Introduction

The protection of intellectual property rights (IPRs) is one of the most controversial issues in today’s global economy. There is a vigorous ongoing debate about the strength of national systems of patent and copyright protection that is of considerable importance. Proponents of more stringent protection argue that differences in IPRs protection constitute a form of non-tariff barriers to trade in products containing a patentable innovation and that lax patent systems of many developing countries represents blatant free-riding, which distorts natural trading patterns and reduces the ability of firms to transfer technology abroad. Proponents of less stringent protection argue that strengthening global IPRs will bestow market power on inventing firms, thus enhancing the profits of the monopolistic foreign firms at the expense of domestic welfare and would constitute a barrier to legitimate trade in imitative products (Taylor 1993; Gaisford and Richardson 2000).

The continuing debate over the role of IPRs in trade, growth and development has resulted in numerous initiatives through international organizations to harmonize, strengthen and broaden the level of protection for IPRs all over the world. One outcome of multilateral negotiations was an agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of 1994, which was approved as a part of the Uruguay Round that established the WTO. The TRIPS provides minimum standards on IPRs for all WTO members.

The growing importance of the issue of IPRs has resulted in a proliferation of empirical and theoretical research analyzing the effect of protecting IPRs on national welfare, technological transfers, trade volumes and economic growth. This chapter explains key features of the protection of IPRs in the global economy. It begins by presenting the rationale for intellectual property protection in a closed economy. Attention then shifts to the impact of IPRs on national welfare in a world economy that is becoming increasingly global rather than isolated. The impact of more stringent intellectual property laws and enforcement on international trade volumes is subsequently discussed. Finally, a selection of empirical studies pertaining to intellectual property protection and trade flows is examined to determine if the theoretical conclusions are supported by the empirical evidence.

Protecting intellectual property rights in a closed economy

To demonstrate arguments for and against granting patent protection in a closed economy, consider Figure 15.1, where the domestic market for a patentable product is illustrated. In the absence of patent protection for this product, the competitive price would be $P^*_C$ and, given the demand for the product is represented by the curve $D$, equilibrium output $Q^*_C$ will result. Welfare maximization in a single market would require that
the market price for a product is equal to the marginal cost (MC) of production. The diagram shows a simple case where the marginal cost is constant and, thus, is equal to the average cost of production. Since price is then equal to average cost, this implies zero economic profits at the production stage. The sunk cost of expenditures on research and development, however, are not covered. Consequently, there is no pecuniary incentive to engage in innovation and the product would not be developed by competitive industry in the absence of policy action. Clearly, this competitive outcome is not efficient. In this system, market price fails to provide the proper signals to economic agents because it does not take account of the costs of inventing. This, in turn, implies that the market would underinvest in new ideas and information, as research and development involves additional costs and results in negative profits for innovators.

Hence, the most compelling argument usually presented in favor of intellectual property protection, say through patents, is that it provides an incentive to undertake research and development activities and fosters the dynamic benefits associated with the production of knowledge. Providing patent protection enables an innovator to exercise temporary monopoly power over the market for the patentable product and to earn a return on the invention. In this scenario, monopolistic price $P^*_M$ will be established on the market and a patent-holder will garner the profit on production represented by the area B. The monopoly profits will provide some return on the cost of inventing. Thus, it seems that the outcome of this standard monopoly pricing model may justify the arguments in favor of strong patent protection.

However, there is a negative side of this story. In contrast to the efficient solution described above, in the monopolistic framework consumers and society as a whole are clearly worse off. The consumer benefits decrease from area A + B + C to A in Figure 15.1. In other words, with monopolistic power in the market, consumers enjoy less output at a higher price. IPRs protection endows a patent-holder with a monopoly on the use of patented products which, in turn, leads to monopoly distortions of consumer choice. In addition, it may be argued that patents are an imperfect method of fostering invention (Deardorff 1992). An optimal patent system fails to promote all worthwhile inventions, since the creation of only those innovations for which expected net gains in monopoly profit exceed the research and development costs will be initiated. Furthermore, the
welfare of a country depends on the average level of product improvement. While strong patent rights increase this average level of product improvement by stimulating innovation, they may also inhibit innovation by preventing a wider dispersion of new technology. In this case, the outcome is the following: fewer publicly available technologies, lower levels of technological spillovers, and, consequently, possibly higher per unit research costs for all firms. In this sense, incomplete patent protection may be optimal. With less restrictive patents, more technologies would remain in the public domain, which, in turn, would allow for more widespread availability and application of innovation (Diwan and Rodrik 1991; Falvey et al. 2002). Further, in practice, patent laws help to protect the innovators from imitation by increasing the price of infringing goods, but they fail to grant the perfect protection theorists often assume. For example product ‘masquing’ technologies are common in practice (Taylor 1993).

In summary, in choosing its IPRs policy a country that acts in isolation will look for the optimal balance between the benefits from enhancing the incentive to innovate, on one hand, and costs of monopoly distortions and lower diffusion of new technology and innovation, on the other. The final policy choice will be some intermediate level of patent strength.

**IPRs and national welfare in a global context**

With national economies becoming increasingly affected by the forces of globalization and the resulting increase in the cross-border trade, investment and the transfer of information, there is a growing recognition of the importance of technology and knowledge spillovers for economic growth. As a result, IPRs have become an issue of international concern.

As we concluded in the previous section, if each country acts in isolation when establishing its system IPRs, they will search for the optimal level protection that suits their own circumstances. However, in contrast to the case of a closed economy, where the country’s patent strength affects only domestic economic agents, in a global market, patent protection in one country affects welfare in other countries. Thus, a country’s choice of its level for IPR protection is now dependent on the choices of other countries and its choice affects other national markets.

Falvey et al. (2002) note that the way patents are applied tends to push countries to choose extreme patent strengths. Even for two identical countries, it is not individually rational to choose patent systems of identical strength. In order to provide an insight for this statement, consider a world of two identical countries A and B. If the countries had identical patent systems, firms from A would have half the sales in country B and vice versa assuming no transportation and transaction costs associated with the international transfer of goods. If country A has a lax patent system, however, it may make eminently good sense for the country B to choose tighter patent procedures. By doing so, B will completely control the sales in its domestic market plus half of the sales in A. In addition, by choosing stronger patent protection, country A provides global incentives for innovation that would not otherwise exist. Alternatively, if country A has a stringent patent system, it is rational for the country B to choose weaker patent protection. In this case, B will not bear the costs of the monopoly distortions, will reap the benefits of free riding and enjoy the higher level of average product improvement due to greater tolerance of imitation. Hence, in a Nash equilibrium, where each country adopts an individually rational strategy and
does not want to deviate from this, one country will have a strong patent system and the other one will have weaker patent protection.

From a global perspective, the resultant Nash equilibrium is sub-optimal, because intellectual property protection is under-provided. The reason for this is that each country ignores the benefits that its tighter protection generates for the other countries. As neither side takes into account these positive spillovers, less than the efficient incentives for innovative activity are provided on a worldwide basis. This result can be contrasted with the outcome which arises in the presence of an institutional framework that has the objective of achieving international cooperation (Gaisford and Richardson 2000).

Whenever the two countries are not symmetric with respect to their characteristics, there are further reasons why it is optimal for them to choose patent systems of different strength. That is why it comes as no surprise to observe that the strength of IPRs protection varied across the globe prior to the TRIPS which standardized patent length internationally. These differences, being more acute between developed and developing countries, resulted in a dispute about the increase in IPRs protection during negotiations to establish common worldwide standards. The basic economic issue that underlies the conflict between the North (that is the developed countries) and the South (the developing countries) is not difficult to understand.

The developed countries argued for the stricter enforcement of IPRs on the grounds that lax patent protection in developing countries allowed for a greater possibility of free riding on the part of local firms, which competed with innovating firms from developed countries. Clearly, tighter protection of IPRs laws and their enforcement in the South would be profitable for the North. It would reduce the ability of domestic firms in the South to imitate technologies embodied in foreign products and, consequently, would result in increased costs associated with infringement. In this way, innovators in the North would be more protected from imitators in their export markets, encouraging additional production and exports of patentable products. The resulting higher monopolistic profits would expand the set worthwhile research and development activities leading to innovations that otherwise would not have taken place as soon. In contrast, the strong imitative abilities and weak patent rights in the South do not allow the innovator to discriminate internationally and reap additional profits. In addition, the differences in the protection of IPRs across the countries constitute a form of non-tariff barrier to trade. For example, for the producer to sell its patentable product internationally, it is necessary to obtain an array of independent national patents, which entails considerable expenses.

For the developing countries there exists a strong free-riding motive because the vast majority of innovative activities take place in the North and the South is mainly a consumer of invented products. The more lax is the protection of IPRs, the less developing countries have to pay for the innovated products. If innovative ideas diffuse freely and the capacity for imitation is high, a close substitute will be produced in the South. Not only are such products likely to be sold domestically at a price lower than would be charged by the foreign monopoly, but they may also be exported to other countries with weak IPRs. In such a situation, it is independently rational for a developing country to provide little protection or no protection whatsoever since the new products can be obtained at competitive prices in any case. Of course, this argument considers only the short run because it does not recognize the disincentive effect on innovation in the North and, hence, that there will be less innovations available to pirate in the future.
The issue of IPRs became controversial in the mid-1980s as the proportion of the value of goods constituted by intellectual property began to rise. For those interested in strong international protection for intellectual property, the existing international conventions pertaining to intellectual property were found wanting. In 1883, the Paris Convention for the Protection of Industrial Property was founded to coordinate patents and in 1886 the Berne Convention for the Protection of Literary and Artistic Works was formed to coordinate copyrights. In order to administer both the Paris and Berne conventions, the World Intellectual Property Organization (WIPO) was established in 1967. In the 1980s developed countries’ frequent frustration with the voluntary nature of the WIPO led to the inclusion of trade-related IPRs on the negotiating agenda for the Uruguay Round of GATT talks. In 1994, the TRIPS agreement was concluded, imposing additional requirements on all WTO members (Gaisford and Richardson, 2000). A major facet of the TRIPS is cross-agreement retaliation through the WTO whereby retaliatory trade measures on goods can be imposed on countries that fail to protect the intellectual property of foreign firms (Boyd et al. 2003; Kerr 2003). As countries wishing to be part of the WTO cannot opt out of the TRIPS, an enforcement mechanism has been added to the multilateral system for the protection of intellectual property.4

The TRIPS agreement was vigorously supported by most developed countries but was extremely controversial for many developing countries. Gaisford and Richardson (2000) argue that the provisions of the TRIPS agreement constitute ‘a fundamental and ill-advised departure from the traditions built up through many rounds of GATT negotiations’ (p. 138). Successive GATT agreements have required symmetric reductions in tariff protection across the countries allowing for the rates of final tariff protection to be asymmetric in accordance to a country’s development status. Hence, some forms of discrimination in favor of developing countries were provided. On the contrary, the TRIPS agreement required asymmetric increases in the durations of intellectual property protection to establish common world standards for patents and copyrights. The only significant concession in favor of the developing countries was longer periods of grace for implementation.

The acrimonious debates over the TRIPS agreement resulted in a considerable research effort to find an answer to the question of how more stringent patent protection will affect the distribution of welfare, trade flows, technology transfer and growth across countries. One prominent study, Deardorff (1992) showed that the extension of patent protection from the North, where innovation takes place, to the South, which only consumes innovative products, unambiguously increases the welfare of the inventing countries but may decrease the welfare of the developing countries. Moreover, the decline in the South’s welfare may far exceed the increase in the North’s welfare. In this case, there will be adverse effects for the world as a whole arising from stronger patent protection. With time, as the coverage of patent protection is extended to more and more countries in the world, there will be a definite loss in the world welfare. This is due to the fact that the number of additional innovations that can be stimulated by extending patent protection diminishes with an increase in the number of markets covered. Thus, after a certain threshold, the costs of extending patent protection will outweigh the benefits. As a result, it may be optimal to limit patent protection geographically.

Further, Deardorff (1992) demonstrated that even if the world’s efficiency does initially improve from extending more stringent patent systems, it is because of the North’s
relatively high gains at the expense of the rest of the world. However, for the developing countries, the benefits from increased economic activity are not strong enough to outweigh the losses from monopoly power and lower dispersion of new technology. This argument provides a formal rationale for the opposition of developing countries to the proposals for more stringent patent protection.

Another pioneering theoretical study by Chin and Grossman (1990) found that more stringent intellectual property protection may or may not enhance global welfare. They demonstrated that there is a conflict of interest between developed and developing countries such that it may be in the South’s interest to evade rather than enforce the protection of IPRs.

The arguments above strongly rely on the assumption of identical demands for invented goods in both countries. However, in reality the developed and developing countries have different technological needs or tastes and, therefore, the inventions demanded by different countries can be different. Diwan and Rodrik (1991) assume that North and South have differences in distributions of preferences over the range of potential innovated products. This, in turn, implies a greater incentive for the South to protect IPRs, because tighter patent protection in the South now implies a larger proportion of scarce research and development resources will be allocated to the invention of goods that are of particular importance to its consumers. To put it differently, more stringent property protection in the South leads to a tighter fit between innovated technologies and the preferences of its population. This additional incentive can at least partially offset the strong free-riding motive the South would have in case of identical technological needs and tastes.

The model by Diwan and Rodrik (1991) suggests that the restrictiveness of the prevailing patent laws in the South has important implications for the welfare of both regions. More stringent patent protection in the South affects the welfare of the North and the South in two directions: (a) through the magnitude of profit transfers from the South to the North; and (b) through the change in the range of innovated technologies. The second impact is of particular interest as it suggests that the stringency of intellectual property protection affects not only the quantity of the products innovated, but also their quality. In other words, the South’s more stringent patent rights will facilitate the invention of technologies more appropriate to their own preferences and may skew the range of innovations away from Northern preferences. In this vein, Gaisford et al. (2001) examine the impact of IPRs in agricultural biotechnology on the trade patterns. The authors note that there exists substantial potential for the innovations that are more appropriate to the local needs of developing countries that are left unexplored. One reason for this is the low levels of income and resulting low demand in developing countries. Therefore, the degree to which the extension of patent protection in the South will alter the range of products innovated remains problematic. Merely suggesting that the South could reap greater benefits by protecting intellectual property more vigorously, because it will stimulate the invention of more ‘local’ technologies, leaves the vital question of affordability unanswered. Are the developing countries able to pay monopolistic prices for more ‘appropriate’ innovated products, such as drugs to combat tropical diseases, and to reap the benefits of extended protection? If the answer to this question is doubtful, as the HIV/AIDS crisis in Africa seems to suggest, then the debate regarding extending patent protection in poor developing regions may be a moot point.
The theoretical results of the welfare analysis by Diwan and Rodrik (1991) imply that a benevolent global planner would assign identical rates of patent protection to the North and South only if their welfare levels are weighted equally, that is when the global welfare function is strictly utilitarian. In addition, the results of their numerical simulations suggest that when the poor South’s welfare is given priority, as in the case of an egalitarian global welfare function, the North should be required to provide a higher level of patent protection.

The findings of the previous models critically depend on the assumption of how the information about the innovated product is transmitted. If one assumes that information is costlessly spread from the North to the South and the South’s level of imitation is high, then the same product may be produced in the South with no patent protection whatsoever. However, in reality, innovative ideas do not diffuse without cost. Consequently, extending patent protection may be beneficial for the developing countries to the extent that it stimulates the transfer of technology (Deardorff 1992).

To investigate how the stringency of the South’s patent protection affects the level of unintentional technology transfer, a North–South model is developed by Taylor (1993). He adopts a leader–follower (Stackelberg) framework where the North is the first to move and to set its output and ‘market-made’ barriers to imitation, such as physical masking techniques in order to deter local imitators. It is assumed that both institutional and market-made barriers to imitation affect Southern costs of production. In this respect, southern production costs are increasing in the strength of the South’s patent protection and in the level of the North’s efforts at masking product technology. The results of the model indicate that vigilant intellectual property protection by the South reduces the need of firms in the North to invest in masking their product’s characteristics and, consequently, leads to higher flow of unintended technology transfers. This increase in the transfer of technology to the South would enhance the productivity of resources employed in the South and, hence, raise output in the South. Conversely, laxly enforced intellectual property laws in the South would call forth defensive reactions from the side of innovative firms, which can limit technology transfer to the South. This represents a Pareto-inferior position for the world economy. The North is diverting resources into strategies to reduce imitation and the South, in its turn, is employing resources to uncover the ‘embodied technology’. The analysis suggests moving away from this situation through the use of a mechanism to protect IPRs more vigorously will be beneficial for both the developed and the developing countries. The world welfare is maximized at some intermediate level of patent strength.

Taylor (1994) employs a two-country endogenous-growth model to investigate the effect of intellectual property protection on world trade, technology transfer and growth. His analysis leads to the conclusion that laxly enforced patent laws in developing countries: (a) reduce the incentive for inventors to implement best practice research techniques; (b) decrease the willingness of innovators to transfer technology abroad; (c) reduce global research and development activities; and (d) slows global economic growth. The stark move from a symmetric protection regime to an asymmetric one brings a loss in export opportunities for the developed countries, where innovating firms are concentrated, and distorts the patterns of trade in both goods and research and development. In addition, a move to asymmetric protection eliminates technology transfer between the countries and, consequently, slows down the rate of technological progress in all industries in the developing countries. The welfare of both regions may fall in the move to an asymmetric
IPRs regime. On the contrary, if the levels of intellectual property protection are equalized across countries, innovative firms will have an incentive to transfer technologies abroad, the allocation of the world technical resources will improve and, in many cases, world economic growth will rise. Thus, the paper by Taylor (1994) argues that there is substance to the claims of the developed countries.

In contrast to Taylor (1994), Grossman and Lai (2002) examine an optimal government policy for intellectual property protection in the framework of a simple model of endogenous innovation. They found that the harmonization of patent systems is neither necessary nor sufficient for the efficiency of the global patent regime. This result is consistent with a study by Gaisford and Richardson (2000), which addresses problems caused by the establishment of a harmonized world level of intellectual property protection under the TRIPS agreement. These authors argue that, given the existing asymmetry in innovative capacity across countries in the world, the common international standards for IPRs protection established by the TRIPS are not likely to be mutually beneficial. The move to the uniform worldwide standards worsens the positions of the developing countries both absolutely and relative to the developed countries. The developing countries potentially suffer significant losses in their national welfare and would comply with TRIPS requirements only under the threat of WTO trade sanctions. Alternatively, a mutually beneficial efficient solution can be achieved with asymmetric intellectual property protection where lower levels are allowed for developing countries and higher are required for developed countries. To support this statement, the authors develop a partial-equilibrium, game-theoretic model, which focuses on patent lengths. The results of the model simulations imply that a move to symmetric levels of patent protection will lead to a 40–47 percent decline in the net welfare benefits from innovation in the developing countries. At the same time this change is unambiguously welfare enhancing for the North.

**IPRs and trade volumes**

The issue of the trade-related IPRs has gained more importance as the share of high technology products in total world trade has increases from 12 percent in 1980 to 24 percent in 1994 (see Braga and Fink 1999). The main findings of the theoretical studies establish that IPRs are related to international trade flows. The theoretical literature alone cannot provide clear prediction on the direction of the impact of greater intellectual property protection on international trade flows.

To analyze the influence of the level of IPRs protection on international trade flows, Maskus and Penubarti (1995) developed a model in which a dominant exporting firm competes with a fringe industry in a particular market. The fringe industry is capable of imitating the dominant firm’s production process and produce competing goods. The paper shows that the optimal response of an exporting firm to a marginal strengthening of intellectual property laws by an importing country could be to either increase or decrease its exports. This is because there is a tradeoff between enhanced market power and greater market size. In other words, the results of the model indicate that no unambiguous theoretical prediction can be made about the effects of strengthening IPRs protection on international trade flows because there are two opposing effects. On one hand, a stronger level of IPRs protection decreases the level of imitative activity in the importing country. This increases the demand faced by the exporting firm, encouraging it to export more to the local markets. This is known as the market expansion effect. On the
other hand, stronger protection of IPRs grants monopoly power to the exporting firm by
assuring exclusive rights for its products and technologies. This allows the firm to behave
more monopolistically and export less. The latter effect is known as the market power
effect. Thus, the impact of the imposition of stronger IPRs protection depends on the rela-
tive importance of the two countervailing effects.

The market expansion effect lies at the heart of the numerous initiatives from the side
of international organizations to harmonize and strengthen the level of IPRs around the
world. The developed countries contend that differences in intellectual property protec-
tion constitute a form of non-tariff barriers to trade, which distorts natural trading pat-
terns. Thus, the asymmetries in national standards of IPRs protection are thought to
negatively affect trade between countries. However, the market power effect provides
support for the developing countries’ counter argument. From their point of view, a more
stringent IPRs system would provide monopoly power to the foreign firms and decrease
foreign exports to their domestic markets. In addition, such requirements would consti-
tute a barrier to legitimate trade in imitative products and substantially restrict the exports
of developing countries in ‘IPR sensitive’ industries.

According to Smith (1999), the relative strength of the market-power and market-
expansion effects depends on how exporters respond to the threat of imitation (or its
absence) in the importing country. Table 15.1 describes the relationship between threat of
imitation and market power and expansion effects. The table entries describe the threat of
imitation as an interaction between imitative abilities and level of IPRs protection in the
country. As is summarized by Shevtsova (2004), the numbers in the cells rank the threat of
imitation from weakest (1) to strongest (4). A stricter patent system is expected to pri-
marily generate an increase in market power in importing countries with a weak threat of
imitation (Group 1) because few substitutes are available. For these markets, enhanced
patent protection increases the monopoly power of innovative firms by ensuring exclusive
rights to their technologies. Higher prices then follow from a restriction in the supply of
exported goods. By contrast, in importing countries where there is a significant threat of
imitation (Group 4), the market-expansion effects are expected to be dominant if the
patent system becomes stricter because imitation is made more difficult. Reductions in
masking costs incurred by innovative firms then lead to greater exports. In situations with
a moderate threat of imitation (Groups 2 and 3), it is not possible to make an unambigu-
ous prediction concerning the impact of more stringent intellectual property protection
on trade flows.

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<th>Weak IPR protection</th>
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<td>Weak imitative abilities</td>
<td>2. Moderate threat of imitation; ambiguous effect (+/-)</td>
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<td></td>
<td>1. Weak threat of imitation; market power effect (-)</td>
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<td>Strong imitative abilities</td>
<td>4. Strong threat of imitation; market expansion effect (+)</td>
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<td>3. Moderate threat of imitation; ambiguous effect (+/-)</td>
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Source: Smith (1999)
In general, theoretical analysis provides few definitive priors on how stronger intellectual property protection will affect international trade flows. Further, there are important additional complications. First, an innovative firm’s response to an increase in intellectual property protection will depend on the structure and strength of the trade policy regime in the importing country. Second, a firm’s decisions about the volume of exports to a particular market are interdependent with its decisions to service the market through licensing or foreign direct investment (see Horstmann and Markusen 1987). All this implies an imperative for empirical analysis to ascertain how enhanced intellectual property protection by an importing country will affect trade volumes.

Maskus and Penubarti (1995) examined the influence of differences in national patent laws on international trade. A positive relationship was found between manufacturing exports of OECD countries and the level of IPR protection in importing countries. This relationship was found to be stronger in developing countries with significant abilities to imitate and weaker in small developing countries with low incomes. From these results the authors conclude that for bigger developing countries with stronger imitative abilities the market expansion effect dominates, causing the exporting country to export more due to the expansion of market size. Conversely in small, low-income developing countries, the enforcement of the level of IPRs protection enhances the market power effect, which in turn causes the exporter to exercise more market power. Consequently, its export volumes increase by a smaller proportion than in the first case. A study by Ferrantino (1993) using US data also provides empirical evidence in support of a positive relationship between trade volumes and the level of intellectual property protection in importing countries as proxied by the duration of patent rights.

Smith (1999) showed that, while US exports are sensitive to intellectual property protection in importing countries, the relationship is more complex. There is a positive relationship for importing countries with strong infringement abilities due to the domination of the market expansion effect and negative in the case of importing countries with a low threat of imitation because stronger intellectual property protection enhances the market power effect, stimulating US exporters to reduce their exports to those markets. In addition, Smith’s results indicate that IPRs have a market expanding effect on US exports to countries in the lower-middle income per capita group, which is consistent with the findings by Maskus and Penubarti (1997). These patterns prevail in the majority of manufacturing industries and in the aggregate for patent-sensitive industries. Smith (2002) also obtained similar results in an additional study focusing on the effects patent rights have on US exports in three drug industries: biological products, medicinals and botanicals and pharmaceuticals.

Rafiquzzaman (2002) studied the impact of national differences in the level of protection of patent rights on international trade flows using Canadian manufacturing export data. He found that stronger IPRs protection induces Canadian firms to export relatively more to high-income countries than to low-income countries. In addition, Canadian exports are biased against those importers that pose a weak imitative threat due to the market-power effect and biased toward those importers that pose a strong imitative threat due to the market-expansion effect. Wisniewski (2003) contributed new empirical evidence on the sensitivity of US exports of biotechnology related agricultural inputs to national differences in IPRs protection. This study provided some support for the market-expansion hypothesis for field crop seeds and significant support for the market-power hypothesis for both field crop seeds and agricultural chemicals. Wisniewski also found
that the relationship between the strength of IPRs and trade was not sensitive to a country’s ability to imitate. It is worth noting that Wisniewski’s findings for the biotechnology related agricultural industry are different from the results for manufacturing industry described above. This suggests that findings for manufacturing products may not be applicable to the agri-food sector.

**Conclusion**

Despite the fact that a great deal of effort has already been expended in the attempt to shed light on the debates over IPRs, there are still some aspects that require a more detailed theoretical and empirical investigation. It is apparent that existing empirical studies focus on industries at fairly high levels of aggregation. Thus, more empirical work is needed at the level of disaggregated industries or even the firm level. For example, trade in agricultural products warrants further attention. Knowledge of the performance of firms and industries in this field is becoming increasingly important to policy makers as the amount of intellectual property embodied in agricultural products increases due to the potential for widespread application of agricultural biotechnology. As the existing theoretical and empirical studies do not provide unambiguous predictions related to more stringent IPRs protection, reliable normative policy recommendations remain elusive.

**Acknowledgments**

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**Notes**

1. An invention is considered to be worthwhile as long as the consumer benefits exceed the costs of research and development.
2. The countries are identical in terms of number of firms and market size.
3. Traded good are subject to the patent strength of both the importing and exporting countries and must satisfy the stronger of two systems. Exporting the imitated product to a country with stronger patent rights would infringe the patent in the destination country (Falvey et al. 2002).
4. The efficacy of this enforcement mechanism has been questioned by Yampoin and Kerr (1998).

**References**


