

THE ECONOMICS OF PARALLEL TRADE IN PHARMACEUTICAL PRODUCTS

Revised Summary for WTO-WHO Workshop April 2001

This contribution summarizes a longer paper by the same title which is drawn from a more comprehensive manuscript, "Post-TRIPS Options for Access to Patented Medicines in Developing Countries," written jointly with Jayashree Watal. Copies of the complete parallel trade paper will be available at the workshop. The conclusions in this version are my own and not necessarily those of Mrs. Watal.

Let me begin by addressing a semantic muddle. Various workshop contributions speak of "equity pricing," "tiered pricing," and "differential pricing." There is a century-old tradition in economics of calling the subject on which we focus "discriminatory pricing." I prefer to be precise but politically incorrect and abide by that tradition. I will also refer to a special case known as Ramsey pricing (named after British economist Frank Ramsey, 1903-30) and propose that there are good reasons for using that term, since the concept characterizes the kind of pricing that, we shall see, is in a particular sense ideal for international price formation in pharmaceuticals.

Parallel trade occurs when a product covered by intellectual property rights in Nation A is exported to and re-sold in another Nation B without the rights holder's authorization. The incentive for its occurrence is a sufficient difference in prices between the two nations to cover shipping and transaction costs and still offer gains to both the shipper and the Nation B buyer. It is therefore a form of arbitrage. For it to occur, there must be underlying monopoly power and/or market imperfections, among which patent protection figures most prominently, exploited by the original seller through a strategy of price discrimination. Adjudicating parallel trade disputes using WTO's disputes resolution procedure was expressly excluded in the compromises struck when the Uruguay Round Treaty was concluded, so the legality of barriers to parallel trade depends upon national laws, which are only required to confer most-favored nation treatment.

My longer paper shows in detail why, in two nations that are identical except in incomes per capita, the demand curves for a pharmaceutical product can differ because of what economic theory calls an income effect. The demand curve in the rich nation is steeper and (admitting possible exceptions) less price-elastic than the demand curve in the less affluent nation. Assuming similarity of production and distribution cost functions, this difference in demand curve elasticities leads a profit-maximizing firm with some monopoly power to charge a higher price in the rich nation than in the poorer nation. If forced to charge the same price in both nations, the firm's profits will be lower, and under conditions that plausibly mirror the distinctions between rich and poor nations, the firm required to quote uniform prices may choose to set its price so high that there are no sales in the less affluent market. Thus, discriminatory pricing facilitates selling pharmaceutical products in less affluent markets at lower prices than would otherwise be charged, and it may make the difference between having the product available in the developing country market and not having it at all. It cannot ensure that sales will occur in the less affluent nation, for if demand is so weak that no feasible price is high enough to cover production and distribution costs, the market will implode to a zero - supply equilibrium. In such cases, charity or government financing of drug purchases are the only viable alternatives. Watal and I have shown in our Post^aTRIPS paper that certain interpretations of the U.S. federal income tax laws make it profitable for pharmaceutical companies to donate free supplies to charitable organizations.

For those who are concerned with ensuring that the citizens of less-developed nations have affordable access to patented pharmaceuticals, discriminatory price-setting is intrinsically attractive. But economic analysis makes a stronger statement. When a large block of fixed costs must be recovered -- in the case of new pharmaceutical products, the costs sunk for research, development, and clinical testing -- setting prices lower in high^aelasticity markets (i.e., in low-income nations) than in low^aelasticity markets confers the further advantage that those fixed costs can be recovered with minimal distortion to the efficiency of resource allocation. That is, with so-called Ramsey pricing, the fixed costs can be recovered with the smallest feasible reduction of the summed surpluses retained by consumers and producers. In the case of constrained Ramsey pricing, prices will be elevated only enough to ensure recovery of the desired fixed costs. With unconstrained Ramsey pricing, i.e., with the elevation of prices above marginal costs being proportional to the inverse of the affected markets' demand elasticities, resource allocation will be relatively efficient while maximizing the amount of funds inducing future research and development. Such pricing comes about as close as one can hope in an imperfect world to having one's cake and eating it.

The distinction between constrained and unconstrained Ramsey pricing is an important one. Professor Danzon appears to believe that the profits of pharmaceutical firms are constrained by price competition among themselves. Wholly apart from the fact that such competition was not the sort of constraint Ramsey and his followers had in mind, I am skeptical of the Danzon argument for two reasons. For one, the detailed market structures within which pharmaceutical firms find themselves competing vary enormously, from situations (such as with Diflucan) in which there is no good substitute therapy for certain indications, to those in which several different patented molecules offer essentially the same therapy, and from there to those in which good generic alternatives exist. It is impossible to know whether the "right" degree of constraint arises from such a heterogeneous set of market structures. Also, economic theory and studies of actual pricing strategies reveal that competition among substitute patented products with differing characteristics may lead to price increases, rather than the price restraint assumed by Professor Danzon. My belief that unconstrained Ramsey pricing may be "good enough" is rooted in the assumption that when firms compete for market position and profits by investing aggressively in research and development (a phenomenon known as rent-seeking), pricing behavior that maximizes the profit pool also maximizes the stimulus to R&D investment, which, again admitting possible exceptions, is on the whole to be encouraged.

My longer paper then explores three cases in which Ramsey pricing will fail, or at least, fail to have these desirable properties. All are related to parallel trade.

Because parallel trade arbitrages price differences by diverting products from low-price to high-price markets, it can undermine attempts to maintain a system of discriminating prices. This has two adverse consequences. First, it will erode profits in the higher-price markets, lessening the contribution those markets make to the recovery of fixed (i.e., research and development) costs. Second, profit-maximizing firms will react to the diversion of products from high-elasticity, low-price markets by reducing their supply to those markets, raising prices there and perhaps (depending upon demand curve shapes and the magnitude of parallel trade) choosing not to supply them at all. Since this works to the disadvantage of low-income nations, one might reasonably

support national laws or international covenants that prevent parallel exportation of pharmaceutical products supplied at low discriminatory prices within less-developed nations.

Second, the attractive logic of Ramsey pricing may vanish if the market for pharmaceutical products within a low-income nation can be segmented into two (or more) groups: an affluent minority, often well-covered by health insurance, with a low price elasticity of demand, and another group (comprising the majority of low-income nations' population) with little ability to pay and high price elasticity of demand. Multinational pharmaceutical companies may find it more profitable to supply only the affluent minority, in which case prices in the low-income nation will be much higher than one would expect under Ramsey pricing with homogeneous demand. To deal with such cases, nations characterized (e.g., under United Nations criteria) as less-developed should not be denied the opportunity to engage in parallel importation from other nations in which prices are lower.

Third, national price controls can undermine the logic of discriminatory world market pricing. Then nations may be the origin of parallel exports not because prices have been kept low under a Ramsey pricing rationale, but because local governments have exerted their price-restraining power. When this happens, individual nations will end up paying less than their Ramsey^a optimal contribution to cover research and development costs. In addition, the pharmaceutical manufacturer may react to the diversion of product from the price-controlled market by reducing its supplies into that market. If parallel exports continue nevertheless, there will be welfare-reducing product shortages in the market from which the parallel exports originate. Recognizing these difficulties, it might be necessary to prohibit parallel exports from national markets subjected to price controls, especially when the receiving market is an affluent industrialized nation.

Further complications can arise under so-called "reference price control" regimes that take as the benchmark for setting controlled prices the lower price charged in some other nation. If discriminatorily low prices in low-income markets are the external reference, pharmaceutical producers will respond rationally by reducing the supply of drugs to the low-income markets and increasing prices there, or perhaps discontinuing supply to those low-income markets altogether. Since this is plainly undesirable, price control systems using low-income nations' prices as an external reference benchmark should be strongly discouraged. Because this may conflict with the narrow national interest of the price-controlling jurisdiction, such a prohibition is likely to be accomplished only through an international accord.

There appears to be considerable uncertainty as to whether pharmaceutical manufacturers actually try to set their prices across diverse national markets in conformity with the idealized Ramsey pricing guidelines. If they did, we should expect to see lower prices for a given product in low-income markets than in high-income markets, other conditions being held equal.

Jayashree Watal and I have assembled a database providing insight into this hypothesis for certain drugs used in combatting AIDS. From the leading collector of data on pharmaceutical product sales, we have obtained information on sales revenues and quantities sold for 15 AIDS anti-retrovirals in 18 nations with low or intermediate per-capita incomes over the years 1995 through 1995. The nations or national groupings comprise Argentina, Brazil, Central America, Chile, Colombia, the Dominican Republic, Ecuador, French West Africa, India, Indonesia, Malaysia,

Mexico, Peru, the Philippines, South Africa, Thailand, Uruguay, and Venezuela. For most of the nations, the sales covered are at the wholesale level to retail outlets, but for four of the nations, sales to hospitals are also included. Excluded from the data set are donations or other sales at especially low prices to national procurement authorities. Average wholesale prices for each of 586 nation-product-year triplets could be derived by dividing sales revenue by the number of units sold, the latter expressed as standardized daily dose quantities. These standardized prices were then expressed as a ratio of the Red Book wholesale list prices for the same products in the United States. The ratios derived in this way are called U.S. price relatives.

Figure 3 attached plots the price relatives for 461 nation-product-year triplets attributable to multinational pharmaceutical companies. (The average price relatives for the 125 triplets from companies not known to be multinationals were on average 14 percent lower than those of the multinationals plotted in Figure 3.) In 98 of the 461 cases plotted in Figure 3, price relatives were higher, and sometimes much higher, in the less-developed nations covered by our sample than the unit value implying parity with U.S. wholesale list prices. The average of all 461 price relatives was 0.847, suggesting that on average, prices in our sample of low- and medium-income nations were lower than wholesale list prices in the United States. This finding must be amended by recognition that there is extensive discounting of actual transaction prices in the United States below published Red Book values -- assuming typical current experience, in the range of 15 to 25 percent off list. Thus, prices of AIDS anti-retrovirals in the 18 nations were on average at about the same level as those prevailing in the much more affluent United States.

A regression analysis of the multinational drug product price relatives yielded two noteworthy further insights. First, there was a systematic tendency for the price relatives in our sample nations to fall over time -- by about seven percentage points per year. Thus, in 1995, prices in our sample of 18 low- and medium-income nations were on average above those prevailing in the United States, assuming that discounting in the United States then was of about the same magnitude as it has been recently, but by 1999, they had been reduced to average levels below those prevailing in the United States. Second, there was a weak overall tendency for price relatives in the lowest-income nations to be below those for the high-income members of our sample. However, that tendency eroded with the passage of time so that by 1999, the correlation between per-capita income (measured in purchasing power parity terms) and price relatives was close to zero. Since the Ramsey pricing hypothesis predicts that price relatives should rise systematically with income per capita, it would appear that the multinational pharmaceutical companies have moved away from finely-tuned discriminatory pricing strategies toward cruder but more extensive discounting relative to the United States in less affluent nations. Nevertheless, the main impression conveyed both by the scatter diagram presented as Figure 3 and the regression analysis is one of enormous unsystematic variation reflecting idiosyncratic pricing policy variations not adequately explained by our data. Absent evidence to the contrary, these unsystematic variations would appear to suggest that the pricing of AIDS drugs by multinational pharmaceutical companies conforms at best poorly to the Ramsey strictures we have suggested as a rough ideal.

To be sure, our data set ends with price observations for 1999. Since then there have been important new developments as multinational pharmaceutical companies have offered large price concessions on AIDS drugs in some low-income nations. Frank Ramsey's spirit may yet smile approvingly from its exalted place in economist's heaven.