SOCIALLY RESPONSIBLE PRICING:
Lessons from pricing of AIDS drugs in developing countries

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Abstract

Corporate social responsibility (CSR) has major implications for pricing decisions in some markets. An extreme case is the pricing of life-saving drugs in developing countries; industry critics have pointed to price as an obstacle to treatment and a factor in the deaths of millions of AIDS victims. This article examines socially responsible pricing in the form of differential pricing across markets taking into account ability to pay and social welfare. The implications of this remedy to the issue of access to drugs in developing countries are explored.

Multinationals are criticized for profiting from developing-country consumers. Our analysis demonstrates that, in fact, the high prices of AIDS drugs in developing countries sub-optimized contribution earnings in those markets. Until the late 1990’s, multinationals could have earned greater contributions in developing countries by reducing prices, while also saving thousands of lives. However, that could have jeopardized earnings in developed countries, and this, together with other factors, created barriers to socially responsible pricing.

Neither multinationals nor developing-country governments can, alone, create conditions for socially responsible pricing to prevail. We identify the role of different players in addressing barriers to socially responsible pricing and moving prices of AIDS drugs to levels where significant proportions of consumers could afford them. These players included multinationals, governments, non-governmental organizations, and multilateral institutions such as the World Trade Organization and the World Health Organization. This analysis highlights the challenges of “structural CSR”. We conclude by identifying other industries with characteristics similar to the drug industry where socially responsible pricing may be needed, and draw lessons for managers.
“Some may think that because better medicines have been found, the AIDS emergency is over. Alas, no. For most people living with HIV/AIDS today, the $10,000 to $60,000 (U.S.) annual price tag of an anti-retroviral regime belongs, quite simply, in another galaxy.”

U.N. Secretary General, Kofi Annan, January, 2001

“The poor have no consumer power, so the market has failed them. I’m tired of the logic that says: ‘He who can’t pay dies’.”

Dr. James Orbinski, President, Medecins sans Frontieres, 2000

Prahalad and Hammond’s (2002) “world pyramid” shows that there are four billion people earning less than $2,000 each per year and this two-thirds of the world’s population is essentially unserved by multinational companies. This is a matter of great concern when lives are so clearly at stake, as is the case with certain pharmaceutical products. Price would appear to be an obstacle to many of the world’s population having access to life-saving drugs as well as other essentials such as food and education. The needs of the world’s poorest people cannot be adequately met by charitable donations alone and multinationals have faced tremendous pressure to reduce their prices in developing countries to better serve the poor. While multinationals have been portrayed as insensitive to the needs of the poor by maintaining high prices that their patents allow them to charge, the high prices of drugs in developing countries cannot be explained simply by multinationals’ desire to earn large profits in developing countries. Other important factors, which threaten to jeopardize profits in developed countries, serve as disincentives for price reduction in developing countries. This points to a need for coordinated action by developed- and developing-country governments, multilateral institutions and NGOs (non governmental organizations), as well as firms, to help create conditions in which prices can be lowered to a “socially-responsible” point at which the poor can be better served.

NGOs such as Oxfam, Medicins sans Frontieres and other critics of the research-based pharmaceutical industry have successfully exerted pressure on pharmaceutical companies to
lower their prices in developing countries. Drug access in developing countries, particularly for
HIV/AIDS drugs, has become a major issue of corporate social responsibility (CSR). Thus, it is
within this context that this paper explores the lessons from the pricing of AIDS drugs in
developing countries—including the need for a multilateral response to the access issue—and
examines the concept of socially responsible pricing.

CSR refers to the obligations of the firm to society or, more specifically, the firm’s
stakeholders—those affected by corporate policies and practices. Responding to CSR issues can
result in higher costs for the firm. The additional costs assumed by the firm might reflect
externalities that would otherwise have been imposed on others, including some of its stakeholders
(e.g., environmental harm), but its shareholders’ economic interests are less well served. However,
failure to respond on a CSR issue might itself lead to the firm incurring even higher additional costs
(e.g., as a result of reputational harm and lost sales) and thus, under some circumstances, there is a
“business case” for CSR because company action on the issue is in the firm’s economic interest.

The financial implications of CSR are particularly apparent where pricing is the issue. As
Nagle and Holden (1995, p. 1, emphasis in original) observe, “product, promotion and distribution
are a firm’s attempts to create value in the marketplace… pricing… is the firm’s attempt to capture
some of that value in the profit it earns” and thus the pricing decision is marketing’s moment of self-
interest. However, socially responsible pricing reflects pricing decisions consistent with a firm’s
obligations to society and is not necessarily maximizing the economic interests of the firm. As with
other types of CSR initiatives, the motivation for socially responsible pricing may stem from a
business case or a “normative case”—that it is the morally right thing to do (Smith 2003).

1 See Smith (2003) for a detailed discussion of the characteristics of CSR, rationales for corporate attention to CSR and recent trends.
2 Ibid. Smith asserts that CSR and profit maximization need not be mutually exclusive and that firm action on a CSR issue may be in the economic interest of shareholders (also see, for example, Martin 2002).
We define socially responsible pricing as pricing that attempts to sustain or enhance social welfare.\(^3\) This might involve higher prices, such as coffee wholesalers paying more than three times the market price for Fairtrade coffee to support small farmers, as well as consumers paying a premium for coffee and a variety of other fair-traded products (Harford 2003). Arguably, these higher prices take into account market externalities. Socially responsible pricing might also require that a product’s prices be increased in order to “demarket” it to lessen unwholesome demand (Kotler 2000).\(^4\) More typical, however, and more challenging from the perspective of the traditional view of pricing (at least within marketing), is a requirement to lower price. In this paper, we restrict our attention to socially responsible pricing in the form of differential pricing, where companies price discriminate across markets to take account of ability to pay and social welfare.

There has been little or no attention to socially responsible pricing, as such.\(^5\) Clearly, however, there are related literatures. For example, studies which show that “the poor pay more” have resulted in policy recommendations consistent with our definition of socially responsible pricing (e.g., Andreasen 1975; Freedman 1991). Price gouging also may not be regarded as socially responsible and may prompt policy responses that restrict its use; for example, during shortages of needed goods (e.g., fuel during a natural disaster). Price gouging is generally considered unethical and is sometimes illegal (Lacziak and Murphy 1993), though from an economics perspective it may be more efficient (e.g., reduces queuing).

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\(^3\) Our use of the term social welfare is consistent with its general use in marketing and strategy rather than the precise and various meanings found within economics (e.g., Rawlsian social welfare, conservative social welfare) and it is used interchangeably with the term consumer welfare. Further, our references to pricing are from a marketing rather than from an economics perspective, which involves the exercise of managerial discretion in setting price including the possibility of decisions influenced by moral as well as economic values.

\(^4\) Kotler (2000, p. 6) writes: “Unwholesome products will attract organized efforts to discourage their consumption. Unselling campaigns have been conducted against cigarettes, alcohol, hard drugs, handguns, X-rated movies, and large families. The marketing task is to get people who like something to give it up, using such tools as fear messages, price hikes, and reduced availability.” However, it is rare for demarketing price increases to be initiated by the firm marketing the product; such price increases are more likely to come from a tax rise.

\(^5\) We focus on the price level, though socially responsible pricing might also extend to pricing practices (e.g., misleading pricing), which have received attention, particularly from a public policy standpoint.
Studies have shown that consumers are likely to judge price increases as unfair if they increase the firm’s relative profit, but are perceived as fair when justified by increased costs to the firm (Kahneman, Knetsch and Thaler 1986). However, Nagle and Holden (1995) point out that with claims of price gouging, the perception of unfairness may have little to do with profitability and recent research has identified a broader array of factors influencing price fairness perceptions, including past prices and competitor prices (Campbell 1999; Bolton, Warlop and Alba 2003). The concept of socially responsible pricing suggests that ability to pay is also a factor in price fairness perceptions. Perceptions of unfairness in the pricing of drugs in developing countries clearly have been influenced by ability to pay as well as company profitability. Such perceptions of price unfairness may point up a need for firms to give attention to socially responsible pricing. As with claims of price gouging, however, understanding the objective fairness of a price and whether it is socially responsible calls for a far broader analysis.

Price discrimination and its welfare implications receive extensive coverage within economics. The standard analysis is to treat price discrimination as an attempt by the producer to extract consumer surplus and thus it might be considered antithetical to consumer welfare. Under what is known as first-degree price discrimination, a firm would charge each customer the maximum price that the customer is willing to pay for each unit bought (the reservation price) and all consumer surplus is captured by the firm (Pindyck and Rubinfeld 1989). Price discrimination is not possible without some degree of monopoly control, though it need not necessarily be contrary to consumer welfare; it might, for example, result in greater output, more consumption and more efficient use of resources (Douglas 1975).

The question of socially responsible pricing has come to the fore with pharmaceutical pricing. Concern was expressed at the pricing of AZT, the first treatment for AIDS, when it was originally introduced (Chase 1987). Monopoly control and the life-threatening characteristic of
AIDS permitted an extremely high initial introductory price (it was the most expensive prescription drug on the market at that time). More recently—and more forcefully—we have seen concern expressed about the price of AIDS and other drugs in developing countries. Responses to the issue of access to drugs in developing countries include giving the drugs away and preferential pricing policies. The latter is essentially the use of a firm’s monopoly control to price discriminate across markets to promote social welfare in developing countries rather than to extract consumer surplus. We view this discretionary action by firms as socially responsible pricing.\(^6\)

Consider the position taken by Jean-Pierre Garnier, as CEO of the newly merged GlaxoSmithKline, who said in 2001: “The pharmaceutical industry today sells 80% of its products to 20% of the world's population. I don't want to be the CEO of a company that only caters to the rich… I want those medicines in the hands of many more people who need them” (Smith and Duncan 2003). This quote reflects an ambitious, socially responsible vision for GlaxoSmithKline. However, it also reveals a sad and longstanding truth about the research-based pharmaceutical industry and the constraints imposed by its business model. Many of the benefits of the industry available in the developed world do not reach most of the world’s population, which resides in the developing world. This is not to say that the industry is entirely to blame and, as Prahalad and Hammond (2002) show, the problem is not unique to the pharmaceutical industry. However, where prices do not take account of ability to pay, many go untreated. In the next section we examine the drug access issue in more detail. We then focus more specifically on differential pricing, one of the major industry responses, and the lessons that emerge from an

\(^{6}\) In a report for the WHO and the UK’s Department for International Development, Grace (2003, p. 1) differentiates between terminology used in relation to pricing of AIDS drugs: “The terms ‘differential pricing’, or ‘equitable pricing’ can be defined as pricing based on ability to pay. As it relates to the policy goal of maximizing health impact through affordability of medicines, a more accurate term might be ‘equity pricing’, where countries apply a price structure or pricing policy according to some principle of fairness or equity. In practice this may mean proportionality with income per capita, human development index or similar indicators.” Our use of the term socially responsible pricing reflects a more generalizable and potentially broader (though possibly more arbitrary) basis for pricing that is consistent with corporate social responsibility and the exercise of management discretion.
analysis of industry pricing over the 1999-2003 period. Having explored socially responsible pricing within the context of the pharmaceutical industry, we conclude by broadening our discussion to other industries.

ACCESS TO ESSENTIAL MEDICINES IN DEVELOPING COUNTRIES

The drug needs of developing countries are different from those of the developed world. While both may suffer from worldwide diseases, such as HIV/AIDS, some diseases are generally only found in developing countries, such as malaria. Similarly, “diseases of affluence” such as heart disease, are primarily found in developed countries. There are also diseases that stem from poverty and are mostly found in developing countries, such as diarrhoeal diseases. According to WHO statistics for 2000, the leading infectious killers worldwide were: acute respiratory infections (3.9 million deaths worldwide), AIDS (2.9 million), diarrhoeal diseases (2.1 million), TB (1.7 million), childhood diseases including measles (1.4 million) and malaria (1.1 million).

Until recently, there had been no new drug discoveries for developing-world diseases (or “tropical diseases”) for 25 years. These diseases receive little R&D attention from the industry because although potentially huge in volume, the size of the market monetarily is close to insignificant. For example, in 2002, Africa represented approximately 1.3% of global pharmaceutical industry sales of just over $400 billion.  

The disparity between the developed and developing world has been brought into sharp relief by HIV/AIDS, a disease that afflicts both, though 95% of HIV-positive people live in developing countries. While governments and organizations such as UNAIDS (United Nations Programme on HIV/AIDS) and the World Health Organization (WHO) have key roles to play, it is widely asserted that the industry could do more. With the potential of untreated HIV/AIDS in developing countries to have major impacts on the workforce and on child rearing in afflicted

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families, it has major economic as well as health and human consequences, especially in high-incidence countries in Africa.

As of mid-2003, there were approximately 29 million people living with HIV/AIDS in sub-Saharan Africa, estimated to be 70% of HIV/AIDS victims worldwide (UNAIDS 2003C). While this number puts the incidence of the disease at around 10% across sub-Saharan Africa, in four countries, Botswana, Lesotho, Swaziland and Zimbabwe, it was over 25%; in Botswana it was as high as 38% (WHO 2003). South Africa, with 5 million AIDS victims (an incidence of 11%), was the country with the largest number of AIDS victims in the world (UNAIDS 2002).

At the end of 2002, only 50,000 of the 4.1 million HIV/AIDS victims requiring antiretroviral (ARV) treatment in Africa—that is, around one percent—were receiving it, in contrast to the almost universal treatment of HIV/AIDS victims in developed countries (WHO 2003). At the end of 2002, of the 800,000 people receiving ARV treatment worldwide, 300,000 were in developing countries, largely in Latin America; only 93,000 of the developing-country AIDS victims receiving ARV treatment lived in sub-Saharan Africa and Asia.

While healthcare and other infrastructure shortcomings of developing countries serve to restrict the flow of drugs to developing-country AIDS victims, WHO and UNAIDS (2002, p. 2) reported that “many countries have underutilized health system capacity that, but for lack of financing and affordability, could be used to expand treatment today.” They note (p. 2): “despite the major reductions in ARV prices, the annual cost of ARV treatment for a person living with HIV still exceeds the annual per capita gross domestic product of many least developed countries.”

Undoubtedly, there can be much debate about who should pay for increased developing-country access to AIDS and other drugs. Some have pointed to the responsibility of developing-country governments for the health and well being of their peoples, contrasting health
expenditures with an allegedly disproportionate spending on defense, while others have asserted a human right to good health under the U.N. Declaration of Human Rights, suggesting a more diffuse responsibility.\textsuperscript{8} Regardless, pharmaceutical firms have faced considerable pressure to increase drug access. NGOs have campaigned vigorously against the industry, securing a high-profile victory in 2001 when the industry was forced to withdraw a case brought against the South African government over its plans to allow distribution of generic copies of AIDS drugs (Tickell 2002; Vachani 2002). Generic competition also has been a factor in those countries with generic manufacturing and less constrained by WTO restrictions, most notably Brazil and India (Vachani 2002). Downward pressure on prices was also felt in other markets as the generic price in these countries was used as a ‘reference price’\textsuperscript{9} by activists and others who argued that the huge disparity in price between the developed world price and that of generics reflected profiteering by the drug companies. Firms have tried three major approaches in response to the access issue: drug donations, differential pricing and out-licensing.\textsuperscript{10}

Drug donation programs date back at least 15 years to Merck’s development of a treatment for onchocerciasis (“river blindness”), a tropical disease that afflicts people in some of the world’s poorest regions. Although there was no commercial market for the drug, Merck invested tens of millions of dollars in its development and, in 1987, set up the Mectizan Donation Program to organize the free distribution of the drug in collaboration with WHO, the World Bank, and other partners. Around 25 million people a year are treated under the program and

\textsuperscript{8} The General Assembly of the United Nations adopted and proclaimed the \textit{Universal Declaration of Human Rights} on December 10, 1948. Several articles of the Declaration have been offered as the basis for the argument that people have a right to good health, including Article 25, of which Paragraph 1 states: “Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.”

\textsuperscript{9} In marketing, a reference price is “any standard of comparison against which a potential transaction or purchase price is compared” (Winer 2000, p. 311).

\textsuperscript{10} There are other approaches, such as public-private partnerships. For a more comprehensive review of the options, see Gardiner (2003).
avoid the risk of premature blindness.\textsuperscript{11} Other firms have followed suit, such as GlaxoSmithKline (and Merck) who donate large quantities of medicines as part of the Global Alliance to Eliminate Lymphatic Filariasis (“elephantiasis”), a program founded in 1998 in conjunction with WHO.\textsuperscript{12} Over 120 million people in 83 countries are afflicted with Lymphatic Filariasis (LF) and 20% of the world’s population is at risk of the parasitic infection. Using mass administration of the drug (e.g., 10 million people in one day in Sri Lanka in July 2003), the program aims to eliminate LF by 2020. GSK has committed to donating 5-6 billion albendazole tablets free of charge during this period, valued at US$1 billion.

In theory, drug donation programs set the price for drugs at zero and remove it as an obstacle to drug access. Tax benefits allow firms to off-set as much as (and sometimes more than) the marginal cost of the drugs, though they might have administration costs to bear (as well as any R&D). Collaboration with health authorities of country governments and multilateral organizations such as the WHO also enable targeting of the most needy populations. However, these programs have drawbacks. They can burden recipients with hidden costs (e.g., drug distribution) as well as donor countries (lost tax revenue). They can be challenging to administer because demand is more difficult to estimate without market signals. They can harm commercial sales when there is unauthorized diversion into the private sector and, because provision is through the public sector only, access to the drug is not maximized, especially in countries where private sector provision dominates.\textsuperscript{13} Most important, these programs are not considered sustainable given the scale required for HIV/AIDS—conservatively estimated at close to 6 million people in developing countries in need of ARVs (WHO and UNAIDS 2002)—and when

\textsuperscript{11} www.merck.com/about/philanthropy/9.htm
\textsuperscript{12} www.gsk.com/filariasis/index.htm
\textsuperscript{13} According to the WHO, 60-80\% of healthcare is private sector financed in developing countries. For example, in Tanzania, 71\% of malaria treatment expenditures were out-of-pocket.
long-term therapy is needed, in contrast to one-dose treatment. Even if the scale could be achieved, NGOs (and many within the WHO) fear that firms would not stay committed.

Differential or preferred pricing involves a price greater than zero, but is often intended to be without loss or profit. An example of this approach can be found within the Accelerating Access Initiative (AAI), a partnership of five UN organizations and five pharmaceutical companies working together to increase access to HIV/AIDS care and treatment in developing countries. As a result of AAI negotiations and the competition from generic producers, prices for some ARVs decreased in some developing countries to 10-20% of their price in developed countries (WHO and UNAIDS 2002). Differential pricing is assumed to be more cost effective and more sustainable than the donation approach. However, it does have drawbacks, exacerbating the price referencing that already occurs with generics and providing scope for diversion in the same way as the donation option (Dyer 2002). The potential of private sector distribution is also underexploited, though programs involving large employers counter this criticism. Differential pricing has become the preferred solution of many in the industry and of some (though not all) NGOs and is examined in more detail in the economic analysis that follows in the next section.

It is worth noting that multinationals sell drugs at different prices even among developed-country markets. As a result of government pricing regimes in Europe, multinationals are forced to sell drugs at lower prices in Europe than in the US. Partly as a result of price differences and partly owing to physicians’ reluctance to prescribe newer and more expensive medication, Europe spends 60% less per head on drugs than the US (Economist 2004a).

Finally, out-licensing allows the firm to charge a lower price via a third party, a local developing-country manufacturer that produces the drug under license. Typically, the firm makes no profit from the arrangement (e.g., license fees paid are used to support drug distribution). For example, in 2001, GlaxoSmithKline granted a voluntary license to Aspen Pharmacare, South
Africa’s largest producer of generic medicines, to allow it to manufacture GSK ARVs in South Africa and to sell them to the South African government and others in the not-for-profit sector. GSK waived its royalty fee and instead required a 30% fee on net sales to be paid as a donation to NGOs managing HIV/AIDS programs in South Africa.

Not used as extensively as drug donations or preferred pricing, out-licensing has the advantage of distancing the firm from the lower price and potentially reducing the scope for price referencing where critics point to the same brand sold at dramatically different prices in different markets. It is also a commercially appealing response to generic competition and can attract favorable media coverage. However, the price may not be low enough to make the product affordable for large proportions of the population in need, there are limitations posed by the restricted availability of companies in developing countries with adequate quality control systems, and the price referencing problem does not entirely disappear.\(^{14}\)

**CHARACTERISTICS OF THE PHARMACEUTICAL INDUSTRY**

The cost structure for the manufacture of patented drugs is characterized by extremely high fixed costs on account of R&D expenses for drug discovery and development. According to industry sources, it takes, on average, $800m to bring a drug to market (Pharmaceutical Research and Manufacturers of America 2003, p. 2). On the other hand, variable costs are very low. For the highest priced drugs they could be as low as 3-5% of the price. Given the high fixed cost and very low variable cost, under perfect competition drug prices would be driven down to levels that would yield low contribution margins and discourage drug discovery.\(^{15}\) However, as a result of the patent system the industry has a monopolistic structure for most new drugs, and companies are able to maintain prices high enough to earn profits that cover fixed costs and provide

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\(^{14}\) Aspen promised to sell Combivir below the price of $2/patient/day that GSK was offering and just above the $1/patient/day quoted by Cipla, a generic producer of the drugs in India (where they were not patent protected).

\(^{15}\) We use the word contribution to refer to the difference between selling price and variable cost and not to charitable contributions made by donors.
attractive returns to shareholders. See Table 1 for profits earned by some of the research-based pharmaceutical multinationals.

In Figure 1, we show the traditional business model for the research-based pharmaceutical industry. Huge investments in R&D eventually pay-off in drug development, with the drug companies then able to charge monopolistic prices for up to 20 years as a result of patent protection (however, given regulatory approval and other delays to drug introduction, on average drugs are patent protected in the market for 10-12 years). This pricing policy generates support for future R&D and rewards investors, with the industry consistently reporting the highest levels of profitability; according to Fortune, the pharmaceutical industry in 2001 continued to hold the top ranking position with an average industry profit of 18.5% as a percentage of revenues, compared to a median 5% return for all industries surveyed. In Figure 2, we show how this model is changed by the introduction of differential pricing and how its sustainability is threatened by price referencing and diversion, as well as generics.

The price of some life-saving drugs tends to be quite high. For example, a year’s supply of a multinational’s patented three-drug ARV combination for a single AIDS patient was priced (as of 2003) at around $10,000 in developed-country markets. Similar drugs produced by generic drug manufacturers in India, where patents currently are enforced only for drug manufacturing processes, but not for drug formulations, are sold at $200-350. The quality of the products and the processes used by leading generic drug manufacturers (selling at about $300), have been verified as meeting developed-country standards by regulatory agencies in the US and Europe. Some of

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16 Fortune, April 15, 2002. The pharmaceutical industry performed well ahead of other profitable industries including commercial banks, ranked second at 13.5% return on revenues, diversified financial institutions (10.5%), mining and crude oil producers (8.6%) and computers, office equipment and computer/data services (2.3%).
these companies also supply bulk drugs to developed-country multinationals, which convert them into pills for resale in developed-country markets. This attests to the high quality of their generic products. Since the generic drug manufacturers earn profits on their sales of ARV drugs despite the low selling prices it suggests that their variable cost of manufacturing a year’s supply of ARV combination is below $300. One can assume that given the parity in production methods and product quality, the variable cost for drugs manufactured by multinationals is not much higher than that for generic product manufacturers. As we show in Appendix A, the variable cost of drugs manufactured by multinationals is probably between $300 and $500.

While the $10,000 price tag for an annual supply of ARVs may seem high, it is small compared to some other drugs currently available. For example, a year’s supply of Cerazyme, an “orphan drug” used to treat Gaucher’s disease, is priced at around $150,000. This high price is made possible by the fact that the US government orphan drug policy grants patents to a single company for discovering a cure for diseases that afflict very few people and are, therefore, unlikely to attract the R&D attention of drug companies without special incentives. This policy allows companies to enjoy a monopoly position rather than an oligopoly position and price drugs high enough to recover R&D costs and make profits from a very small quantity of sales. For example, there are less than 5000 people known to have Gaucher’s disease.

Between 1999 and 2003, the prices of ARVs sold by multinationals in developing countries dropped dramatically, from around $10,000 for a triple-drug ARV combination to under $1000. In the next sections, consistent with our interest in better understanding socially responsible pricing in practice, we examine ARV pricing in developing countries from the viewpoint of profit and social welfare maximization and how that changed between 1999 and 2003.
AIDS DRUG PRICING IN 1999

In 1999, the prices of multinationals’ AIDS drugs were regarded to be much too high for developing-country customers, prompting remarks such as those of Kofi Annan and James Orbinski quoted at the outset of this article. While in developed countries many were able to receive AIDS treatment as a result of health insurance coverage, few developing-country patients were able to afford AIDS treatment at an annual cost of $10,000.

Multinationals’ ability to maintain high prices in developing countries was enhanced in 1995 with the formation of the WTO, which brought about a change in the rules for global trade. The WTO’s TRIPS agreement, which covers intellectual property rights, was negotiated during the 1986-94 Uruguay round of the GATT, and became effective with the formation of the WTO. Before that, developing countries were in a stronger position to persuade multinationals to license their technology for manufacturing products in developing countries for sale at prices much lower than in developed countries.

Not so long ago, even some developed countries provided weak patent protection for drugs. For example, Canada instituted its strong protection of drug patents as recently as 1992. Its 1923 law allowing compulsory licensing of drugs for local manufacture was extended to imports in 1969. In the following eight years, 227 licenses were issued. According to one study, this resulted in prices of US-patented drugs being 47% lower in Canada than in the US. Canada began weakening its compulsory licensing laws as it prepared to enter into trade treaties. In return, multinationals agreed to locate more R&D in Canada and adopt “reasonable price” controls instituted by the Canadian Patented Medicines Review Board (Scherer and Watal 2002). Italy introduced drug patent protection only in 1978, after the Italian Supreme Court forced the government to do so (Scherer 2000). Indeed, the US Defense Department bought Italian generic drugs until 1961 when it was forced to stop by Congress (Scherer and Watal 2002).
The Profit-Maximizing Perspective

What did the high prices of AIDS drugs in developing-country markets in 1999 imply for multinationals’ profits? Given differences in the price elasticity of demand in developed and developing countries, the optimal pricing strategy for maximizing profits calls for segmenting the markets and pricing low in developing countries and high in developed countries. According to economists, in industries with cost structures similar to that of the pharmaceutical industry, profit is maximized when prices in different segments are roughly inversely proportional to the price elasticity of demand of the segments (see, for example, Danzon 1997; Ramsey 1927). First-degree (or “perfect”) price discrimination is nearly impossible to achieve for pharmaceutical firms and the best they can aim for is third-degree price discrimination, in which prices are different across segments but all customers in a segment pay the same price.

If multinationals were selling drugs across the globe at a uniform price, they were probably earning profits below the maximum level in developing countries. At high prices they earned a large unit contribution in developing-country markets, but sold very few units. If they had reduced prices in developing-country markets they would have earned less contribution per unit, but might have sold so many more units that they would have earned greater profits.

We modeled the economics of selling AIDS drugs in developing-country markets in order to estimate the level of contribution at stake for multinationals (see Appendix B). Central to this analysis is an estimate of demand, which is used to calculate multinationals’ potential contribution from selling drugs in developing countries at different prices in 1999, when there was minimal donor assistance. The demand for triple-drug combinations to treat AIDS in developing countries was meager (approximately 1,000) at prices of around $10,000 per patient per year, which is consistent with statements of UN officials that a negligible number of developing-country patients could afford drugs at those prices.
There was little contribution (only about $10 million) to be earned in developing countries at the $10,000 price owing to the small demand. Had prices been lower (say $750-1000), demand would have increased significantly to 50,000-80,000. While contribution would have risen from around $10 million to a maximum of between $20 and $36 million (depending on level of variable cost), the incremental amount at stake was not large relative to industry net revenues. So multinationals did not have a large economic incentive to reduce prices substantially in developing countries. On the other hand, the prospect of product diversion to developed-country markets if developing-country prices were very low, or of price referencing depressing developed-country prices, must have been sobering, as it threatened to jeopardize contribution in developed-country markets which was enormous by comparison, running into billions of dollars.\footnote{Assuming price of $10,000 per person per year and variable costs of $300-500, multinationals would have earned $4-5 billion in contributions from sales to half a million developed-country patients.} So, while at the global price of $10,000 multinationals were suboptimizing developing-country contribution, they were probably maximizing global contribution. We assume that fear of diversion or referencing, along with other concerns, served as barriers to price reduction by multinationals in developing countries, as discussed later in this paper.

\textit{Welfare-Maximizing Perspective}

From a welfare-maximizing perspective lower drug prices are naturally preferable. Given the extremely low income levels of developing-country AIDS patients the prices of drugs would have had to fall far below variable costs to make them affordable for the 6 million patients who needed them. If prices needed to fall to $40 to reach 6 million patients, as our model predicts, suppliers of drugs would have had to be out of pocket to the tune of $1.7-3.0 billion (depending on the level of variable cost) in order to supply drugs to all patients at that price.
Between those two extreme price points ($10,000 and below $100), however, appear to lie a number of points where multinationals would not have suffered a major contribution penalty in the developing-country market, and might, in fact, have earned higher contribution than at the $10,000 price, while social welfare could have been enhanced considerably. For example, at prices of around $750-$1000, between fifty and eighty thousand patients might have been served instead of around one thousand at $10,000.

**Tradeoff Between Developing-Country Contribution and Lives Saved**

The case of AIDS drug pricing provides interesting insights with regard to the tradeoff between contribution earned and lives saved in developing countries, which is presented in figure 3. As price starts out at $10,000 toward the right, and moves left to lower price points, more lives are saved. In Zone I multinationals could not only have saved more lives as prices fell, but could also have increased contribution earnings in developing countries. However, moving the price to points that would have raised welfare required tackling barriers, such as the risk of gray markets, which could have compromised contribution in developed countries.

Insert Figure 3 here

In Zone II, as prices fall below $750-$1000, the actions needed to raise welfare cease to be congruent with those necessary to raise profits. Multinationals would have needed to begin sacrificing contribution in developing countries to save lives. However, initially at least, thousands of lives could have been saved with contribution reductions that were not relatively large. This is where multinationals had the opportunity to demonstrate their commitment to human welfare and both lower price and challenge other stakeholders like governments and NGOs to contribute resources to extend the reach of drugs to more patients.

Maximization of social welfare (Zone III), however, would have been very difficult for multinationals to achieve alone. As Figure 3 shows, to provide ARVs to all the patients who
needed them would have required an enormous commitment of resources in the absence of donor assistance. It is difficult to expect that multinational pricing could prevail at Zone III levels, and the solution for addressing the needs of the vast numbers of patients depended on the provision of substantial funds by donors. (It also assumes adequate infrastructure for drug delivery at this scale, almost certainly not present in most developing countries at this time.)

**Coordinated Stakeholder Responses to Achieve Socially Responsible Pricing**

From the multinationals’ perspective there are a number of potential costs and risks that discourage socially responsible pricing in this context. Multinationals alone cannot overcome all these barriers. The coordinated effort of multiple stakeholders is necessary to overcome them and create conditions for socially responsible pricing. These stakeholders include developing- and developed-country governments, multilateral institutions such as the UN, WHO and the WTO, private donors, NGOs, and generic product manufacturers in addition to multinationals.

*Product diversion.* From the multinationals’ perspective, one of the risks of significant price differences between countries is the possibility of diversion of low-priced product from developing countries to developed countries. For example, in October 2002, AIDS drugs sold by one of the multinationals at sharply reduced prices in Africa were found to have been illegally resold in Germany and the Netherlands (Dyer 2002). The Dutch government recalled two of the drugs fearing contamination in transportation and planned to prosecute the importer. While it is important for developed-country governments to discourage unscrupulous distributors, it is also important that they address the needs of developed-country patients whose insurance does not adequately cover procurement of life-saving drugs creating demand for diverted products. By 2002 the number of uninsured Americans had risen to 43.6 million (Harding, 2004). Currently, the US government is more preoccupied with the issue of whether to allow drug imports from its
neighbors, Canada and Mexico, than with the potential impact of AIDS drugs diverted from
distant developing countries.

Developing-country governments also have a role to play by creating stronger monitoring
and control of low-priced drugs that are introduced into their public health system. While it may
be difficult to eliminate diversion, greater attention to the problem might help contain the risk.
Multinationals can also use strategies to discourage diversion; for example, they could introduce
different brands and packaging in developed and developing countries so that diverted products
can be more easily detected (though regulatory requirements generally mean that this involves
considerable time and expense).

*Price referencing.* As noted earlier, price discrimination across countries, with
significantly lower prices in developing countries, could result in increased pressure for price
reductions in developed countries where pharmaceutical companies are constantly facing
demands for lower prices from a range of buyers (see, for example, Scherer 1997). The prospect
of jeopardizing contributions in developed-country markets, estimated at $4-5 billion, probably
made multinationals reluctant to reduce prices in developing countries. On the other hand, it is
not clear how much this would have increased the problem of large institutional buyers of drugs
negotiating aggressively for price discounts, since such buyers were probably aware that variable
costs of drug manufacture were a fraction of selling prices, and the provision of low-priced drugs
in developing countries would not, in itself, have provided significant new information. There is
not much other stakeholders can do to address this issue, except that if developed-country
governments are able to address the needs of the poorer segments in their own countries, the
pressures for lower prices from multinationals might ease somewhat (e.g., fewer attacks from
AIDS activists).
Inadequate infrastructure and avoiding drug resistant strains. Pharmaceutical multinationals claimed that lack of infrastructure was a bigger hurdle to treating developing-country patients than drug prices (Lohr 2002). Aside from drug distribution and administration challenges, without proper infrastructure patients would end up not taking their medication as directed, rendering the treatment ineffective and helping create drug-resistant strains of the AIDS virus. In Europe, almost 10% of fresh AIDS cases have been found to be resistant to at least one drug (McNeil 2003B). The medical infrastructure is indeed sorely lacking in developing countries and needs billions of dollars to upgrade, which would need to come from contributions of donors, multilateral agencies and developing- and developed-country governments. NGOs are helping by keeping up the pressure on all those stakeholders to focus on infrastructure development. NGOs are also making up for some of the shortcomings in the public health system by providing testing and patient care.¹⁸

Donor reluctance. When poor patients are unable to pay for medication one possible solution is for companies to price drugs lower to help serve patients’ needs. However, if multinationals are quick to cut prices, donors and local governments may be under less pressure to provide financial support. The more the donors pay the better the economics from the multinationals’ perspective since donor funds flow through to drug producers as payment for drugs purchased and increase potential contribution. Perhaps the zero-sum aspect of this “game” creates reluctance on the part of multinationals to cut prices early on and let donors and governments off the hook.

Pressure from NGOs is perhaps the most effective factor in inducing developed-country governments and private donors to put up funds necessary to save lives. However, when drug

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¹⁸ It is important to note that despite infrastructural shortcomings the risk of developing drug resistant strains in developing countries may be overstated. The evidence suggests that Africans are more likely than developed-country patients to take their medicines as prescribed. In Africa, 80-85% of patients follow prescribed treatment procedures compared with 60% in developed countries (Economist 2003).
prices are high, donors probably lack motivation to contribute significant amounts from their scarce pool of funds, since the impact of donations is low (and at high prices some also believe that attention to drug therapy drives out prevention efforts). Donors’ willingness to provide funds is likely to rise as drug prices fall. NGOs made a valuable contribution by pressing various stakeholders to permit the sale of generic products in developing countries thereby enhancing the impact of donors’ funds and creating conditions for them to increase donations, while also putting pressure on multinationals to reduce their prices.

Administrative overhead. The contributions at stake in developing countries are relatively small and while safeguards might protect the company from gray markets there is a certain amount of administrative overhead and transaction cost involved in setting up, managing, policing and fine tuning a differential price system. From the multinationals’ viewpoint, the economic benefits may not have justified the effort involved. However, over time, as NGOs have applied pressure on multinationals and the public relations challenges have increased, maintenance of uniform prices has become costly and unpopular. We argue that this has led to socially responsible pricing, as we describe below.

AIDS DRUG PRICING IN 2003

Despite barriers to price reduction, multinationals’ AIDS drug prices fell sharply over the period 1999-2003, beginning with steep declines in 2000, as a result of a number of important changes in the industry (UNAIDS 2003A; Vachani 2002).

Change in political support. When the US government suddenly backed off from pressuring the South African government to refrain from allowing the licensing of local manufacture of generic AIDS drugs, multinationals found themselves politically isolated and unable to resist calls from activists for price reductions in developing countries. Brazil’s decision in 1997 to ignore US pressure and aggressively license local generic manufacturing also helped
set an example for other developing countries to emulate. The primary impact of this decision was non-generic manufacturers lowering the average price for a year’s supply of ARVs by two-thirds to around $4,500 and reducing the government’s health bill by an estimated $472 million over three years (Smith and Duncan 2003).

*Generic products.* The high prices of multinationals’ products became unsustainable in developing countries where local manufacturing of generic drugs commenced and increased. However, there are some developing countries that lack the ability to manufacture generic drugs locally and, until recently, WTO rules prohibited import of generic products. In anticipation of the WTO meetings at Cancun in September 2003, which were seen at risk of being derailed in the absence of liberalization of drug imports during medical emergencies, the US withdrew its opposition to such imports (Becker 2003). As developing countries that lack local manufacturing capability begin to import generic drugs the downward pressure on prices of multinationals’ drugs will likely increase within those countries.

*Upward Shift in Demand Curve at Lower Prices*

While, on the one hand, the demand for high-priced branded AIDS drugs was reduced on account of the greater availability of generic drugs, there was a significant upward shift in the demand curve at lower price points. This shift occurred as a result of the substantial funds being made available by donors to tackle the AIDS epidemic in developing countries. One of the main channels for these resources was that provided by multilateral institutions and initiatives. Prominent among them was the Global Fund, a multilateral effort set up at the urging of the UN, with contributions from the governments of the US, UK, France, Germany and other countries, and private donors such as the Gates Foundation. The other channel was bilateral assistance provided by developed-country governments. In February 2003, President Bush announced a significant increase in bilateral aid devoted to HIV/AIDS (McNeil 2003A). In addition,
developing-country governments increased their own commitment of resources to combat AIDS. In 2001, as part of the Abuja Declaration, African countries pledged to allocate 15% of their national budgets to health care (UNAIDS 2003B).

As a result of pressure from donors, the disbursements made from the Global Fund and other multilateral donors stipulated purchase of drugs of adequate quality at the cheapest prices. In effect, this meant that the funds would be utilized only for drugs with prices around $300 (by May 2003, the cheapest generic ARV combination recommended by WHO was just under $300; see UNAIDS 2003A). It appears that US funds were to be used to purchase drugs from US multinationals, whose prices toward the end of 2002 were around $1000.  

**Profit-and Welfare-Maximizing Perspectives**

As the contribution estimates in Appendix B indicate, if $600 million of donor funds were made available for drug purchases, multinationals stood to earn maximum contributions of around $175-$245 million (depending on the level of variable cost) at prices of $1000. As Figure 4 shows, Zone II became attractive for multinationals as it provided the opportunity to earn significant contributions while saving many more lives than before. Zone III, which is where prices needed to be to ensure universal access, remained elusive however.  

Insert Figure 4 here

From a welfare-maximizing perspective, the situation in 2003 was much better than in 1999, with more patients served with life-saving drugs. However, the funds were inadequate to provide drugs for the 6 million patients who needed them. On the basis of our demand estimation, at the $300 price point less than 40% of the 6 million who needed the drugs would have had access to them.

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19 In a major policy change, the US government shifted toward acceptance of generics in mid-2004 (see Altman 2004; Dyer 2004).
By May 2003 the cheapest branded ARV combination being sold in developing countries was priced at $675 (UNAIDS 2003A). Over time, prices of other branded products could well drift down as well, with most multinationals charging around $700. Likewise generic products have begun appearing at around $200, giving hope that the prices of generic drugs of certified quality will also drop down to that level. Even so (and assuming availability), nearly 40% of victims needing ARVs would go untreated.

REALIZING SOCIALLY RESPONSIBLE PRICING

A large number of stakeholders played a role in moving the price of AIDS drugs down toward socially responsible levels, as we illustrate in Figure 5. NGOs provided the initial impetus by highlighting the need for action, and followed that by continually exerting moral and public relations pressure on governments, donors and multinationals. In response, multinationals made modest price reductions (Glaxo offered lower prices on AIDS drugs in Africa as early as 1997). The appearance of generic products served to demonstrate how low the variable manufacturing costs were and, where generic manufacture was allowed, they put multinationals under severe competitive pressure. Large developing-country governments, such as Brazil, helped legitimize generics, enhancing their impact. Developed-country governments, such as the US, which initially protected multinationals’ interests by dissuading developing-country governments from infringing on multinationals’ intellectual property rights, backed off from that position and ultimately shifted to providing large donations for drug procurement. The Accelerating Access Initiative, created in 2000, was a coordinated industry response in combination with WHO and UNAIDS, that achieved some negotiated price reductions on a country-by-country basis of as
much as 80-90% by 2002, but even the lowest prices under AAI were still more than double those of comparable generics.\textsuperscript{20}

Having lost the support of developed-country governments in the intellectual property rights battle, facing severe competition from generics, and with donors showing signs of substantially increasing assistance, multinationals cut prices significantly. With a shift in the US position on restricting generic imports, and under intense pressure from developing countries in the weeks before the 2003 Cancun meetings, the WTO eased import rules. In 2004, donors were looking to find ways to put together the massive financial and other assistance needed to provide near universal availability. The 2004 World Health Report was optimistic about the prospects for success, while Richard Feachem, Executive Director of the Global Fund, reported in May 2004 that finance and drug costs, which were now as low as $150 per person per year, were no longer the binding constraints they once were on providing treatment for AIDS, with the main constraint now being the capacity of countries to deliver drugs to those who needed them (Williams 2004).

\textbf{Insert Figure 5 here}

What if anything could the major stakeholders have done differently to move prices to socially responsible levels more quickly? Perhaps governments, donors and multinationals could all have moved earlier. We focus on multinationals.

In the context of the access to essential medicines issue, it is difficult to see how multinationals (certainly, if publicly held) could have maximized social welfare acting alone, even assuming this had been their intent. The economic costs would have been so high, in this case running into billions of dollars, that multinationals alone could not reasonably be expected to bear them (aside from whether multinationals could address other obstacles to drug access.

\textsuperscript{20} Grace (2003) reports the effect on AAI prices of much lower priced generics and that the relatively high prices under AAI (along with other factors) constrained its impact. Even with substantial price reductions, AAI prices still exceeded annual GDP per capita of many LDCs and, as of December 2001, only 27,000 people in the 19 countries participating in AAI had ARV access.
beyond price). Multinationals could, however, have significantly enhanced social welfare. In this case, instead of persuading developed-country governments to assist them in deterring price erosion in developing countries, they could have taken a proactive stance and assumed leadership in devising a coordinated strategy to reach the poorest patients. Embracing socially responsible pricing in this way could have been a dramatically different response from the belated and reactive AAI. It would have comprised, at minimum, the following elements.

*Accepting suboptimal earnings in developing countries.* While it is unrealistic to expect stockholders of multinationals to put up billions of dollars to provide drugs to the neediest at a time when powerful governments and private donors are contributing little, it is not unreasonable to expect multinationals to absorb a certain level of contribution reduction in order to save lives, while at the same time urging governments and donors to bear the remainder of the cost. For example, in the late ‘90’s, the maximum developing-country contribution at stake was between $25-36 million (depending on variable cost). So even if multinationals had priced all the way down to variable cost, saving several thousand lives, the contribution sacrificed would have been small relative to the contribution on AIDS drugs in developed-country markets. Given that not all the drugs multinationals sell are life-saving drugs and, therefore, such sacrifices are not required on all products, this might not have been an unreasonable cost, especially when compared with the overall profits of the industry. However, as discussed previously, other stakeholders would have had to help address other barriers to price reduction.

In light of the reputational impact on the industry during this period as a result of the access issue, the business case for CSR may have provided sufficient incentive for price reductions of the magnitude reflected in Zone II in Figure 3 (i.e., to $300-500). This is with the benefit of hindsight. In contrast, one might also point to the normative case. Social contract theory can provide the normative rationale (Donaldson 1982; Dunfee, Smith and Ross 1999).
Consistent with classic social contract theory (e.g., Locke, Hobbes, Rousseau), Donaldson (1982) identifies a social contract for business founded on consent; i.e., he asserts that corporations exist only through the cooperation and commitment of society. This suggests an implied agreement between the corporation and society. As Donaldson (1982, p. 42) writes: “If General Motors holds society responsible for providing the condition of its existence, then for what does society hold General Motors responsible? What are the terms of the social contract?” The simplest form of the contract is to specify what business needs from society and what, in turn, are its obligations to society.

In the case of pharmaceutical firms, the social contract appears to provide for special treatment with regard to intellectual property such that new drugs may be patent protected for up to twenty years and monopolistic prices charged during this period (as per Figure 1). In return, society expects the profits from these activities to provide the incentive to develop new drugs, many of which may be life enhancing if not life saving. The industry has undoubtedly done much to improve human welfare. However, it has become increasingly apparent that only a minority of society is benefiting, as indicated by the earlier quote from Jean-Pierre Garnier. Arguably, the last 5-10 years have seen this social contract being reinterpreted to include greater provision for poorer sections of society in developing countries (as reflected in Figure 2). Garnier’s responses to critics at the GSK Annual General Meeting in 2002 reflect this view, though they also reveal the importance of employees as a potential motivator underpinning the business case for CSR:

Some months ago, when the newly merged GlaxoSmithKline was formed, I said that I did not want to be head of a company that caters only to the rich. I made access to medicines in poorer countries a priority and I take this opportunity to renew that pledge. We have 110,000 people who go to work every morning because they are pro-public health. We

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21 An alternative social contract might be proposed whereby patent protection is treated as a special dispensation for pharmaceutical firms in developed world markets only, with patents inapplicable in developing-country contexts (after all, gray markets and the threat of diversion are the problem of rich countries, not the most poor). However, at the very least, this would be inconsistent with broader international trade developments and efforts to protect intellectual property (but see Grace 2003 for a response to this problem).
have to make a profit for our shareholders but the primary objective of any policy put forward in the industry is public health.22

**Challenging governments and donors.** By taking a proactive welfare-enhancing stance, multinationals could perhaps have challenged governments and private donors to assume the bulk of the financial costs. While in the short run, implementing a differential pricing system might have involved assuming transaction costs of managing the system, it would have allowed multinationals to take the high ground and enhanced NGOs’ pressure on donors and governments to provide greater financial assistance for drug procurement. As the flow of financial assistance increased multinationals would have benefited by selling more drugs.

**Searching for ways to facilitate price discrimination.** Gray markets present a major risk for a price discrimination strategy and the challenges of gray markets should not be understated (see, for example, Antia, Bergen and Dutta 2003; Myers and Griffith 1999). However, in several industries multinationals have developed strategies to segment markets and design product and service packages in ways to reduce the chances of product flow across markets. These industries come in a wide range; e.g., automobiles, retail, airline, aircraft and hotels. Given that much of the developed world is served with drugs paid for by insurance companies or national health providers, with appropriate packaging and branding it might have been possible to devise ways to limit gray markets to levels low enough to make price discrimination effective.

**Working with generic manufacturers.** One of the serious challenges to manufacturers of patented drugs is competition from generic drug manufacturers. While these companies pose serious threats in the market place they also serve as valuable suppliers who help contain manufacturing costs. Multinationals have to strike the appropriate balance in terms of combating

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22 Smith and Duncan, op. cit. Similarly, Merck’s culture is committed to the alleviation of suffering and this is recognized to be an important motivator of its staff. Asked about why Merck chose to donate Mectizan, the river blindness drug, Roy Vagelos, Merck’s CEO, said it was because of “… the people at Merck. The research people and how disappointed they would be if the drug never reached the people that would benefit” (Hawthorne 2003, p. 17).
them and cooperating with them (Economist 2004b). In the effort to supply developing-country markets with inexpensive drugs there is little reason why multinationals could not have relied on supply from generic drug manufacturers, especially if their own variable costs exceeded those of generic manufacturers.

Willingness to accept the hassle. The top management of any organization must juggle numerous projects that compete for its attention. Under ordinary circumstances it is important that managers focus on the most important activities from a profit viewpoint. When lives are at stake, however, there is at least a moral imperative for giving attention to irksome problems that present little apparent opportunity for short-term profit but great opportunities for enhancing human welfare. Indeed, writing in the *McKinsey Quarterly*, Gupta and Taliento (2003, p. 100) assert that there is “a moral, strategic, and financial responsibility to do so” on the part of companies seeking to benefit from globalization.

**DISCUSSION**

*Socially Responsible Pricing and Martin's Virtue Matrix*

Martin’s (2002) “virtue matrix” provides a classification of CSR activity according to whether it is “instrumental” and serves shareholders’ economic interests or “intrinsic” and motivated, at least initially, by the belief that it is the right thing to do, though it might not be of economic benefit to shareholders. He starts from the premise that managers of publicly traded companies cannot (rationally) engage in activities that erode shareholder value. As Figure 6 shows, instrumental CSR actions are done out of “choice” (consistent with norms or customs; e.g., conventional cause-related marketing campaigns) or “compliance” (mandated by law or regulation; e.g., health and safety in the workplace). Intrinsic CSR actions are “strategic” or “structural”. Strategic CSR at the same time as benefiting society might also benefit shareholders by being aligned with corporate strategy, but this outcome is unclear at the time such actions are
contemplated (e.g., James Burke’s famous decision as CEO of Johnson and Johnson to recall Tylenol following deaths from product tampering, at considerable expense and despite advice to the contrary from the FBI and others). There are impediments to “structural” CSR because it would not benefit shareholders and thus requires collective action (of businesses and possibly others, such as NGOs) or government mandate (e.g., air bags in automobiles).

**Insert Figure 6 about here**

Martin’s matrix provides a valuable framework for understanding the evolution of forces that affected socially responsible pricing in the context of the access issue, as we show in Figure 6. In 1999, engaging in socially responsible pricing by reducing the price of ARVs in developing countries from between $10,000 to $1,000 (Zone I of Figure 3) would have been consistent with “strategic CSR”, where society benefits but it was unclear that benefits would accrue to shareholders. It would have taken a leap of faith by managers—while total industry contribution from developing countries would have been maximized, the additional contribution was relatively modest and there were considerable risks attached to the use of tiered pricing. In Zone II, contribution declines from a maximum to zero and becomes increasingly negative in Zone III, and it was not apparent that any countervailing benefit was likely to be forthcoming from consumers, employees, NGOs or governments. Zone II and Zone III pricing would most certainly have been “structural CSR”; it would have benefited society but reduced shareholder value.

Martin explains (2002, p. 72) that CSR initiatives that start out as intrinsic CSR may, over time, become more widely adopted and “such conduct is less a responsibility than a duty” (e.g., on-site day care); they may even become legally mandated (e.g., recycling now required of business under environmental regulations). As we earlier discuss and illustrate with Figure 5, the business environment changed substantially between 1999 and 2003, causing a shift in where the zones fall within the virtue matrix. In 2003, pricing toward the lower end of Zone I has become
the norm and so this is no longer strategic CSR. It represents “choice CSR”, profit maximization appears to be consistent with welfare enhancement and firms can be instrumentally motivated in pursuing this pricing policy. Equally, a failure to have lowered price would be viewed as a laggardly CSR performance.

Moving to prices within Zone II, however, requires some sacrifice of profit even with the donor funding available in 2003, and thus is more consistent with strategic CSR. Business leaders do this because they are intrinsically motivated—it is “the right thing to do.” However, the legitimacy of their actions and at least some of the pressure to act has come from the increased engagement with the issue by NGOs, consumers, employees and governments. Action might ultimately be in the best interests of shareholders as well as society; for example, it might allow the industry to retain what is generally a highly profitable business model. Also, if price reductions continue to prompt higher commitment of donor funds multinationals could earn larger contributions from drugs sold to donor-funded programs.

Finally, Zone III pricing would permit welfare maximization (assuming adequate healthcare infrastructure), but shareholders would not be well served (it would eliminate all industry profits from the category and probably more). As in 1999, pricing in Zone III demands the involvement of other parties, such as governments and NGOs—the firm cannot do this alone—consistent with Martin’s discussion of “structural CSR”.

**Beyond AIDS**

In some ways, the pricing of AIDS drugs presents a case with greater reason for optimism than some others. As we indicate in Figure 7, the degree of disease prevalence in developed- and developing-country markets has a significant impact on drug discovery and access. For AIDS, the market was large enough in developed countries to motivate discovery of remedies and generate significant profits for multinationals leaving them relatively well positioned to pursue socially-
responsible pricing strategies in developing-country markets (Cell 1). In contrast, when disease prevalence is low in developed-country markets but high in developing-country markets (Cell 2), multinationals lack motivation to devote R&D to the disease and donor funds are likely needed for drug discovery as well as access (though, as of 2002, GlaxoSmithKline for one has committed to dedicating an entire R&D facility in Spain to drug development for tropical diseases). Differential pricing is less relevant because demand for the drug in developed-country markets is minimal if it exists at all. This probably presents the most challenging set of conditions from a social welfare perspective and is illustrated by the case of malaria, which kills millions but for which as yet there is no effective vaccine.

 Insert Figure 7 here

When the disease prevalence is low in developing countries their needs are perhaps easier to meet when prevalence is high in developed countries (Cell 3). Developing-country needs may be met with relatively low level of donor funds or multinationals’ donations that don’t require large negative contributions. However, developing-country needs may simply be neglected (e.g., cardiovascular diseases). Finally, when disease prevalence is low in both developed and developing countries (Cell 4), there is the risk that no discoveries may be made since the world market is small (e.g., Gaucher’s disease). However, there is hope on account of orphan-drug incentives, which led to the discovery of a cure for Gaucher’s disease despite the small market. While prices are high, the insurance system is able to cover the cost of patients in developed countries who have coverage. With differential pricing the needs of developing-country patients also could be met.

**Socially Responsible Pricing Beyond the Pharmaceutical Industry**

Prahalad and Hammond (2002) suggest that serving the base of the world’s economic pyramid could be lucrative as well as potentially improve the lives of billions of people and
contribute to greater world stability. However, it is the very bottom of the pyramid where most
HIV/AIDS victims are to be found—the 20% earning less than $1/day (World Bank 2003). Our
analysis of the access issue suggests, at least in the context of AIDS drugs, it is difficult to make
the case that this market could ever be lucrative for drug companies unless donors commit
substantial funds to procure drugs, some of which flow through to multinationals as profits.
However, it is possible to see how this most vulnerable segment of the world’s population could
have its life chances dramatically enhanced as a result of multilateral action, with firms willingly
or under pressure making provision for drug access in combination with aid agencies, NGOs and
others.\(^{23}\) We have suggested that this outcome—albeit somewhat speculative as yet for many
disease categories—may be realized via differential pricing. It is sometimes claimed that the
pharmaceutical industry is a special case. Thus, we conclude by identifying other products and
markets where we might find pressure to adopt this form of socially responsible pricing and
multinationals, under pressure or otherwise, extend their reach to the less advantaged parts of the
world’s economic pyramid. That said, while the disparity in income between developed- and
developing-country markets suggests that the scope for socially responsible pricing is greater in
the latter, with more than 12% of the U.S. population officially below the poverty line, there is
ample opportunity for firms to look at home too (though the greater physical proximity suggests
the diversion and price referencing problems are also likely to be greater)

Our analysis suggests that the necessary conditions for socially responsible differential
pricing of the form examined here are: 1) an element of monopoly control; 2) high fixed costs and
low variable costs; 3) a life-saving or profoundly life-enhancing product or service; and, 4) a
differential ability to pay across market segments. Examples of such products would be those that

\(^{23}\) Noting that more than 6 million people died in 2002 from HIV/AIDS, tuberculosis, and malaria, Gupta and
Taliento (2003) assert that no lasting solution will be found to this health crisis without creative partnerships between
business, NGOs and the public sector.
help alleviate poverty by providing necessities such as food, healthcare, and education. Outside healthcare, we might include computer software, educational books, and agricultural inputs such as high-yielding seeds.\textsuperscript{24} Intellectual property is key to competitive advantage in these industries and enables firms to enjoy market power and command prices several times variable cost.

In the software industry Microsoft has been forced to move away from uniform pricing to differential pricing with steep discounts in Asian developing countries because of two factors (Harney 2004). First, loss of market to pirated software. For example, in China pirated software accounts for about 90\% of the market. Second, the decision by large developing-country governments, such as Brazil’s, to shift to free, or inexpensive, substitutes such as Linux. In educational publishing, companies such as McGraw Hill and Prentice Hall have used differential pricing of textbooks to serve developing-country customers for over thirty years. In the agriculture sector, there is concern that wider acceptance of higher-yielding genetically-modified seeds will result in increasing concentration and market power of suppliers, such as Monsanto, resulting in high prices. Some experts feel that developing-country farmers, who might be unable to afford the higher priced seeds, risk becoming uncompetitive in international markets (Steed 2002). The Commission on Intellectual Property Rights set up by the British government’s Department for International Development Commission has recommended that developing countries should refrain from providing patent protection for plant varieties (Commission on Intellectual Property Rights 2002). Depending on how the industry and the WTO rules on intellectual property rights evolve, there could be an argument for differential pricing of seeds across countries.

\textsuperscript{24} It might be argued that, unlike healthcare, these products and services are life enhancing rather than life saving and thus the case for socially responsible pricing is less compelling and, to the extent that they are life enhancing rather than essential, people might be better off with subsidized incomes and the capacity to exercise choice. We note that some of these products are clearly life saving (e.g., seeds that enhance food security). Further, our argument can be buttressed from a positive rights perspective, according to which one might assert a right to education, for example (consistent with Article 26 of the U.N. Declaration of Human Rights).
CONCLUSIONS

With these examples outside the pharmaceutical industry, as with AIDS drugs, there are facilitating factors and potential obstacles to socially responsible pricing. NGO activism is a likely stimulus—and, arguably, set to grow (Spar and La Mure 2003; Teegen, Doh and Vachani 2003). The risks of diversion present a tremendous obstacle that needs to be overcome. Equally, with greater transparency of pricing (especially via the internet), there is also the risk of lower prices in one market leading to downward pressure on prices in another higher-priced market. Nonetheless, as we demonstrate in our analysis of the issue of access to AIDS drugs, it is possible for these challenges to be met and the prospects for the world’s poorest people to be substantially improved. For managers in such industries who wish to enhance their firm’s contribution to society and preempt activism that seriously tarnishes their image and jeopardizes shareholder value, we have four suggestions.

1. **Define the opportunity and the barriers.** Carefully assess the opportunity for the firm to enhance social welfare through socially responsible pricing, its impact on profits, and the barriers that prevent it from being achieved. This analysis is the first step in moving the firm, the industry and other stakeholders toward creating conditions for socially responsible pricing.

2. **Anticipate pressures and seize the initiative.** If the nature of the industry is such that high prices deprive consumers of life-enhancing products, pressure on firms may well be inevitable. Firms that are sensitive to the needs of society may be able to preempt such pressure through proactive strategies. Firms that seize the initiative and take the lead in moving multiple stakeholders forward toward reduction of barriers to socially responsible pricing can hope to achieve the objective of enhancing social welfare while preserving shareholders’ interests.
3. **Partner with diverse stakeholders.** Creating conditions for socially responsible pricing calls for coalitions among odd partners: multinationals, NGOs, developing- and developed-country governments and multilateral institutions. Managers need to figure out how to deal with this diverse set of constituents, some of whom can sometimes be difficult to understand, predict and work with.

4. **Use generics for leverage.** Managers may need to recast their relationships with manufacturers of generic products, who can be transformed from competitors into partners, helping reduce variable costs and extending reach into the lowest levels of the pyramid, where poverty has its strongest grip.
**Table 1**

2001 Financial Data For Selected Pharmaceutical Companies ($bn.)*

<table>
<thead>
<tr>
<th></th>
<th>Merck</th>
<th>Pfizer</th>
<th>GlaxoSmithKline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Home country</strong></td>
<td>U.S.</td>
<td>U.S.</td>
<td>U.K.</td>
</tr>
<tr>
<td><strong>Revenue</strong></td>
<td>47.7</td>
<td>32.3</td>
<td>29.7</td>
</tr>
<tr>
<td><strong>Cost of goods sold</strong></td>
<td>29.0</td>
<td>5.0</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>Selling General &amp; Administrative Expenses</strong></td>
<td>6.2</td>
<td>11.3</td>
<td>12.2</td>
</tr>
<tr>
<td><strong>R&amp;D</strong></td>
<td>2.5</td>
<td>4.8</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Net Income</strong></td>
<td>7.3</td>
<td>7.8</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Source: Annual reports. *GSK’s data were converted at the rate of £1 = $1.45 (end of 2000).
Figure 1
Traditional Business Model for Research-based Industry

Profits $$$$ $$$$ R&D

Monopolistic price Drug X

Patent protection
Figure 2
Modified Business Model for Research-based Industry

Low-Priced Generics
(in some developing countries)

Tier 2 price (developing countries) = Much lower price

Tier 1 price (developed countries) = Monopolistic price

Diversion

Drug X

Patent protection

Other tiers

Price pressure

Profits

R&D

$?

$$?

$$$

$?
Figure 3
Trade off between lives saved & contribution in developing countries (with no donor assistance)

**Zone I**
Developing-country profit maximization objective coincides with welfare-maximizing objective. Managers face barriers discouraging price reduction. NGOs and governments can help reduce barriers.

**Zone II**
Multinationals have to sacrifice profits to save lives. A relatively small profit reduction could save many lives. Multinationals could cut prices and challenge governments and donors to provide funds needed to save more lives and move to Zone III.

**Zone III**
Multinationals would lose prohibitively large amounts of money as prices fall below variable costs. Massive donor assistance is needed.

---

Figure 3: Trade off between lives saved & contribution in developing countries (with no donor assistance)
Figure 4
Trade off between lives saved & contribution with $600 m of donor assistance

**Zone I**
As before, developing-country profit maximization objective coincides with welfare-maximizing objective. Pressures from stakeholders have forced multinationals to reduce prices.

**Zone II**
Multinationals earn much higher contributions than before if donors funds can be used to buy drugs at $1000 a patient.

**Zone III**
Multinationals would stand to lose even more contribution at very low prices owing to higher demand.
Figure 5
Role Played By Major Stakeholders

- NGOs: Highlight problem. Exert moral and PR pressure
- Donors: Provide large donations
- Small developing-country governments: Greater attention to public health needs
- Multinationals: Sharp price reduction
- Developed-country governments: Shift from protecting multinationals to providing financial assistance
- Large developing-country governments: Legitimize generics
- Generics: Exert competitive pressure
- UN/WHO: Legitimize call for action. Political pressure
- WTO: Permit generic imports
- Donors: Provide large donations
### Figure 6
Martin’s Virtue Matrix & the Access Issue, 1999 & 2003

<table>
<thead>
<tr>
<th>Intrinsic motivation</th>
<th>Strategic</th>
<th>Structural</th>
</tr>
</thead>
</table>
|                      | 1999 – Zone I  
|                      | 2003 – Zone II | 1999 – Zone II & III  
|                      |            | 2003 – Zone III |
| Instrumental motivation | Choice  
|                      | 2003 – Zone I | Compliance |
**Figure 7**
Impact of Disease Prevalence on Drug Discovery & Access

<table>
<thead>
<tr>
<th>Prevalence of disease in developing countries</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td><strong>Cell 1</strong></td>
<td><strong>Cell 3</strong></td>
</tr>
<tr>
<td>Multinationals have resources to enhance welfare through socially responsible pricing.</td>
<td>Multinationals have resources to enhance welfare through socially responsible pricing.</td>
<td></td>
</tr>
<tr>
<td>Large donor funds needed to maximize welfare by providing access to drugs. Multinationals can provide leadership by proactively introducing differential pricing.</td>
<td>Developing-country needs neglected owing to lack of spotlight. Multinationals can enhance welfare via differential pricing.</td>
<td></td>
</tr>
<tr>
<td>E.g., AIDS</td>
<td>E.g., Cardiovascular diseases</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td><strong>Cell 2</strong></td>
<td><strong>Cell 4</strong></td>
</tr>
<tr>
<td>Multinationals lack resources to enhance welfare through differential pricing (which may be irrelevant if demand is entirely absent in developed-country markets), but can keep prices low if R&amp;D is subsidized.</td>
<td>Very high pricing in developed-country markets.</td>
<td></td>
</tr>
<tr>
<td>Large donor funds needed to maximize welfare by providing access to drugs to large population of victims.</td>
<td>Developing-country needs neglected owing to lack of spotlight. Multinationals can help with differential pricing.</td>
<td></td>
</tr>
<tr>
<td>E.g., Malaria</td>
<td>E.g., Gaucher’s disease</td>
<td></td>
</tr>
</tbody>
</table>
Appendix A
Estimated Variable Manufacturing Costs of a Year’s Supply of ARV Drugs

<table>
<thead>
<tr>
<th></th>
<th>Generic product cost</th>
<th>Pharmaceutical multinationals’ projected variable cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dollars per unit</td>
<td>Low estimate</td>
</tr>
<tr>
<td>Materials</td>
<td>135</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>135</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>203</td>
</tr>
<tr>
<td>Salaries &amp; wages</td>
<td>14</td>
<td>500%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>700%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>98</td>
</tr>
<tr>
<td>Manufacturing expenses</td>
<td>16</td>
<td>200%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Depreciation</td>
<td>5</td>
<td>200%</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>400%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Total manufacturing cost</td>
<td>170</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>247</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>385</td>
</tr>
<tr>
<td>SG&amp;A</td>
<td>50</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Total manufacturing cost &amp; SGA</td>
<td>220</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>297</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rounded up to 300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>485</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rounded up to 500</td>
</tr>
</tbody>
</table>

Notes
The estimate of generic product manufacturing cost is based on CIPLA’s overall cost structure for 2001 and 2002 as determined from its annual reports for those years. Manufacturing costs are 56.6% of sales, and selling, general and administrative (SG&A) costs are 16.5% of sales. We assume that the manufacturing cost per unit of its ARVs, which sell for $300, is 56.6% of 300, or $170, and SG&A allocated to it is 16.5% or $50. We use these estimates of CIPLA’s full costs to project variable costs for research-based pharmaceutical multinationals, which is a conservative approach. There is little reason to believe that multinationals would suffer a disadvantage in material cost. Their wage costs are probably five to seven times those of CIPLA’s. Their non-wage manufacturing costs are probably higher. It is difficult to estimate how much higher they would be. In order to be conservative we assume they are two to four times as high as CIPLA’s. There would be little selling cost in providing inexpensive drugs to developing countries however there would be some administrative costs. We assume that these would range from amounts equal to the full SG&A for CIPLA to twice that amount.
Appendix B
Demand And Contribution Estimates

Demand estimation (assuming negligible donor assistance)
Our model estimates demand for ARVs in low-income developing countries (in sub-Saharan Africa and Asia) at different prices assuming negligible donor assistance, as was the case in 1999.

Anchoring the demand curve
We began by looking at the actual number of people receiving ARV treatment in recent years. We know that at the end of 2001, at which time more donor funds were available for drugs than in 1999, the total number of patients receiving ARVs in sub-Saharan Africa and Asia was less than 60,000.\(^{25}\) Price of ARVs at that time was around $1000.\(^{26}\) Based on this we assume that in 1999 the ARV demand in developing-country markets at a $1000 price would have been about 50,000.

Form of the demand curve
Given that the vast majority of AIDS victims lives in poverty, it is generally accepted that demand changes little at high prices and a great deal at low prices. Thus a $500 price change, from $10,000 to $9,500, would produce little effect. However, a change from $1,000 to $500 would produce a much bigger change in demand because many more victims can afford the product as price falls within that price range. So it seems appropriate to assume that the demand curve is curvilinear, such as the constant elasticity demand curve, which is widely used in business forecasting:

\[
P = aQ^b \quad \ldots \quad (1)
\]

Here \(P\) is the price for a year’s supply of ARV for one patient, \(Q\) is the demand (in thousands) and \(a\) and \(b\) are constants.

In estimating the curve’s slope we use information from a UNAIDS report that the consulting firm, McKinsey, in studying Ugandan demand had found that as price falls by a factor of four, demand increases by a factor of ten (UNAIDS 2002, p. 146).

Derivation of the relationship
Equation (1) can be transformed as follows:

\[
\ln P = \ln a + b \ln Q
\]

At point P1:

\[
\ln P_1 = \ln a + b \ln Q_1 \quad \ldots \quad (2)
\]

At point P2:

\[
\ln P_2 = \ln a + b \ln Q_2 \quad \ldots \quad (3)
\]

Subtracting, (3) from (2) we get:

\[25\] It was less than 30,000 each in sub-Saharan Africa and Asia (UNAIDS, 2002, p. 22-23 and 29).

\[26\] Prices fell drastically in 2000, and judging by accounts in UNAIDS reports, it is reasonable to assume that during 2001 prices had fallen to around $1000 in developing countries.
\[ b(\ln Q_1 - \ln Q_2) = \ln P_1 - \ln P_2 \]
\[ b = \frac{\ln(P_1/P_2)}{\ln(Q_1/Q_2)} \quad \ldots \quad (4) \]

Using our assumption about demand at the $1,000 price we have:
\[ P_1 = 1000, \quad Q_1 = 50 \]

and our assumption that if price increases four-fold, demand falls ten-fold, gives us:
\[ P_2 = 4000, \quad Q_2 = 5 \]

Substituting in (4) we get:
\[ b = \ln 0.25/\ln 10 = -0.6021, \]
and,
\[ a = P_1 Q_1^{-b} = 1000 \times 50^{-0.6021} = 10,542 \]

So the demand curve is:
\[ P = 10,542 Q^{-0.6021} \]

**Reality checks**

In order to test if the model produces realistic estimates at other points we checked its predictions at the extremities of the range:

1. **Low-price end** ($100 and below). We know from WHO reports that “c]urrently, five to six million people infected with HIV in the developing world need access to antiretroviral (ARV) therapy to survive.” (WHO 2003). Health economists estimate that price would have to fall to $30-40 before cost ceases to be a barrier to drug access for AIDS victims (Brown 2002). It appears, therefore, that prices need to get below the $100 level for demand to rise to the 6 million level. The model predicts that they would have to be around $56 for demand to rise to 6 million.

2. **High-price end** ($10,000). At the high price end, around $10,000, we know from the statements of UN officials that a negligible number of developing-country AIDS victims could afford ARV treatment. The model predicts demand would fall to 1000 at a price of $10,542, which appears consistent with experts’ views.

**Limitations**

Clearly, the demand curve is only as good as the assumptions it is built on. While it serves us well to help determine intermediate points and use that information to estimate variation in multinationals’ contribution earnings as prices go from $10,000 to $1,000, one must be careful not to use it to predict precise demand, especially in the lower-price region where small changes in assumptions can make big differences to demand estimates.
**Contribution estimates**

We use the demand curve developed above and variable cost estimates from appendix A to model multinationals’ contributions at different price points in table B1.

*With minimal donor assistance (1999)*

**Table B1**

Annual demand and contribution estimates for AIDS drugs in developing countries
(for three-drug ARV cocktail with minimal donor assistance, 1999)

<table>
<thead>
<tr>
<th>Price ('000)</th>
<th>Number of patients</th>
<th>Revenue ($m.)</th>
<th>Contribution assuming $300 variable cost ($m.)</th>
<th>Contribution assuming $500 variable cost ($m.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>4000</td>
<td>5</td>
<td>20</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>2500</td>
<td>11</td>
<td>28</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>1000</td>
<td>50</td>
<td>50</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>750</td>
<td>81</td>
<td>61</td>
<td>36</td>
<td>20</td>
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<td>500</td>
<td>158</td>
<td>79</td>
<td>32</td>
<td>0</td>
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<tr>
<td>400</td>
<td>229</td>
<td>92</td>
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<td>200</td>
<td>724</td>
<td>145</td>
<td>-72</td>
<td>-217</td>
</tr>
<tr>
<td>100</td>
<td>2290</td>
<td>229</td>
<td>-458</td>
<td>-916</td>
</tr>
<tr>
<td>60</td>
<td>5350</td>
<td>321</td>
<td>-1284</td>
<td>-2354</td>
</tr>
<tr>
<td>40</td>
<td>6500</td>
<td>260</td>
<td>-1690</td>
<td>-2990</td>
</tr>
</tbody>
</table>

In order to test the sensitivity of our analysis to changes in assumptions for estimating the demand curve, we developed two other demand curves with a different form and more conservative demand estimates at lower prices. Each of these assumed a curve comprising two linear segments instead of the curvilinear relationship assumed in the base model. Table B2 indicates that our inference with regard to a higher contribution opportunity at lower prices did not change.

**Table B2 - Sensitivity analysis***

<table>
<thead>
<tr>
<th>Form of curve</th>
<th>Base model</th>
<th>Lower-demand scenario I</th>
<th>Lower-demand scenario II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand at $10,000 ('000)</td>
<td>Curvilinear (constant elasticity)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Demand at $1,000 ('000)</td>
<td>50</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Demand at $100 ('000)</td>
<td>2290</td>
<td>1000</td>
<td>200</td>
</tr>
<tr>
<td>Price for maximum contribution ($)</td>
<td>754</td>
<td>674</td>
<td>674</td>
</tr>
<tr>
<td>Demand at max. contribution ('000)</td>
<td>80</td>
<td>394</td>
<td>79</td>
</tr>
<tr>
<td>Maximum contribution ($m.)</td>
<td>36</td>
<td>147</td>
<td>29.5</td>
</tr>
</tbody>
</table>

*Contribution calculation assumes variable cost of $300.*
With $600 million donor assistance (2003)

Table B3 provides estimates of the demand for AIDS drugs if we assume that US$300 million is made available from the Global Fund and the same amount from the US government’s bilateral aid program, and if drug pricing is $300 or less for purchases under the Global Fund and $1,000 or less for US government aid. When price drops to $1,000 we assume that 300,000 patients are served with drugs bought with $300 million from the US government’s bilateral aid program. As prices drop further these funds buy proportionately more drugs. When prices fall to $300 the demand spikes on account of $300 million becoming available from the Global Fund to buy drugs. The demand stops growing at prices below $100 as all those needing the drugs are accounted for.

We see that there is much more contribution to be made at the price point of $1000 than at higher prices. This is driven by the fact that demand picks up sharply at prices of $1000 and below as donor funds kick in. Furthermore, as long as a significant portion of donor funds are available to buy drugs at $1,000 (rather than at $300) there is little incentive for multinationals to drop prices below the $1000 point, where contributions are much higher.

Table B3
Annual demand and contribution estimates for AIDS drugs in developing countries
(for three-drug ARV cocktail with $600 m. donor assistance, 2003)

<table>
<thead>
<tr>
<th>Price</th>
<th>Number of patients</th>
<th>Self supported</th>
<th>Paid for by Global Fund</th>
<th>Paid for by US Funds</th>
<th>Total</th>
<th>Revenue</th>
<th>Contribution assuming $300 variable cost</th>
<th>Contribution assuming $500 variable cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>(`000)</td>
<td>(`000)</td>
<td>(`000)</td>
<td>(`000)</td>
<td></td>
<td>($m.)</td>
<td>($m.)</td>
<td>($m.)</td>
</tr>
<tr>
<td>10000</td>
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<td>0</td>
<td>5</td>
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<td>11</td>
<td>27.5</td>
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<td>245</td>
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<tr>
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<td>481</td>
<td>361</td>
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<td>600</td>
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<td>6500</td>
<td>260</td>
<td>-1690</td>
<td>-2990</td>
<td></td>
</tr>
</tbody>
</table>

27 Some of these could be among those previously counted as potential self-supporting customers but this number is difficult to estimate and we assume that demand from self-supported patients remains unchanged at 50,000.
REFERENCES


