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IFN Working Paper No. 704, 2007

Intellectual Property Rights, Parallel Imports and Strategic Behavior

Mattias Ganslandt and Keith E. Maskus

Intellectual Property Rights, Parallel Imports and Strategic Behavior

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Abstract

The existence of parallel imports (PI) raises a number of interesting policy and strategic questions, which are the subject of this survey article. For example, parallel trade is essentially arbitrage within policy-integrated markets of IPR-protected goods, which may have different prices across countries. Thus, we analyze fully two types of price differences that give rise to such arbitrage. First is simple retail-level trade in horizontal markets because consumer prices may differ. Second is the deeper, and more strategic, issue of vertical pricing within the common distribution organization of an original manufacturer selling its goods through wholesale distributors in different markets. This vertical price control problem presents the IPR-holding firm a menu of strategic choices regarding how to compete with PI. Another strategic question is how the existence of PI might affect incentives of IPR holders to invest in research and development (R&D). The global research-based pharmaceutical firms, for example, strongly oppose any relaxation of restrictions against PI of drugs into the United States, arguing that the potential reduction in profits would diminish their ability to innovate. There is a close linkage here with price controls for medicines, which are a key component of national health policies but can give rise to arbitrage through PI. We also discuss the complex economic relationships between PI and other forms of competition policy, or attempts to limit the abuse of market power offered by patents and copyrights. Finally, we review the emerging literature on how policies governing PI may affect international trade agreements.

Keywords: IPR, parallel imports, international arbitrage, research and development

JEL codes: F15, L14, K21

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1. Introduction

This chapter surveys the primary literature on a particular aspect of intellectual property rights (IPR) that is crucial for competition but heavily understudied to date. As described elsewhere in this volume, various forms of IPR, including patents, copyrights, trademarks, plant variety rights, and other policies, protect the exclusive rights of their owner to produce, sell, import, and license their goods and technologies or to use specific identifying marks and brand names. However, for purposes of achieving the desired policy balance between ownership rights and consumer access, numerous limitations are placed on the exercise of IPR. For example, patented medicines may be subject to compulsory licensing, protected plant varieties may be used by rival firms under a research exception, and copyrighted published materials may be copied for educational purposes, under the fair use doctrine. The scope of exclusive rights versus the extent of such limitations is largely a matter of national discretion, subject to the minimum expectations set out in the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) at the World Trade Organization (WTO).

Among the most important of such limitations is the exhaustion doctrine. This doctrine, which is explained more fully in the following section, simply states that at some point the owner of an IPR may no longer control distribution of a good that it had legitimately placed on the market. For example, once a patent or trademark owner sells a protected commodity within the United States she no longer can control its distribution because first sale within the country exhausts original ownership rights, which are transferred to the buyer. Similarly, distribution rights are exhausted upon first sale

anywhere within the European Union. However, both U.S. and EU policy prohibit imports of such goods from outside their territories.

Once exhaustion applies, it becomes legal for any interested party to sell or give away the goods he has purchased within the region of application. Because such transactions occur in channels that are outside the distribution system of the original IPR owner, they are referred to as either “gray market trade” (in the United States) or “parallel imports” (in the EU and most of the world). The terminological difference reflects territorial variations. There are no “imports” within the United States, but there is unauthorized parallel exchange among exclusive territories, hence the term gray market. Within the EU, however, such goods are traded across national borders. In this chapter we will refer to this process as parallel imports (PI) or parallel trade, noting here that most of the analysis holds equally for intra-regional trade within a nation.

The existence of PI raises a number of interesting policy and strategic questions, which are the subject of this chapter. For example, parallel trade is essentially arbitrage within policy-integrated markets of IPR-protected goods, which may have different prices across countries. Thus, we analyze fully two types of price differences that give rise to such arbitrage. First is simple retail-level trade in horizontal markets because consumer prices may differ. Second is the deeper, and more strategic, issue of vertical pricing within the common distribution organization of an original manufacturer selling its goods through wholesale distributors in different markets. This vertical price control problem presents the IPR-holding firm a menu of strategic choices regarding how to compete with PI.

Another strategic question is how the existence of PI might affect incentives of IPR holders to invest in research and development (R&D). The global research-based pharmaceutical firms, for example, strongly oppose any relaxation of restrictions against PI of drugs into the United States, arguing that the potential reduction in profits would diminish their ability to innovate. There is a close linkage here with price controls for medicines, which are a key component of national health policies but can give rise to arbitrage through PI. We also discuss the complex economic relationships between PI and other forms of competition policy, or attempts to limit the abuse of market power offered by patents and copyrights. Finally, we review the emerging literature on how policies governing PI may affect international trade agreements.

Thus, in this chapter we review the analytical literature on exhaustion and PI. In Section 2 we discuss briefly some basic introductory concepts. We then turn to the legal framework governing parallel trade, including within international trade agreements. In Section 3 we consider models of price discrimination and retail arbitrage through PI, including implications for quality of goods. In Section 4 we analyze the possibility of wholesale arbitrage through vertical organization of distribution channels. In Section 5 we review the literature on PI and incentives to engage in R&D. Finally, in Section 6 we consider the limited empirical evidence available on the determinants and impacts of parallel imports. Concluding remarks are in Section 7.

2. Basic Economic and Legal Concepts and the Exhaustion Doctrine

Almost all legally produced (i.e., not counterfeited) goods are sold with the benefit of some form of intellectual property rights. Pharmaceutical products, for example, generally begin life with patent protection in one or more countries. New

machinery and transport equipment embody numerous technologies in their component parts that may also be patented. Digital products, such as music recordings on compact disks and software, are sold under copyrights. New cinematic films and television broadcasts similarly have exclusive rights under copyright protection. Fashion goods and cosmetics are marketed in different countries with the benefit of trademarks, brand names and logos. Indeed, many products incorporate a complex mix of numerous IPR. Medicines, for example, may be patented but are sold by licensed companies bearing the rights to use registered brand names and trademarks. Microsoft's software products embody patents, copyrights and brand names.

Classic "intellectual property goods", such as pharmaceuticals, seed varieties, books, recordings, computer software, wines, and high-end cosmetics, share a number of important characteristics. First, it generally requires a significant investment of capital and engineering to invent or create the intellectual asset itself, such as a chemical formulation, genomic tool, symphony, platform computer program, or quality and reliability reputation. Next, taking that idea or expression and converting it into commercially useful products also involves substantial and costly investments in organizing production facilities, testing, labeling, marketing, and distribution. These features together imply that there typically are large upfront fixed costs in invention, creation and innovation.

However, once these fixed costs are paid and the good is ready for market, the actual marginal production and distribution costs are comparatively small. Drugs are produced at very low per-unit cost, once the formulation is perfected. Computer software may be distributed electronically at virtually zero cost. The actual monetary costs of a

fashionable shirt or the ingredients in a bottle of perfume may be just pennies, in relation to the per-unit value of the trademark under which it is distributed.

The obvious implication of this combination of high fixed costs and low marginal costs is that free riding through imitation, unauthorized copying, and trademark counterfeiting is likely to be endemic in countries without strong IPR protection. The essential and familiar point of IPR is to provide innovators with exclusive production and marketing rights in order to support prices above marginal distribution costs, thereby earning a return that compensates for the costs of investing in new ideas, cultural goods, and reputations. Without it, the development of new technologies and goods would be severely curtailed.

A less obvious, but no less important, implication is that innovators have a strong incentive to sell their IPR-intensive goods at different prices to different types of consumers. There are always “impatient” consumers who are willing to pay higher prices for more rapid delivery or product versions with higher quality characteristics and there are always “patient” consumers who would prefer to economize through waiting or accepting less quality. Countries, or various groups within countries, similarly may display different demand functions for information goods and cultural products. Given these differences, innovator firms clearly would prefer to differentiate their prices, terms, or access to raise their aggregate returns to investment. If, for example, a music producer can sell compact disks at a lower price in poor countries than in rich countries, it would prefer to do so as long as those lower prices cover marginal costs and generate more consumption.

The legal principle governing whether, in fact, firms can segment markets in order to support price discrimination across countries in goods protected by IPR is the exhaustion doctrine. In brief, it means that, once a product is placed legitimately onto one market, the rights to prevent further distribution across national borders without authorization may be exhausted or sustained. Where such secondary international distribution occurs without authorization by the original rights holder, the activity is termed parallel imports or gray-market imports.

The exhaustion doctrine is a fundamental component of each country's IPR regime. With strong rights to preclude parallel trade, firms can segment markets and deploy price differentiation that should raise profits. Without them, markets become more integrated and firms suffer a diminished ability to set discriminatory charges. These differences matter for marketing strategy, the vertical organization of distribution, and investments in future research and development (R&D).

2.A. International Differences in the Exhaustion Doctrine

Before we proceed to the economics of parallel imports, it is useful to provide fundamental perspective on the variations in the legal treatment of PI across countries.³ Exhaustion policies vary widely as may be seen in Table 1. The European Union asserts regional exhaustion in all fields of intellectual property within the Community but excludes PI coming from outside member states. The European Court of Justice (ECJ) consistently has upheld the view that, under the Treaty of Rome, free circulation of goods takes precedence over IPR. This principle of legally unrestricted arbitrage extends to goods that may be on the market in different countries due to varying price controls, including pharmaceutical products, despite the evident conflict between trade policy and

³ This discussion summarizes the extensive treatments in Maskus (2000) and Fink (2004).

public-health policy. Thus, national governments within the EU cannot use differential price mandates to justify restrictions on PI. An important exception is that if products are placed on the market under a compulsory-licensing order, they may not be parallel traded. A further exception is that the first showing of a film or television broadcast does not exhaust distribution rights within the EU.

Policy in the United States follows a mixture of regimes. Under the first-sale doctrine, rights to control redistribution of all IPR-protected goods are sold upon initial transaction within the country.⁴ Regarding PI in trademarked goods, US law sets out a “common-control exception,” under which trademark owners are permitted to bar PI except where both the foreign and domestic firms are in a parent-subsidiary relationship (Palia and Keown 1991; National Economic Research Associates 1999). The notion is that if a parent cannot control its owned distributors there is no rationale for the customs authorities to act in their behalf, a point upheld by the Supreme Court in *K Mart Corporation v. Cartier* (486 US 281, 1987). Moreover, to exclude PI a trademark holder must demonstrate that the imported goods are not identical in quality to the original products and could cause confusion among consumers. The situation is different for patents and copyrights. Patent owners in the United States are protected against PI by an explicit right of importation. Neither may copyrighted goods be parallel imported under terms of the Copyright Act of 1976.

The difference in treatment is natural when one considers the legal basis of the underlying IPR mechanisms. Patents and copyrights are designed explicitly to provide monopoly rights so that the inventor or creator can recoup the costs of investment.

⁴ For clarification, it is worth noting that this doctrine does not apply to licensed products, including software, which may not be resold without permission.

Accordingly, the ban on PI simply forms a component of the exclusivity, or scope, of those rights. Trademarks, however, in the law exist as a guarantee to consumers that the firms using the marks were the ultimate origin of goods sold. Parallel imports are, in fact, legitimate goods that were originally sold under the trademark. If no consumer confusion would result then PI amount to another distribution channel for authentic commodities since parallel imports are not counterfeit but genuine goods.

Japan allows PI in patented and trademarked goods unless they were explicitly barred from parallel channels by contract provisions or unless their original sale was subject to foreign price regulation. In copyrights it pursues an open PI regime except for motion pictures, representing the lobbying power of its movie industry. Overall, Japan's case law makes that country much more open to PI than the United States (Abbott 1998).

Australia generally permits PI in trademarked goods but patent owners may block them. In 1998 Australia ended protection from PI for copyrighted compact disks and did so later for digital video disks.

Finally, India has international exhaustion in trademarked and patented goods, but largely blocks PI in copyrighted items. Again, this reflects the strength of the local film industry, plus growing interests in software protection. Generally, few developing nations restrict PI in any field of protection, reflecting in part the absence of broader competition policies and the existence of stricter limitations on the exercise of intellectual property rights than are found in the United States and EU.

2.B. International Agreements on Exhaustion

Despite lengthy negotiations, it proved impossible in the deliberations leading to the TRIPS Agreement at the World Trade Organization to reach a global consensus on

exhaustion policy. Countries with strong export interests in intellectual property, primarily the United States, pushed for a global regime of national exhaustion in patents and copyrights, which would have banned parallel imports anywhere. Major developing countries and some developed countries were unalterably opposed to such a restriction, particularly in light of perceived needs to have access to PI in medicines. As a result, Article Six of TRIPS essentially states that each country is permitted to establish its own rules on exhaustion, subject to the condition that it do so on the basis of non-discrimination, as enshrined in the national treatment and most-favored-nation principles.

It is not surprising that a global rule on PI could not be reached. Indeed, this is precisely the point of the model in Richardson (2002). He demonstrated in a multiple-country model with Nash bargaining that neither a regime of full international exhaustion (a uniform global price), nor a regime of full national exhaustion (segmented markets), could be sustainable in equilibrium.

Some agreements have been reached in the context of preferential trading arrangements (PTAs). As noted above, the EU has a region-wide exhaustion policy, which is particularly interesting in light of the recent accession of lower-income transition economies in Eastern and Central Europe. In contrast, the language of the North American Free Trade Agreement (NAFTA) contains no explicit reference to exhaustion, suggesting that the policy is left up to individual members. However, in its recent negotiations of PTAs with Central America nations, Peru, Colombia, Jordan, Morocco and Vietnam the United States has made it a priority that its trading partners

restrict parallel imports in pharmaceuticals (Maskus, 2006). This provision, one of the so-called “TRIPS-Plus” features of bilateral trade agreements, is highly controversial in developing countries.

2.C. Competition Law and Parallel imports

A policy of national exhaustion, banning parallel imports, amounts to a government-supported segmentation of international markets. As we will analyze in detail later, IPR-owning firms would take advantage of this situation through profitable price differentiation. Even in the absence of a legislated ban, however, firms might write contracts with distributors that prevent them from engaging in PI or selling to parallel-trading companies. Such vertical restraints with the effect of geographically partitioning markets are sometimes considered incompatible with competition law. In the United States, for example, it is generally illegal for an exclusive territorial distributor to discriminate between potential customers in order to deny supplies to gray-market channels. Correspondingly, market-sharing agreements between horizontal competitors in different locations are generally illegal *per se* and considered to be a serious infringement of competition rules in both the United States and the European Union. In addition, one particular aspect of EU competition law is that it dictates that unilateral behavior of a monopolist, or a firm in a dominant position, that restricts cross-border trade and segments markets geographically is typically abusive and, thus, illegal.

Because the issue has been more active in European courts, we treat the situation there more fully, followed by a brief discussion of US practice.⁵ To begin, EU law prohibits certain types of price discrimination by a monopolist, specifically if it puts one

⁵ For further discussion see Ganslandt and Maskus (2007b).

trading partner (e.g., a wholesale distributor in one location) at a competitive disadvantage compared to other trading partners. Article 82 of the EC Treaty states that price discrimination of this kind is abusive and hence illegal. A pricing strategy that is harmful to the single market is considered to be a particularly serious infringement of this Article and prices charged to prevent or limit the scope for parallel imports or exports are condemned. This stance is indicated in the following court finding.

“The influence of the pricing policy of operators active on a national market on that of operators active on a neighboring national market is of the very essence of a common market. Anything which restricts that influence must therefore be regarded as an obstacle to the achievement of that common market and prejudicial to the outcome of effective and undistorted competition, especially with regard to the interests of consumers. Accordingly, where such obstacles are brought about by an undertaking holding a dominant position, it is in principle appropriate to conclude that this is a case of abuse incompatible with Article 86 of the Treaty (now Article 82 EC).”⁶

More generally, the relevant EU case law on dominant firm pricing can be summarized in three principles (Whish, 2003). First, a monopolist cannot charge excessive prices to impede parallel imports. This principle was established in the *British Leyland* case in 1984.⁷ The European Court of Justice (ECJ) found that BL, which was a dominant firm, refused to supply traders planning to re-import (that is, parallel import) certain cars into the UK with certificates of uniformity, though the imports had been certified by the National Transportation Authority (NTA). Further, when it began issuing such NTA certificates BL charged parallel-importing firms fees that were discriminatory and disproportionate to the value of the service provided. These charges impeded parallel trade and were, consequently, illegal.

⁶ *Irish Sugar plc v Commission of the European Communities* (1999).

⁷ 84/379/EEC: Commission Decision of 2 July 1984 relating to a proceeding under Article 86 of the EEC Treaty (IV/30.615 - BL) OJ L 207, 2.8.1984.

Second, a monopolist can only price-discriminate across geographical markets to a limited extent and the price-discrimination must be "objectively" justified. In *United Brands* the ECJ found that UBC abused its monopoly power by charging different prices depending on the final destination of its products.⁸ Since UBC sold its products to distributors at two common locations (Rotterdam and Bremerhaven) and not in different local markets across Europe it was entitled to take local market conditions into account only to a limited extent. Similarly, in *Tetra Pak II* the court ruled that geographic price discrimination by the dominant firm was unacceptable and incompatible with the single market since the relevant market was the entire EU and the price differences charged across different locations lacked objective justification.⁹

Third, it is illegal for a monopolist to give rebates that impede imports or exports. Rebates that target competition across borders ("border rebates") are incompatible with the EC Treaty. According to the European Court of Justice's finding in *Irish Sugar*, the competitive spillovers across borders are the very essence of a common market.¹⁰ In *Michelin II* the court found that a rebate scheme designed by a dominant firm to discourage cross-border purchases within the EU is illegal.¹¹

In addition to restricting the pricing behavior of a dominant firm, EU law prohibits other types of unilateral behavior that partition the internal market. For instance, unilateral behavior that raises the cost of cross-border arbitrage or limits the scope for such trade is potentially an infringement of Article 82. In the *Deutsche Post*

⁸ Case 27/76 ECR 207, *United Brands* 1978.

⁹ Case ECR-I/5951, *Tetra Pak II*, November 1996.

¹⁰ Judgment of the Court of First Instance (Third Chamber) of 7 October 1999. - *Irish Sugar plc v Commission of the European Communities*: "The grant, by an undertaking holding more than 88% of the relevant market, of special rebates to certain customers exposed to competition because of their location along a border, constitutes an abuse contrary to Article 86."

¹¹ Case ECR T-201/01, *Michelin II*, September 2003.

case, the Commission found that this firm had abused its dominant position in the German letter market by intercepting, surcharging and delaying incoming international mail.¹² Deutsche Post had abused its dominant position in the German market for the delivery of international mail in four ways: (i) discriminating between different customers, (ii) refusing to provide its delivery service, (iii) charging an excessive price for the service offered and (iv) limiting the development of the German market for the delivery of international mail and of the UK market for international mail bound for Germany.

In another case the Commission found that the pharmaceutical company AstraZeneca infringed Article 82 by abusing public procedures and regulations in a number of countries.¹³ The abuse was a pattern of misleading representations made before patent offices in a number of member states in connection with the company's applications to extend patent protection of the drug Losec. It also deregistered its market authorization for Losec in Denmark, Norway and Sweden. At the time, generic products could only be marketed and parallel importers could only obtain import licenses if there were an existing reference market authorization for the original corresponding product.

Finally, *Clearstream* was found to infringe Article 82 of the EC Treaty by refusing to supply cross-border securities clearing and settlement services to Euroclear Bank SA.¹⁴ Clearstream held a dominant position for providing cross-border clearing and settlement services in Germany to intermediaries situated in other EU member states. Its behavior qualified as an abusive refusal to supply because the company's services

¹² *Deutsche Post AG II* - Case COMP/36.915 (OJ L 331, 15.12.2001).

¹³ COMP/37.507 - *Generics/Astra Zeneca*.

¹⁴ COMP/38.096 - *Clearstream*.

were essential and it had the effect of impairing other firms' ability to provide efficient cross-border clearing and settlement services to clients in the EU market.

Turning next to the United States the issue surrounds whether pricing restraints have the effect of limiting grey-market exchange. Within the United States the Robinson-Patman Act of 1936 and subsequent guidelines issued by the Federal Trade Commission define illegal forms of price discrimination. This Act essentially bars the setting of differential prices across markets and customers if doing so is anti-competitive and injures competition. Subsequently courts have stated that conditions of competition are paramount and that price discrimination reflecting legitimate cost differences, or that does not otherwise interfere with antitrust principles, is acceptable.

As interpreted later by the courts, in essence price differentiation is acceptable unless it injures or threatens to injure competition. In one principal case, a tobacco company was accused of violating Robinson-Patman by giving volume discounts for generic cigarettes to some wholesalers and not to others, which might have had the predatory effect of driving the less-favored distributors out of business. In fact, the Supreme Court ruled in favor of the defendant because no causal link to injured competition was established.¹⁵ In another, a major gasoline company was accused of limiting competition by providing a subsidy to some distributors that might have driven other sellers out of the market.¹⁶ Finally, as noted earlier, U.S. law prohibits territorial distributors from discriminating across customers in an attempt to limit competition.

2.D. Preliminary Matters on the Economics of PI

¹⁵ *Brooke Group Ltd. v. Brown and Williamson Tobacco Corporation*, 509 U.S. 209, no. 92-466 (1993).

¹⁶ *Texaco v. Hasbrouck* 496 U.S. 543, no. 87-2048 (1990).

As defined earlier, parallel imports are unauthorized distribution across borders of goods protected by intellectual property rights in the recipient nation. Thus, PI constitutes arbitrage that exploits either a retail price differential between two markets or a markup between the wholesale price in one country and the retail price in another that is sufficient to cover the costs of procuring it from distributors in the former and shipping it to the latter. In this section we consider models of retail arbitrage.

Before proceeding, it is useful to make two clarifications. One relates to the term “parallel trade” and the other relates to the persistence of the phenomenon. First, arbitrage can either be profitable or unprofitable for the original manufacturing firm that holds the IPR. Our main focus in this chapter, however, is on arbitrage that is unprofitable for the manufacturing firm and therefore unauthorized. The manufacturing firm prefers to use only profitable, and hence authorized, distribution channels. In our opinion it is sensible to restrict use of the term parallel imports to unprofitable (unauthorized) cross-border trade and use the broader term “international arbitrage” for both profitable and unprofitable trade.

Second, arbitrage can either have temporary or persistent equilibrium effects. Economic shocks can permit sudden arbitrage opportunities across markets. In particular, exchange-rate fluctuations and demand shocks create incentives for international arbitrage and parallel trade in some situations. The effect of this type of arbitrage is normally temporary, however. Parallel imports can also have persistent effects because they constitute an important restriction on pricing power by the holder of intellectual property rights. Indeed, the scope for unauthorized international arbitrage is

one important factor that determines the market equilibrium. The economic literature has focused on this latter category.

Economic theory has considered three theoretical settings in which parallel trade can be a problem for a firm that manufactures a good protected by IPR and uses independent firms to market and distribute the product in different countries. In the first category of models, which is the subject of the following section, parallel trade is horizontal arbitrage that limits the scope for international price discrimination (Malueg and Schwartz, 1994). A firm with market power has an incentive to set prices across markets that reflect differences in willingness to pay for its good. The difference between prices in two markets cannot exceed the cost of parallel trade. Parallel imports in this framework typically have a negative effect on the manufacturing firm's profit.

The second category of models, discussed in Section 4, consider parallel trade as a response to differences between retail and wholesale prices that arise as a result of vertical price control (Chen and Maskus 2005; Ganslandt and Maskus 2007a). A monopolist that uses selective, independent distributors that have market power in national markets must consider several conflicting interests. It has an incentive to induce optimal consumption in each market and also an incentive to obtain cost-efficient distribution. Parallel imports give rise to a profit-reducing pro-competitive effect in the import market. It also makes distribution of goods inefficient since costly trade replaces more cost-efficient local distribution.

In the third category of models parallel trade has an effect, directly or indirectly, on the provision of local services. We do not discuss these further in the paper and therefore provide a brief review here. Retailers provide costly pre- and post-sale

services, such as advertising, test drives, quality assurances, and warranties and the costs of these services must be recovered through some exclusivity. Parallel trade can undermine the scope for pricing that permits the retailer to recover such costs. It can thus be argued that the provision of services is likely to be suboptimal when cross-border free-riding on services occurs (Telser 1960; Perry and Porter 1986; Chard and Mellor 1989).

Parallel imports cause a related problem when services are provided by independent distributors with market power in national markets (Mathewson and Winter, 1984). The manufacturing firm wishes to give distributors incentives to provide the optimal level of services and induce the optimal level of consumption in retail markets. By limiting the profitability of such investments, parallel trade becomes a horizontal externality that may result in suboptimal retail prices. The manufacturing firm could charge a higher wholesale price to solve this problem but this strategy would have a negative impact on the incentives for the retailer to provide services. Consequently, the resulting equilibrium is suboptimal for the manufacturing firm.

3. Price Discrimination and Retail Arbitrage

Firms with market power have an incentive to set prices that reflect the economic valuation of specific consumers. Revenues increase when a firm has the ability to extract more consumer surplus by setting separate prices for each group of consumers. Such price discrimination boosts profits and is desirable from the firm's point of view. It requires, among other things, that the scope for arbitrage is limited. Unrestricted, frictionless arbitrage among consumers facing different prices would eliminate any price differential and thereby force the firm to set uniform prices.

3.A. The Economics of Third-Degree Price Discrimination

Third-degree price discrimination refers to the existence of prices that differ across groups of consumers, with each group distinguished by a common elasticity of demand. This situation most closely characterizes the fact of internationally segmented markets, with perhaps a single price in each country. Parallel trade in such retail markets clearly limits the scope for international price discrimination. Permitting PI implies that the price differences between geographical markets are limited to the costs of trade, including trade barriers, between them. The scope for international third-degree price discrimination is, therefore, far greater in the context of national exhaustion than in a regime of international exhaustion of intellectual property rights.

Economic theory demonstrates that firm profitability is generally positively related to the scope for third-degree price discrimination in international markets (Krugman, 1986), at least in the absence of commitment problems and strategic interaction among firms. The welfare results of price discrimination are, however, less straightforward and the net effect on society is typically theoretically ambiguous. It follows that the overall welfare impacts of PI, which limits the scope for price discrimination, are also ambiguous.

The ambiguous welfare effect of third-degree price discrimination depends on two factors with offsetting influences. On the one hand, different retail prices cause a misallocation of consumption as marginal valuations across markets diverge. On the other hand, global consumption is potentially higher as consumers in more price-sensitive markets can afford to buy the good.

A necessary and sufficient condition for price discrimination to result in a reduction of total “Marshallian” welfare is that total consumption is larger or equally large with a uniform price. Put differently, price discrimination can increase total welfare if total consumption increases, otherwise it cannot (Pigou 1920; Robinson 1933). Schmalensee (1981) proves this conjecture for constant marginal costs. Varian (1985) extends the proof to incorporate imperfect arbitrage. Schwartz (1990) shows that, by revealed preference, the same result holds for increasing returns to scale.

The intuition for the basic result is that the misallocation of consumption with a uniform price is less than with price discrimination, since the marginal valuations in all markets are equalized. The effect of price discrimination can thus be positive only when the total consumption increases, otherwise the impact must be negative due to the misallocation of consumption. It should be noted in this context that the result is static and depends crucially on prices being costlessly equalized. Wasteful arbitrage or free-riding may potentially alter the welfare conclusion.

The comparison of total consumption with price discrimination and with a uniform price is crucial for the basic welfare result stated above. The next question is whether third-degree price discrimination can increase consumption and if this expansion is sufficiently large to dominate the negative effect of diverging marginal valuations in different markets. It has been shown that total consumption can expand under price discrimination for several reasons. Some of these are particularly important in the context of intellectual property rights, where goods have significant development costs and very low marginal costs, generating substantial returns to scale.

The second possibility is that price discrimination permits the manufacturing firm to open new markets in countries where the marginal value of the good is significantly lower than the prevailing price in existing markets. If the manufacturing firm is forced to charge a uniform price it may not be worthwhile to serve price-sensitive consumers and markets with very high price elasticities of demand. Price discrimination may consequently Pareto-dominate a uniform price when it establishes additional markets, because both consumer surplus and producer surplus rise.

The tradeoff between misallocation of consumption due to diverging marginal valuations and the possibility that price discrimination opens new markets indicates that the welfare benefits of price discrimination are positively related to the size of differences across markets. Substantial differences in valuation and elasticity of demand increase the risk that a uniform price leaves significant consumer groups and markets unserved. This possibility raises the issue of the welfare effects of price discrimination and arbitrage in a multi-market context, meaning a situation with more than two markets. This case is clearly relevant for international trade.

Malueg and Schwartz (1994) present a model with a continuum of countries and compare price discrimination, a uniform price, and a mixed regime with uniform prices in subsets of markets but potential price discrimination between different groups of markets. Their model has linear demand and a constant marginal cost. The total output is therefore independent of the degree of price discrimination as long as all countries are served. Consequently, price discrimination is only desirable if it opens new markets. Not surprisingly, demand in countries must be significantly different for price discrimination to increase welfare compared to a uniform price. More interestingly, they show that a

mixed regime with uniform prices within groups of markets and price discrimination across groups increases welfare compared to either a uniform price or price discrimination across all countries. The intuition for this result is that the misallocation due to price differences between countries can be reduced, without risking that total output is diminished, if markets with relatively similar demands are grouped together. This result may accordingly suggest that it could be socially optimal in global terms to have regional IPR exhaustion within groups of countries with similar demand characteristics (e.g. the European Union or developing countries in a preferential trading area) but to permit third-degree price discrimination across groups, as long as significant international differences in income and wealth persist.

3.B. Profitable Arbitrage and Second-Degree Price Discrimination

The previous section was devoted to third-degree price discrimination, or differential prices set across markets. In that context we noted that a firm with market power has an incentive to price discriminate between distinct geographical markets, while the welfare effects of such conduct are ambiguous. One important feature of models of third-degree price discrimination and retail arbitrage is that parallel trade does not actually arise as an equilibrium phenomenon. The price difference between two markets is limited to the trade costs between them but arbitrage would actually never occur. It is always more profitable for the firm to set prices to make arbitrage unprofitable than to set prices that would give rise to parallel trade.

In markets with heterogeneous consumers the situation is quite different. In particular, consumers in the same country may have different arbitrage costs and different valuations for a good. The firm can choose to set prices in two markets to induce self-

selection; that is, it can engage in second-degree price discrimination. Self-selection and the scope for this form of price discrimination open the possibility that the firm's profit increases if international consumer arbitrage is permitted. Further, parallel imports arise in equilibrium. We turn to this problem next.

Anderson and Ginsburg (1999) develop a model with two countries and heterogeneous consumers. They show that a firm with market power may have an incentive to create a second market in the second country, even if there is no local demand there, in order to price discriminate across consumers in the first country. Note, however, that arbitrage must be limited across consumers in the same country for such price discrimination to be sustainable. The intuition for Anderson and Ginsburg's basic result can be easily understood with a simple example. Assume two distinct groups exist in one market and the first group, with inelastic demand, has a prohibitive arbitrage cost while the other, with elastic demand, has a low, but positive, trade cost. A monopolist can increase its profit by opening a market in a second country with a lower price. The low-cost arbitrageurs would serve only consumers with a high valuation in the domestic market, since their own valuations remain low. It is fairly straightforward that the monopolist would benefit from a lower arbitrage cost on the part of this second group as long as the first group has a prohibitive arbitrage cost. A reduction of the arbitrage cost in the group of price-sensitive consumers allows the firm to raise the price in the foreign market and thus increase its revenue.

Another example that illustrates that a firm with market power can gain from arbitrage is the model by Raff and Schmitt (2007). They show that a monopolist can benefit from parallel trade in a situation when demand is uncertain with respect to

quantity, and is also different across countries, while excess inventories have little value. Parallel trade in this setting has two functions. It potentially increases competition between retailers but it also increases the expected value of inventories, since excess supplies can be sold to other markets. Banning parallel trade can cause prices to fall drastically when retailers have large stocks on hand and demand is low. This effect reduces the retailers' incentive to order large volumes and potentially has a negative effect on the manufacturing firm's profitability. Allowing parallel trade, on the other hand may keep retail prices from falling sharply even when the state of demand turns out to be low. This effect raises the incentives for the distributors to order larger volumes and could consequently increase profits of the manufacturing firm.

4. Vertical Price Control Models and Parallel Imports

While it is natural to conceive of PI as arbitrage against retail or horizontal price differences across countries, survey evidence suggests that the bulk of such trade happens at the wholesale level (NERA 1999). This is true of consumer goods, such as compact disks, wearing apparel, cosmetics, pharmaceuticals and automobiles. It is also true of intermediate goods, including certain kinds of machinery, chemicals, and bulk syrup for soft drinks. Indeed, wholesale-level trade is conducted both by independent but licensed distributors and parallel trading companies that specialize in the activity.

As noted by Ganslandt and Maskus (2007a) there are three primary reasons why retail-level arbitrage is not large. First, there are likely to be significant costs associated with finding reliable supplies for parallel trade and getting goods across borders. If fixed costs of such activity are even modest we would not expect consumer arbitrage. Second,

there may be complementary services that are sold with the physical goods, such as calling plans for mobile phones. Third, consumer-level parallel trade may simply be illegal for purposes of safeguarding public health. This is the case for pharmaceuticals in the EU, for example, and for alcoholic beverages in the United States. Regarding medicines, firms engaged in parallel trade must achieve approval to import from health authorities, requiring substantial costs for certification. Thus, the simple idea that manufacturers exercise price discrimination at the retail level and individuals elastically trade on the extra-cost margins is misleading. Instead, firms sell to wholesale distributors, which then deal with retailers. The bulk of PI is then sourced at the distributor level.

Under many circumstances efficient distribution requires permitting the IPR holder a significant degree of vertical control over the operations of its licensees. Multinational enterprises build markets through establishing exclusive dealership rights in various territories. Exclusivity makes it easier to monitor marketing efforts and enforce product quality. However, it may be difficult or illegal in foreign markets to enforce private contractual provisions prohibiting sales outside the authorized distribution chain. Seen in this light, restrictions against parallel trade are a required complement to exclusive territorial rights (Chard and Mellor 1989).

Maskus and Chen (2002, 2004) and Chen and Maskus (2005) first developed a theory of PI and vertical price control (VPC). In their conception, a manufacturer protected by IPR in both a home and foreign market has one independent distributor in each location. The firm needs to set its wholesale prices within two-part tariff contracts in order to induce profit-maximizing retail prices, which vary according to demand

elasticity. They assume that there can be one-way PI from the distributor in one market to the other, though not in the other direction. Where PI exist, or there is a threat of PI, the distributors compete in Cournot fashion. The two-part tariffs extract all extra-normal profits from the distributors to the manufacturer.

In this framework a number of tradeoffs arise. First, the PI coming into one market generates a pro-competitive effect there, reducing profits. Second, the need to limit or even deter this competition affects the wholesale price in the export market, causing a double-markup problem there. Finally, the act of parallel trade incurs real resource costs, also reducing profitability. Put simply, the manufacturer has two instruments, the specific wholesale prices, to deal with three problems, leading inevitably to inefficiencies in distribution.

Their essential conclusions can be summarized as follows. First, starting from a situation of very low unit trade cost, an increase in those freight charges reduces parallel imports. At the same time, the manufacturer raises its wholesale price in the export market to further limit PI and enhance the profit gains in the import market as competition becomes less severe. At some point the distributor price in the exporter becomes sufficiently high to deter PI altogether, though the potential for such imports still affects prices. As trade costs rise toward the prohibitive level that segments markets, the manufacturer is able to reduce its wholesale price toward the efficient vertical level. The implication is that an IPR holder would set distributor prices in different markets that follow an inverted-V shape in underlying trade costs. This is an empirical prediction that we review later in the paper.

The authors find that the manufacturer's profits are U-shaped in trade costs. They fall with an initial increase in cost because even though parallel trade diminishes, the cost of PI rise from zero and there remain pro-competitive and double-markup problems. As PI are deterred profits start to rise until they achieve their maximum at full segmentation. As for welfare, which is the sum of profits and joint (two-country) consumer surplus, it also exhibits a U shape. Consumers jointly are best off at zero trade costs and a maximum PI volume, which causes retail prices to converge. Note that this situation reflects a difference of impacts on consumers in the two nations, with those in the import market enjoying lower retail prices and those in the export market suffering increases, as in standard arbitrage models. The fact that welfare is U-shaped suggests that PI are likely to be beneficial when trade costs are low but harmful when trade costs are intermediate or high. Thus, permitting PI may enhance well-being within regional trade agreements, especially those that work to reduce transactions costs on mutual trade.

This analysis has been extended in a pair of papers by Ganslandt and Maskus (2007a, 2007b). The first paper noted a failure of the Chen-Maskus models to account fully for the strategic effects of imperfect competition at the distributor level as trade costs diminish. These authors work carefully through the first-order conditions that capture, respectively, the pro-competitive effect ("horizontal externality" in their terminology), the double-markup effect ("vertical externality") and the existence of trade costs. They demonstrate the rather curious outcome (assuming there is no retail arbitrage) that, as unit trade costs fall toward zero and PI volume increases, the manufacturer in fact would react by raising his wholesale price in the import market even as he reduces the wholesale price in the export market. The reason is that it is profit-

maximizing in an increasingly integrated market to push one of the distributors out of the market by raising the price it is charged, leaving the joint region open for the remaining distributor. The implication is that an open regime of PI, coupled with declining trade costs, could push an endogenous concentration of the distributor market while inducing price divergence rather than convergence. The authors argue that this may be one reason for the observed failure of retail prices within the EU to move together as much as authorities had hoped in recent years. A further implication is that joint welfare may be maximized at a moderate level of trade costs, arguing for leaving some “sand in the gears” if PI are legal.

Ganslandt and Maskus (2007a) recognize that their model is stylized and consider particular extensions. Permitting retail arbitrage limits the scope for price divergence but does not eliminate it at modest trade costs. Permitting product differentiation and price competition (rather than quantity competition) also retains a flavor of the basic results, though they are weakened. Additional work along these lines would be useful.

The second paper (Ganslandt and Maskus 2007b) offers a comment on the wisdom of a competition-policy rule stating that manufacturers cannot discriminate among their distributors by setting differentiated wholesale prices. In essence, this rule reduces the number of instruments to one without removing the underlying market problems, including the IP holder’s market power and the resource waste in PI. It turns out that, while a uniform price can be beneficial in welfare terms for low trade costs and legalized PI, at higher trade costs the policy forces the firm to induce higher retail prices in both markets than would exist with price discrimination. Under reasonable circumstances, then, a well-meaning competition regime of open parallel trade and non-

discrimination among wholesalers can have negative welfare consequences. The authors extend this analysis to the case of two-way parallel trade and the basic results remain intact.

As a theoretical matter, much remains to be done in the analysis of VPC models with parallel trade. As noted, no serious treatment of price competition or product differentiation has appeared yet in the literature. More fundamentally, no analysis has been applied to the case of multiple markets or the implications of differential PI regimes in preferential trading arrangements. Finally, more work needs to be done to analyze the endogenous strategic responses of IPR owners to international variations in exhaustion policies. One might expect, for example, that in countries that are potential sources of PI international firms owning IPR would acquire their distributors or build their own distribution markets, rather than work with independent wholesalers.¹⁷ Such predictions are also ripe for empirical testing.

5. Parallel Imports and Investments in R&D

As noted above, the existence of PI ordinarily should reduce the profits made by an original manufacturer owning some form of intellectual property. Because profits are the basic return to investments in new technologies and products, inventive firms would correspondingly take the legal treatment of PI into account in determining their R&D programs. Indeed, one of the major arguments made against parallel trade is that it would diminish investments in new technologies. This claim is prominent in the U.S. debate over whether to legalize re-imports of pharmaceuticals from Canada and Western Europe.

¹⁷ In a different context, Raff and Schmitt (2005) showed that trade liberalization would encourage multinational firms to establish exclusive national territories.

Research-based pharmaceutical firms lobby strenuously to forestall implementation of such legislation. More generally, inventive firms in any IPR-based industry would oppose the liberalization of restrictions on PI, as described by Barfield and Groombridge (1998). For example, major music labels were strongly opposed to the liberalization of import barriers in Australia in 1998 (Maskus 2000).

Despite such claims, the formal economics literature on this point is scarce. We review a few papers on this subject in the first sub-section. After that we note the strong linkage between price regulations, R&D, and parallel trade, especially in pharmaceutical products.

5.A. Basic Models of R&D and Parallel Trade

The first paper to marry the concept of PI competition to incentives for R&D in a theoretical model is Li and Maskus (2006). They worked within the VPC model set out by Maskus and Chen (2002) but added an R&D stage prior to the competition between distributors. Thus, in an initial stage the manufacturer makes a decision on how much to invest in a technology that will reduce its marginal production costs, if successful. Depending on the amount of R&D, the firm sets out its vertical price structure with its distributors either on the basis of a high marginal cost or a low marginal cost. The difference in these costs and prices matters for the volume and impacts of PI. Their essential conclusion is that the legal permission of PI would surely reduce final-stage profits of the manufacturer, leading it to invest less up front. However, the extent of this profit reduction, and the impact on R&D, depends on market parameters, including the transportation cost in parallel trade. Accordingly, despite the reduced innovation it is not the case that legalizing PI necessarily reduces welfare, rather it can raise aggregate well-

being if trade costs are small. At larger transport costs, however, the combination of resources wasted in cross-hauling trade and diminished investment tends to reduce economic welfare. These insights were extended to a more general context in Li (2006), while similar results were found for product innovation in Li and Robles (2005).

In a different competitive framework, Valletti (2006) shows that a policy that dictates a uniform price, for instance as a result of global exhaustion of intellectual property rights, in an innovative market increases welfare *ex post* but may reduce *ex ante* investment in R&D. More specifically, the uniform price raises static welfare but reduces investment in research if market-segmented price differentials were based on differences in demand elasticity. However, legalized PI under cost-based differences in prices would yield the opposite effects. In a related paper, Valletti and Szymanski (2006) build on the Malueg-Schwartz (1994) framework and detect a welfare tradeoff in which international exhaustion can raise static welfare but reduce investments in product quality.

5.B. Price Controls and Parallel Trade

It is evident that government price controls in different countries can generate parallel imports. In some cases, notably in markets for pharmaceutical products, national governments choose quite different policies (Danzon 1997). Some countries adopt strict price caps that are substantially lower than prevailing prices in other countries. Parallel trade responds to these price differentials and products flow from countries with lower regulated prices to markets without price regulations or with higher regulated prices.

Parallel trade has several effects in a situation with price regulations. First, it reduces the price gap between markets. Second, it changes the incentives for innovative

firms to undertake costly R&D. Finally, it potentially could put pressure on the price regulations of different countries, tending toward policy harmonization. Clearly parallel trade in markets subject to price regulations imposed by national governments has different effects than arbitrage in situations in which the manufacturing firm can adjust prices without considering binding price caps.

In principle, parallel imports of products that are price-regulated in export markets can cause international prices to converge to a low average price level. From a public-health standpoint, countries that impose strict price caps are focused on affording their patients (or national health systems) cheap access to available products, primarily essential prescription drugs, and to maximize static consumer surplus. Countries that do not regulate prices have a relatively higher valuation of innovation and new products and accept that IPR may cause static dead-weight losses in return for dynamic innovation gains.

In this context, Rey (2003) takes government policy as given and shows that parallel trade causes retail prices in unregulated markets to fall and reduces the incentives to invest in R&D. Danzon (1998) argues strongly against the notion that PI could generate welfare gains. She claims that international price discrimination reflects differences in elasticity of demand, corresponding to Ramsey pricing. Such discrimination, supported by market segmentation, is therefore optimal from a social point of view. She makes the informal argument that (p. 293):

“Parallel trade in pharmaceuticals does not yield the normal efficiency gains from trade because countries achieve low pharmaceutical prices by aggressive regulation, not through superior efficiency. In fact, parallel trade reduces economic welfare by undermining price differentials between markets.”

Szymanski and Valletti (2005) analyze a price regulation backed by the threat of compulsory licensing. In a two-country model, they show that a manufacturing firm has an incentive to sell a high-quality product in the unregulated high-priced market and a low-quality product in both markets. For a low enough price cap the firm prefers to sell two variants to selling a single product. The threat of compulsory licensing ensures that consumers in all markets will be served and thus removes the potential negative static welfare effect of parallel trade, which is exit from markets with a low willingness to pay. The quality of the product provided in regulated low-price markets may nevertheless be a problem. Indeed, there is a tension between the producer and the government that imposes the price cap. The producer has an interest to supply a product with very low quality while the government has an interest in higher quality provided at the regulated price.

Grossman and Lai (2004) show that government policies are often strategic substitutes in an international context.¹⁸ Generous incentives for innovation in one country reduce the interests of other countries in providing similar support. If one country offers strong patent rights and unregulated prices, other countries are tempted to free ride on the dynamic impacts by providing weaker patents and imposing price caps to capture static consumer-surplus gains.

In a subsequent paper, Grossman and Lai (2006) introduce price controls and show that PI can change the government policy equilibrium.¹⁹ Parallel trade reduces the scope for international free-riding on global public goods and weakens the incentives to impose aggressive price regulations to maximize static consumer welfare. A low price

¹⁸ This model is discussed at length in the chapter by Edwin Lai in this volume.

¹⁹ See also Pecorino (2002).

cap in one country reduces incentives for R&D investment worldwide. Arbitrage consequently makes government policies interdependent and forces every government to consider the consequences of its price regulation on global incentives to invest in new products. In fact, this effect can be so important that, in their model, permission of PI strengthens the incentives for innovation and global investment in research increases.

As in the case of vertical price control models of PI, the literature on this kind of arbitrage and dynamic innovation incentives is in its infancy. Considerably more research could be devoted to fleshing out relevant market characteristics that would affect the returns to R&D under parallel trade. This analysis would add much to our understanding of complementarity and substitutability among IPR, competition regulation, and innovation policies.

6. Empirical Studies of Parallel Imports

With the growing analytical attention paid to parallel trade, one might expect a flowering of empirical research on its determinants and impacts. However, empirical literature is quite scarce, for the simple reason that data on parallel imports largely are non-existent. This is because customs authorities in individual countries that permit PI view such imports properly as perfectly legitimate, even though they arrive through unauthorized channels. As such, distributors of PI pay any required tariffs and meet import protocols but there is no customs-related purpose in collecting specific figures on parallel trade. The one exception, discussed further below, is that public health authorities need to be able to track the origins of medicines and other goods that may affect health status. Thus, health ministries may ask customs authorities to designate

particular import transactions as parallel imports. However, such data are almost exclusively confidential and unavailable to researchers.

5.A. Survey Evidence

In the absence of such data, empirical research has relied either on business surveys or indirect measures of the predicted influences of PI. Regarding surveys, there is only one comprehensive survey available of recent vintage.²⁰ This was performed by National Economic Research Associates (NERA 1999), which was retained by the European Commission to analyze the potential implications of a proposed EU decision to deregulate barriers against PI in trademarked goods from outside the region, a policy decision that has not yet been taken.

For this purpose NERA surveyed managers of many trademark-owning firms across numerous sectors, trying to ascertain their understanding of how extensive PI are in the EU. The survey found that intra-EU parallel trade accounted for varying shares of sales in ten industries in 1993, though there is reason to suspect the figures were under-reported by respondents. Parallel imports attained their largest shares in compact disks (10-20 percent of EU sales), cosmetics and perfumes (up to 13 percent), and soft drinks (up to 15 percent), which are generally traded in bulk syrup form. Each of these types of commodities reflects characteristics giving rise to the potential for PI. Compact disks are copyrighted goods subject to substantial increasing returns, fashion goods are subject to heavy marketing (and potential free riding), and soft drinks are intensive in the use of trademarks. Other sectors with significant intra-EU parallel trade included automobiles,

²⁰ An earlier survey of PI in the United States is in Hilke (1988), who reported substantial amounts of such imports entering the economy in the period following a rapid increase in the international exchange value of the US dollar.

consumer electronics, clothing, and confectionery. The survey did not cover pharmaceuticals.

5.B. Indirect Price Studies

While survey evidence is informative, it is not useful for statistical analysis, which must be performed at the detailed product-level or firm-level given the nature of the competition involved. The first attempt to analyze PI econometrically was made by Maskus and Chen (2004). Their interest was to test their vertical price control model, which was possible in principle by looking at the international distribution of wholesale prices. Specifically, the VPC model predicts that an original manufacturer would set wholesale prices that follow an inverted V in the level of trade costs. For this purpose, they considered U.S. export unit values in a cross-section of 26 highly disaggregated (10-digit Harmonized System) commodities in 1993, arguing that they are the closest variable readily available that captures wholesale prices. For example, they developed data on the prices of motorcycles with very specific performance characteristics that were exported to a number of international markets. Extreme prices were eliminated from the analysis.

The authors regressed the export prices (both in raw FOB form, and adjusted for tariff and freight charges to foreign borders) on importer per-capita income, a control for product heterogeneity, and a Herfindahl index capturing local wholesale distribution concentration. Also included were the main variables of interest: the U.S. tariff rate for the good and that tariff rate squared. These tariffs were considered the measure of trade costs from the VPC model, which would predict a positive linear coefficient and a negative coefficient on the squared tariff. Their econometric estimates bore out this expectation, with both coefficients being highly significant. Moreover, the coefficients

on dummy variables for various exporting regions were higher for areas that permit parallel trade, suggesting that U.S. manufacturers set higher prices there to deter such competition. They interpret their results to support the vertical price model of PI.

This result is highly suggestive and should spur additional work on the determination of price setting across markets. However, it can be criticized on a number of grounds. Perhaps most significantly, use of the U.S. tariff rate as the measure of trade costs does not really capture the essence of those costs in the model, which should vary by distance and product characteristics. Incorporation of a more direct measure, the ratio of CIF to FOB prices, substantially reduced the significance of the findings.

A second attempt along these lines is in Ganslandt and Maskus (2003). Much of that report is devoted to theoretical analysis of PI, both in terms of horizontal arbitrage and the VPC model. They note, in fact, that a simple horizontal model would generate a coefficient pattern that is distinctive from that noted above for the VPC theory. Specifically, there would be no negative coefficient on the squared trade cost in the case of horizontal arbitrage. They compared these predictions with detailed export unit values within the European Union, where PI are more prominent than the United States. They found mixed support for both models. The VPC model seemed especially relevant for export price-setting by manufacturers in high-priced economies, such as Denmark, Germany and the United Kingdom, which set lower export prices in nearby economies than in more distant places, controlling for local demand characteristics.

Taking these studies together, there seems to be good initial support for the existence of multiple causes of parallel trade, at least as it would be reflected in wholesale (export) price data. The evidence suggests that vertical control strategies may be

particularly important in this context. However, because these studies are based on price measures of all goods (rather than specific PI volumes or prices) they must be taken with a grain of salt. There is certainly more room for research in this area. A particularly valuable exercise would be to analyze the international distribution of prices in a spatial model of PI in multiple markets.

5.C. A Direct Study of PI Competition in Drugs

Ganslandt and Maskus (2004) offer the only statistical analysis that actually employs data on parallel imports and prices of original manufacturer's goods. They gained access to detailed product-level data on prescription-drug sales in Sweden from 1994 to 1998, with prices existing on a bi-weekly basis.²¹ They estimated the impacts on original manufacturers' prices of brand-name prescription drugs of entry into the Swedish market by firms that brought in identical drugs through parallel channels from other markets in the EU. In this context, Sweden was an ideal natural experiment, for it had to switch from national exhaustion to regional exhaustion when it joined the EU in 1995. After 18 months, by mid-1996, PI were entering Sweden and by 1998 such sales comprised up to two-thirds of the market for large-volume drugs.

Ganslandt and Maskus set out an econometric model in which changes over time in the ex-factory price of manufacturers' drugs were affected by entry of PI firms, controlling for product fixed effects and other price determinants. The authors also took pains to control for the endogeneity of PI entry to domestic market size and prices. In their instrumental-variables estimation they found that original prices are sensitive to this competition, with the reduction in relative pricing power rising as more firms entered, up

²¹ The data were provided by the Swedish Health Ministry.

to four entries. Overall, the pricing power of brand-name firms was reduced by 12 to 18 percent on average due to PI competition, suggesting a strong price-moderating impact.

The last paper is noteworthy for the care it takes with the statistical analysis and the quality of the data used. However, much more research should be done to develop a full picture of what drives parallel imports and the impacts they have on important variables. For example, there is no econometric study available that considers the potential effects on R&D decisions of IPR-owning firms, a considerable gap in the literature.

7. Concluding Remarks

In this chapter we discussed essential legal and economic issues surrounding parallel imports, also called gray-market trade. This is a significant form of competition within the European Union and across regional territories in the United States. It remains a controversial policy question at the global level as well. For example, the United States Congress continues to flirt with the idea of opening the country's borders to PI of medicines from Canada and Western Europe, in the face of intense lobbying from pharmaceutical companies.

The formal analytical literature on parallel trade is emerging rapidly, focusing on horizontal arbitrage, vertical price control models, the role of price regulations, and impacts of legalized PI on investments in research and development. At present these models rely on specific assumptions and most could be usefully generalized. They do, however, set out a number of important insights about what drives PI and how such trade affects market competition. Perhaps most interesting are emerging models demonstrating

that combining PI with other forms of competition policy, such as mandated uniform distributor prices, can be counterproductive in terms of market integration and consumer welfare.

Also important are new insights about the ambiguous effects PI play in the R&D area. If prices are otherwise uncontrolled, a free regime of parallel trade interferes with firm strategy and would reduce investments in innovation. However, where such trade interacts with national variations in price controls, its existence changes the bargaining dynamics between firms and governments. It is possible that a mix of price caps and PI can increase global R&D incentives, which may be of interest in the international debate over access to essential medicines. However, none of these predictions have been faced with empirical investigation.

From the standpoint of global policy, one issue of vital importance has not been addressed in this chapter, largely because it is covered in detail elsewhere in the volume.²² Specifically, restraints on parallel trade may be a central component of attempts to distribute essential medicines to poor countries. As noted in Ganslandt, et al (2001), there are substantial dynamic and static externalities in this area and it is important to separate innovation incentives from distribution needs. Assuming that sufficient financial and technical resources can be deployed to develop important new drugs for diseases of poor countries, it will become increasingly important to ensure that those drugs, targeted for specific markets, do not escape into higher-income locales (Brown and Norman 2003). Here, truly, is an area in which policy regulating parallel trade requires deep thought and careful implementation.

²² See the chapter by Lacroix and Liu.

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Table 1. Summary of Exhaustion Regimes

<i>Country</i>	<i>Trademarks</i>	<i>Patents</i>	<i>Copyrights</i>
European Union	Community exhaustion	Community exhaustion	Community exhaustion
United States	National exhaustion limited by common control and no consumer confusion	National exhaustion	National exhaustion
Japan	International exhaustion unless agreed by contract or original sale is price-controlled	Same as trademarks	International exhaustion except for motion pictures
Australia	International exhaustion	National exhaustion unless sold by patent owner without clear restrictions	National exhaustion except for compact disks and books
India	International exhaustion	International exhaustion	National exhaustion with exceptions

Sources: Maskus (2000).