date (TRIPS Article 70.8).

⁴⁴ Unless a compulsory licence is granted to remedy a practice determined after a judicial or administrative process to be anti-competitive (Article 31.k). As with most of its provisions, Article 31 of TRIPS is open to interpretation. A straightforward reading implies that patent holders can supply protected markets via exports (article 27), and therefore the mere lack of domestic exploitation of the patent is not enough to grant compulsory licensing. But this interpretation is contested. The Ministerial Conference in Doha in November 2001 concluded with a Declaration on the TRIPS Agreement and

neighbours in this way. This problem was acknowledged in the Doha Declaration, and the Council of TRIPs was instructed to find a solution, to be reported by the end of 2002.

The ongoing debate on the desirability of allowing the patenting of life forms was another issue acknowledged in the Doha Declaration, which required the TRIPs Council, in pursuing its work programme, to examine inter alia the relationship between the TRIPs Agreement (article 27.3b), the Convention on Biological Diversity and the protection of traditional knowledge, while taking into account the development dimension. In the light of the divergence of views on this issue, and the difficulties faced in the Uruguay Round in negotiating even a modest agreement on minimum standards for patent law, it seems unlikely that the issue will be resolved in the near future.

4. CONCLUSIONS

Patent rights are conferred by national governments and are valid only within the relevant national jurisdiction. In economic terms, a patent grants a successful innovator a (limited) monopoly in the use of that innovation. While this serves to encourage innovation, it is recognised that permitting some “imitation” is optimal, and the parameters of the patent system can be chosen so as to achieve a desired “patent strength”. National patent systems therefore differ, reflecting different balances between the encouragement of innovation and the toleration of imitation, which combine to generate the desired level of average product improvement.

Innovators then need to decide in which countries to patent. In general, innovators do not patent in all countries. Their choices will be determined by market size, the location of potential imitators and the costs of patenting. The ability of innovators to price discriminate internationally will depend on whether such pricing can be undermined by parallel imports. This in turn depends on the principle of exhaustion adopted in the relevant patent laws.

Public Health which acknowledged the flexibility of TRIPS, and clarified certain provisions. Each member has the right to grant compulsory licenses and the freedom to determine the grounds upon

Where countries are free to choose their patent strengths, taking those of their trading partners as given, the outcomes will depend on country characteristics. One would expect that countries with small domestic markets and few potential innovators would prefer to have relatively weak patent systems (i.e. that permit significant imitation). But as we noted above, this tendency is amplified by the way in which patent laws are applied to traded goods. Such goods are subject to the laws of both the importing and the exporting countries and hence must satisfy the stronger of the two systems. The outcome is that countries choose extreme patent strengths, and, in the light of this, it comes as no surprise to observe a global economy where developed countries have strong patent systems and developing countries have weak ones.

Naturally, such a system does not serve the best interests of innovating firms in the developed countries, or their governments. IPRs were included among the issues negotiated in the Uruguay Round, and the TRIPs Agreement was the outcome. This Agreement provides for international *minimum* standards for protection and enforcement of intellectual property law. But even with these standards, countries retain discretion over the cost of patenting, the enforcement and functioning of their judicial systems, the stringency applied in the evaluation of patentability requirements, the extent of the patentable subject matter and, through competition policy, the exercise of patent rights.

The right of countries to choose their own exhaustion regimes was confirmed by the TRIPs Agreement. This is important for developing countries, which typically allow parallel imports, even though this is not obviously in their interests. The prospects of strengthening and extending the TRIPs Agreement appear limited, at least until the transition period is successfully completed. Then its proponents will be able to observe whether it functions in the way they intended. Contentious issues remain, particularly the extent to which countries should be able to compel a patent-holder to supply

pharmaceutical products domestically, and whether life-forms should be patentable at all.

REFERENCES

- Beath, J., Y. Katsoulacos and D. Ulph (1995), "Game-Theoretic Approaches to the Modelling of Technological Change", in P. Stoneman (ed.) *Handbook of the Economics of Innovation and Technological Change*. Oxford, Blackwell.
- Choi, J. P. (1998), "Patent Litigation as an Information-Transmission Mechanism", *American Economic Review* 88 (5), pp. 1249-263.
- Cornelli, F. and M. Schankerman (1999), "Patent Renewals and R&D Incentives", *Rand Journal of Economics* 30, pp. 197-213.
- Cornish, W.R. (1996), *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights*. London, Sweet & Maxwell, 3rd edition.
- Correa, C. M. (1998), "Implementing the TRIPs Agreement in the Patents Field: Options for Developing Countries", *The Journal of World Intellectual Property* 1(1), pp.75-99.
- Dhanjee, R. and L. B. de Chazournes (1990), "Trade Related Aspects of Intellectual Property Rights (TRIPS): Objectives, Approaches and Basic Principles of the GATT and of Intellectual Property Conventions", *Journal of World Trade* 24(5), pp.5-15.
- Deardorff, A. V. (1990), "Should Patent Protection be Extended to All Developing Countries?", *The World Economy* 13(4), 497-509.
- Deardorff, A. V. (1992), "Welfare Effects of Global Patent Protection", *Economica* 59, 35-51.
- Diwan, I. and D. Rodrik.(1991), "Patents, Appropriate Technology, and North-South Trade", *Journal of International Economics* 30, pp.27-47.
- Eaton, J. and S. Kortum (1996), "Trade in Ideas: Patenting and Productivity in the OECD", *Journal of International Economics* 40, pp.251-78.
- European Patent Office (1999a), *Annual Report*, Munich.
- European Patent Office (1999b), *National Law Relating to the EPC*, Munich.
- Falvey, R. E., F. Martinez and G. V. Reed (2001), "Product Innovation and International Patent Protection" mimeo, University of Nottingham.
- Falvey, R. E., F. Martinez and G. V. Reed (2002), "Trade, Innovation and Patent Policy" mimeo, University of Nottingham.

- Ferrantino, M. J. (1993), "The Effect of Intellectual Property Rights on International Trade and Investment", *Welwirtschaftliches Archiv* 129, pp.300-31.
- Fink, C. and C. A. Primo-Braga (1999), *How Stronger Protection of Intellectual Property Rights Affects International Trade Flows*, World Bank Report 2051.
- Fosfuri, A. (2000), "Patent Protection, Imitation and the Mode of Technology Transfer", *International Journal of Industrial Organization* 18, pp. 1129-49.
- Gilbert, R. and C. Shapiro (1990), "Optimal Patent Length and Breadth", *Rand Journal of Economics* 21(1) 106-12.
- Gould, D. and W. Gruben (1996), "The Role of Intellectual Property Rights in Economic Growth", *Journal of Development Economics* 48, pp.323-50.
- Guellec, D. and B. van Pottelsberghe de la Potterie (2000), "Applications, Grants and the Value of Patent", *Economic Letters* 69, pp. 109-14.
- Helpman, E. (1993), "Innovation, Imitation, and Intellectual Property Rights", *Econometrica* 61, pp. 1247-280.
- Julian-Arnold, G. (1993), "International Compulsory Licensing: the Rationales and the Reality", *IDEA* 33, pp.349-400.
- Klemperer, P. (1990) "How Broad Should the Scope of Patent Protection Be?", *RAND Journal of Economics* 21, pp.113-130.
- Kintner, E.W. and J. L. Lahr (1975), *An Intellectual Property Law Primer*. New York: Macmillan, 1975.
- Lee, J. Y., and E. Mansfield (1996), "Intellectual Property Protection and U.S. Foreign Direct Investment", *Review of Economic and Statistics* 78(2), pp. 181-86.
- Levin, R., A. Klevorick, R. Nelson, and S. Winter (1987), "Appropriating the Returns from Industrial Research and Development", *Brooking Papers on Economic activity* 3, pp.783-831.
- Malueg, D. and M. Schwartz (1994), "Parallel Imports, Demand Dispersion and International Price Discrimination", *Journal of International Economics* 37, pp. 167-95.
- Mansfield, E. (1986), "Patents and Innovation: An Empirical Study", *Management Science* 32 (1), pp. 173-81.
- Martinez, F. (2001), "Towards a Patent Reform in Europe", *The Journal of World Intellectual Property* 4(5), pp. 767-86.

- Maskus, K. E. (1997), "The Role of Intellectual Property Rights in Foreign Direct Investment and Technology Transfer", prepared for the conference *Public-Private Initiatives After TRIPS: Designing a Global Agenda*.
- Maskus, K. E. (2000), "Parallel Imports", *The World Economy* 23(9) 1269-84.
- Maskus, K. E. and Y. Chen (1999), "Vertical Price Controls and Parallel Imports", *Centre for International Economic Studies Discussion Paper* No. 99/21.
- Maskus, K. E. and M. Penubarti (1995), "How Trade-Related Are Intellectual Property Rights?", *Journal of International Economics* 39, pp. 227-48.
- Mazzoleni, R. and R.R. Nelson (1998), "Economic Theories about the Benefits and Costs of Patents", *Journal of Economic Issues* 32(4) 1031-52.
- Meessen, K. M. (1987), "Intellectual Property Rights in International Trade", *Journal of World Trade Law*, pp.67-74.
- Nordhaus, W. D. (1969) *Invention, Growth and Welfare: A Theoretical Treatment of Technological Change*, Cambridge, Mass: MIT Press.
- Pacon, A.M. (1996), "What Will TRIPs Do For Developing Countries?", in Beier & Schricker (eds) *From GATT to TRIPs – The Agreement on Trade-Related Aspects of Intellectual Property Rights*. IIC Studies, Vol.18, Max Planck Institute for Foreign and International Patent, Copyright and Competition Law, Munich, pp.329-56.
- Rapp R.T. and R.P. Rozek (1990), "Benefits and Costs of Intellectual Property Protection in Developing Countries", *Journal of World Trade* 24, pp.75-102.
- Richardson, M. (2002), "An Elementary Proposition Concerning Parallel Imports", *Journal of International Economics* 56(1), pp. 233-45.
- Roland Berg Forschungs (1995), *Utilisation of Patent Protection in Europe*. Representative survey carried out on behalf of the European Patent Office, Munich.
- Sanchez-Padron, M. , V. Cano-Fernandez and E. Los Arcos (1996), "An Analysis of EPO Renewals: a First Step towards Patent Value Estimation. Some Conceptual Considerations." Paper presented at the 54th International Conference on *Innovation Modelling: The Patent* organised by the Applied Econometric Association, Luxembourg.
- Scherer, F. M. "Nordhaus' Theory of Optimal Patent Life: A Geometric Reinterpretation" *American Economic Review*, 62, pp. 422-27.

- Scotchmer, S. (1999), "On the Optimality of the Patent Renewal System", *Rand Journal of Economics* 30, pp. 181-96.
- Sherwood, R. M. (1997), "Intellectual Property Systems and Investment Simulations: the Rating of Systems in Eighteen Developing Countries", *The Journal of Law and Technology* 37(2), pp.261-370.
- Smith, P. J. (1999), "Are Weak Patent Rights a Barrier to US Exports?", *Journal of International Economics* 48(1) 151-77.
- Stegemann, K. (2000), "The Integration of Intellectual Property Rights into the WTO System", *The World Economy* 23(9) 1237-67.
- Strauss, J. (1996), "Implications of the TRIPs Agreement in the Field of Patent Law", in Beier & Schriker (eds.) *From GATT to TRIPs - The Agreement on Trade-Related Aspects of Intellectual Property Rights*. IIC Studies, Vol.18, Max Planck Institute for Foreign and International Patent, Copyright and Competition Law, Munich, pp.160-215.
- Taylor, M. S. (1993), "TRIPs, Trade and Technology Transfer", *Canadian Journal of Economics* 26, pp. 625-38.
- Taylor, M. S. (1994), "TRIPs, Trade and Growth", *International Economic Review* 35, pp. 361-82.
- Van Dijk, T. W. P. (1994) *The Limits to Patent Protection*. Maastricht: Universtaire Pers Maastricht.
- Van Dijk T, and P. van Cayseele (1993), "Economic Implications of Converging Patent Breadth in Europe", Chapter 6 in J. Hagedoorn (ed.) *Technical Change and the World Economy*, Edward Elgar, Cheltenham.
- Watal, J. (1997), "Implementing the TRIPS Agreement: Policy Options Open to India", *Economic and Political Weekly* 32, pp. 2461-68.
- Watal, J. (2000), "Pharmaceutical Patents, Prices and Welfare Losses: Policy Options for India under the WTO TRIPS Agreement", *The World Economy* 23(5), pp. 733-52.
- Watal, J. (2001), *Background note* prepared for the WHO-WTO secretariat workshop on differential pricing and financing of essential drugs. This document can be downloaded at http://www.wto.org/english/tratop_e/trips_e/tn_hosbjor_e.htm
- Weissman, R. (1996), "A Long, Strange TRIPs: The Pharmaceutical Industry Drive to Harmonize Global Intellectual Property Rules, and the Remaining WTO Legal Alternatives Available to Third World Countries", *University of Pennsylvania Journal of International Economic Law* 17(4), pp.1069-125.

Yang, Y. (1998), "Why Do Southern Countries Have Little Incentive to Protect Northern Intellectual Property Rights?", *Canadian Journal of Economics* 31(4) pp. 800-16.

Zigic, K. (1998), "Intellectual Property Rights Violations and Spillovers in North-South Trade", *European Economic Review* 42, pp. 1779-1799.