

9. Alternative and Complementary Solutions

The Health Impact Fund is only one of a number of alternative proposals which have been suggested as a solution to the problems inherent in the use of the patent system as the sole incentive mechanism for innovation in pharmaceutical markets. Direct research funding support – especially through private-public partnerships – has an important role to play. Other proposals – differential pricing, AMCs, compulsory licensing, priority review vouchers, patent pools and prize funds – all have merits, and are compared with the Health Impact Fund in this chapter.

INTRODUCTION

The previous chapter outlined various problems with using monopoly pricing to incentivise research and development. It also highlighted ways in which systems of monopoly pricing have contributed to the lack of access to certain patented medicines, especially in developing countries. This chapter surveys some complements and alternatives to systems of monopoly pricing and evaluates them based on their potential to increase access, stimulate innovation, work efficiently and generate political support. The point of the discussion is to examine how the Health Impact Fund stacks up against other reforms and reform ideas.

GOVERNMENTAL AND NON-GOVERNMENTAL DIRECT PURCHASES

An important means to increasing access to essential medicines, while also potentially stimulating innovation, is government purchasing of medicines. The larger the budget for medicines, the more medicines can be purchased, and the more profits innovators can earn. In the United States, for example, the Medicare Part D provisions, which insure medicines for seniors, not only increase access for patients, but also boost the sales of pharmaceutical companies, and thus gives them incentives to develop new medicines relevant to this group.

Direct funding for purchasing drugs for developing countries has similar effects. The very successful US PEPFAR (President's Emergency Plan for AIDS Relief) program has recently been extended and increased in scale to allow for spending up to \$48bn on anti-retroviral therapies and other HIV/AIDS programs over five years. Given the increasing need for expensive second-line therapies, additional funding is likely to be necessary to continue to finance purchases of drugs for indigent people with HIV/AIDS. Many other countries have programs to subsidize purchases of pharmaceuticals for their own citizens and for foreigners. Inter-governmental efforts have also been made, such as the WHO/UNAIDS "3 by 5" initiative.

Direct purchasing programs are extremely valuable, but they are also limited and problematic in various respects. First, they are often susceptible to political influence that can distort funding priorities. For example, political considerations resulted in the requirement that at least one third of PEPFAR funds must be used for abstinence-only educational programs (Stolberg 2008). Political considerations may also influence the choice of diseases for which treatments are funded, the products which are purchased, and the countries to which products are supplied.

Second, these purchasing programs are often *ad hoc* and therefore subject to rapid change. The philanthropists and affluent country governments funding such programs may withdraw their support or alter their spending priorities at any time. These efforts

do not therefore provide reliable long-term access to essential medicines.

Third, purchasing programs such as PEPFAR, like insurance programs generally, may handicap themselves by encouraging higher prices for patented medicines. If a profit-maximizing firm has a patented medicine that is the treatment of choice against some given disease, this firm will raise the price of its product when a new buyer appears who is disposed to purchase large quantities even at high prices. (The new buyer affects the aggregate demand curve and thereby the optimal monopoly price.) This problem is not severe when there are several competing drugs in one therapeutic class. Often, however, patented drugs face little competition; and the benefit from increased funding may then be largely offset by price increases. A particularly undesirable outcome would be if the *anticipation* of such a large buyer with deep pockets resulted in high prices.

While a funding initiative offset by price increases may make little difference to access, it does boost corporate profits. Such a boost would be good if it strengthened innovation incentives; but it is unlikely to do so. Existing research efforts cannot be restructured to fit new funding initiatives because pharmaceutical research takes many years to produce a marketable product. And new research efforts cannot be tailored to future funding initiatives whose magnitude and direction are unpredictable. Still, pharmaceutical firms will maintain higher R&D spending when they expect occasional windfalls from new funding initiatives. Though they cannot predict which drugs will benefit, they can assume that many drugs they could develop have a chance to be favored or a chance to attract new funding.

The HIF has several clear advantages over direct support for the purchase of medicines. First, the HIF is designed according to general principles that strictly tie its payments to global health impact as assessed in terms of a single metric. It cannot favor any particular disease or innovator or country, and thus is, as far as possible, free of political influence.

Second, as expressed by the long-term commitments of its funding partners, the HIF is designed as an enduring institution. As such, it will provide stable and reliable innovation incentives. Innovators

contemplating some specific research project can know that the HIF will still be accepting registrations by the time the research (if it succeeds) produces a marketable new medicine.

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Third, the HIF harnesses competition in a way that ensures cost-effectiveness and protects patients. Recall that direct purchases by larger buyers are likely to drive up the prices of patented drugs unless there is serious competition in their therapeutic class. The HIF will not suffer from this problem, because it constrains the prices of registered medicines. And it will not suffer from the analogous problem of funding increases driving up the reward rate per QALY, because the HIF creates competition between all products, regardless of their therapeutic class. In response to a funding increase, any new medicine that otherwise would have been a little more profitable outside the HIF than inside can be registered or be switched over. And these extra registrations will keep the dollar-per-QALY rate very nearly where it would have been without the funding increase.

DRUG PRICE REDUCTION EFFORTS

Various attempts have been made by Governments, NGOs and pharmaceutical companies to lower drug prices for patients in developing countries, thereby increasing access. Such efforts include bulk buying to exert more bargaining power, differential pricing, and compulsory licensing. Despite the obvious short-term improvements they produce in access, such programs do nothing to stimulate innovation, and may even deter it.

Differential Pricing

Differential pricing involves selling the same treatments at different prices in different markets, depending on relative ability to pay. Differential pricing is often put forward as a plausible mechanism

for making patented pharmaceuticals available to developing countries at affordable prices. Widespread implementation of differential pricing would, in certain respects, reconstruct the pharmaceutical market prior to TRIPS, when loose international patent protection forced pharmaceutical companies to sell drugs at lower prices to poorer markets or face generic competition. But once the implementation of TRIPS has eliminated the threat of generic competition, differential pricing would require some additional mechanism to encourage patent holders to sell their drugs at reduced prices.

Systems of differential pricing can guard against some of the deadweight losses caused by the patent system. However, and as discussed in the previous chapter, pharmaceutical companies are understandably concerned about the scope for parallel imports as well as indirect impacts on pricing in affluent countries through comparison, and have therefore not systematically charged lower prices in developing countries.

Further, differential pricing does not incentivize innovation into new medicines for diseases that predominantly afflict developing countries. A very positive overall evaluation of differential pricing notes that even under optimal conditions, in which there are strong barriers to parallel imports and external referencing and confidential price agreements, differential pricing would be an effective long-term strategy only if confined to drugs with a substantial market in affluent countries (Danzon and Towse 2003).

Compulsory Licensing

Compulsory licensing is a mechanism for enabling competitive production of a patented product by mandating a license at a set royalty rate for a patented innovation, and is in effect an overturning of the normal patent right to the exclusive use of the claimed invention. By issuing a compulsory license, a government authorizes the production and marketing of a cheaper generic version of a patented medicine on condition that the authorized generic firm pays a small license fee to the patent holder. Such a license, and even the mere threat of one, will typically cause the price of the relevant medicine to fall substantially in the relevant country. In Canada, compulsory

licensing applied to pharmaceutical patents from 1923 until 1993. Thailand and Brazil have recently imposed compulsory licenses on a number of medicines. Compulsory licensing was expressly envisaged in the TRIPS Agreement and again prominently endorsed in the 2001 Doha Declaration, which stated that “the TRIPS agreement does not and should not prevent members from taking measures to protect public health” (WTO 2001). Since Doha, compulsory licensing has become popular among many NGOs, who see it as an effective mechanism for improving access to essential medicines. However, compulsory licensing has important limitations.

First, the scope for increasing access to existing medicines is limited. Compulsory licensing is normally only allowed for domestic consumption. This does not help the many countries that lack domestic generic drug manufacturing capacity, which include almost all developing countries other than Brazil, India, and China. According to a 2003 WTO General Council decision, exceptions exist for issuing compulsory licenses to countries lacking domestic production capacity, but the cost of the compulsory license must be borne by the exporting country (WTO 2003). Even when the will to export under a compulsory license exists, the process is often so complex and “riddled with restrictions, safeguards, practical hurdles, and red tape that it is unworkable” (Johnston and Wasunna 2007, S18).¹

Second, the use of compulsory licenses is limited by the fierce opposition of the pharmaceutical industry, which has attempted to suppress the use of compulsory licenses or to confine it narrowly to cases of acute crisis. For this reason, developing countries are often reluctant or uncertain about whether to engage in compulsory licensing, lest they provoke political retaliation.

Third, while systems of compulsory licensing may provide an expedient solution to short-term health problems, they discourage investment in R&D for diseases whose remedies may become targets for compulsory licenses. The welcome relief from the problem of high prices compulsory licenses bring thus aggravates the neglect of diseases concentrated among the poor. Pharmaceutical companies spend less on the quest for vital medicines — especially ones

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needed mainly by the poor — when the uncertainties of development, testing, and regulatory approval are compounded by the additional unpredictability of whether and to what extent successful innovators will be allowed to recoup their investments through undisturbed use of their monopoly pricing powers. Compulsory licensing may thereby even exacerbate the health crisis facing developing countries over the medium and long terms (Pogge 2008b, 240).

Bulk Buying to Lower Prices

An interesting strategy which has been widely trumpeted is bulk buying of drugs. The Clinton Foundation has focused its HIV/AIDS campaign on achieving price reductions through bulk buying contracts. If these contracts resulted in a decrease in the cost of producing drugs, then bulk buying could yield gains to all parties. However, it is more likely that costs will remain the same, so that the effect of the price reductions is to reduce the buyers' costs and the sellers' profits. Bulk purchasing may be able to achieve such price reductions through exercising market power owing to a stronger position in negotiating with sellers. This approach, however, is similar in its effects to compulsory licensing, since it will lower profits and thereby reduce innovation incentives.²

The proposals discussed in this section can, at best, address effectively only one of the problems with the existing pharmaceutical patent system - that of high prices. And they address this problem in a way that will aggravate other problems faced by the same populations: the lack of incentives to research their specific diseases and to help overcome their last-mile problems. Alternatives to the above mentioned programs can be broadly divided into two types: push programs, in which innovators are provided with funding to undertake particular research, and pull programs, in which a reward of some kind is offered for the achievement of some valued innovation.

PATENT POOLS

A new mechanism to assist with lowering drug prices in specific countries is the patent pool approach recently espoused by Unitaid. What makes this ap-

proach particularly interesting is that it could also result in a reduction in transactions costs which could benefit patentees too. A patent pool is a portfolio of patents related to a particular technology and held by companies, universities, and government institutions. The patents would be made available under a non-exclusive license to manufacturers and distributors, and the pool operated through the auspices of a licensing agency. The licensing of patents to the pool is to be done on a voluntary basis with royalties paid, and there could be geographic limits on the license. The appeal of this approach is particularly for formulations which may require patents from multiple firms, since the pool would substantially reduce the transactions costs of dealing with separate patentees. Unitaid has initially suggested a focus on patents relating to pediatric anti-retrovirals and new combination products.

PUSH MECHANISMS

Most existing efforts to incentivize innovation for neglected diseases and to provide affordable access to the resulting drugs fall in the category of push mechanisms. Push mechanisms reduce the cost of research by providing some or all of the funding for R&D directly. The most common kind of push program is a research grant, where researchers are paid by governments or other funding sources for research on a topic thought to be socially valuable. Overall, the amount of publicly subsidized or supported R&D in the US is roughly equal to the amount of private R&D (Baker 2004, 12).³

A second common form of push funding involves public-private partnerships (PPPs), in which public or non-profit institutions collaborate with private firms. There are currently 60-80 PPPs in the global health field. Examples include the International AIDS Vaccine Initiative, the Medicines for Malaria Venture, the Global Alliance for Tuberculosis Drug Development, and the Drugs for Neglected Diseases Initiative (Johnston and Wasunna 2007, S26).

Strengths of Direct Funding

Governments and foundations (and their partners in PPPs) can use direct support for research that pat-

ents cannot incentivize. If the funding agency is well informed about the quality of projects, then direct support can be a cost-effective mechanism for obtaining desired research. If the funding agency has an interest in supporting research in an area perceived to be of great importance, it can directly pay for that research. (In contrast, the patent/HIF system is by its nature a market-based mechanism in which private interest dictates the direction of research investment.) This, of course, enables granting agencies and PPPs to focus resources on research related to high-priority and neglected therapeutic areas.

A second important strength of direct funding is potentially superior information about alternatives. When a firm with an idea for an innovation is deciding whether to proceed with investing into research and development into this idea, it only knows about a limited set of possibilities. For example, it may be unaware that another firm is developing a parallel idea or superior innovation, until the patents are actually published. This can clearly lead to wasteful duplication of efforts as well as expenditures on inferior innovations.

In contrast, when investment decisions are centralized through a granting agency, the agency can know about the entire set of ideas which have been proposed to it. If the proposals convey sufficient information to make good decisions, the agency can direct funding towards proposals with the greatest expected value. While under the patent/HIF system the decision about funding is made by a party that is very likely to have the best information about its specific proposal but perhaps little information about alternatives, funding decisions in a centralized system of grants will typically be made with less information about each specific proposal but more information about alternatives. In a sense, research grants resemble a system of central command and control over research investment, while the HIF mechanism more closely resembles a market in that decisions are made by agents on the basis of their private information.

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Weaknesses of Direct Funding

Incomplete Information

Direct funding is, as discussed above, likely to be efficient when the funding agency has good information about the costs of research, the probability that such research will result in valuable innovation, and the expected value of the innovation should it be successfully developed. However, funding agencies are likely only to have reliable information about the costs of research, while the probability of success is much more difficult to estimate. Granting agencies, in order to minimize their risks, tend to rely heavily on the past research record of the investigator – in general, only those investigators who have been successful in the past will be supported in the future. While this encourages investigators to put forward projects which they anticipate will be successful, the information available to the funding agency about the specific proposal is still inferior to the information about the project that is available to the researcher. In addition, rules in many research grant competitions do not allow the granting agency to selectively request more information – instead, the applicant may simply be required to submit a single application.

In some cases, funding agencies support research by for-profit companies, and here the willingness of a for-profit company to share the research cost does provide some assurance that the (better informed) company really believes in the value of the research project. However, in these cases the funding agency does not know whether its contribution is in fact necessary to support the project, or whether it is simply providing a subsidy to the firm to undertake research that it would have undertaken anyway.

Weak Incentives for Efficient Allocation

In addition to incomplete information on the part of granting agencies, the financial incentives for employees of funding agencies to choose the “best” projects are relatively weak, since they personally cannot profit. In many contests, the funding agency asks academic volunteers to assess the quality of proposals. Evidently, the incentives of assessors are in

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part likely to be swayed by what they find of interest personally, perhaps because of a relationship to their own research interests or because of familiarity with the applicants. Research targets can be influenced by political factors, so that research is not necessarily targeted toward innovations that will have the greatest health impact (Baker 2004, 13). The selection of funding recipients is also open to political manipulation and bias. Even when funding recipients are chosen with the best intentions, due to information asymmetries between donors and innovators donors may not be able accurately to determine which projects are most likely to lead to successful innovations (Hollis 2007a, 78-79; Johnston and Wasunna 2007, S26; Pogge 2008b, 242).

The problem of assessment is exacerbated by the incentives of potential grant recipients to overstate the amount of progress they have made in order to attract more resources to their projects. Since the costs of R&D are covered regardless of the success of the research and because grants are an essential source of revenue, push programs encourage potential innovators to continue research into projects that have a high likelihood of failure, causing enormous waste (Schwartz and Hsu 2007, 26). This makes it difficult for the funding agency to sort out which projects are the most valuable. In contrast to for-profit companies, which are exposed to the discipline of the market when they fall short in the development of valuable products, governmental and non-governmental granting agencies have much weaker incentives to avoid and cull projects with low prospects of success.

Incomplete Mechanism for Bench to Bedside

Innovators who have received a research grant have relatively weak financial incentives to finish the research and turn it into a commercializable innovation, since they cannot usually profit substantially from this. (This is not to say that such researchers have no incentives to succeed in their research; but a commercial firm is motivated by desire for success in the same way and by the desire for profits. Since the prospect of financial gain appears to be a very powerful motivating force, it is of course desirable to harness it to the greatest extent possible.)

This problem is emphasized by Kieff (2001) who notes that simple patent buy-outs (i.e. purchases of the patent right by government) might not lead to the accompanying investments required to generate full impact from a given innovation. The problem is that it is not sufficient merely to invent a new drug and obtain patents. Following the invention, an enormous investment in clinical trials is required before market approval can be granted. Even after market approval, continued clinical trials are often important for demonstrating relative effectiveness. If no one has a commercial incentive to undertake these expensive trials, they will not occur. Similarly, once the product has been commercialized, the patentee will normally invest in marketing to physicians even if the product has no close competitors, in order to educate physicians about its properties. Without such promotional activities, prescribing volumes would tend to be lower, and the health impact of the product smaller.

For pharmaceuticals in the developing world, the lack of incentive to distribute medicines might be a particularly acute problem. This is often due to the challenges involved in the final stages of the distribution of medicines, known as the “last mile” described in Chapter 7. The final distribution mechanisms for drugs influence whether they are appropriately prescribed, whether patients receive them on time and in sufficient freshness and quantity, and whether they are properly administered to achieve full effectiveness.

Access Hindered by Patents Even When Research Funded by Grants

Funding agencies have financed many important innovative drugs, which have nevertheless been patented and then priced as if they had never benefited from public funding. Public funding is irrelevant at the time the drug is being sold, since all funding costs are sunk and cannot affect decisions about pricing. Thus, unless the funding agency, as a condition for the funding, requires the firm to set a low price for the resulting product, or requires some licensing, the public funding will affect only the innovation decision, but not reduce the deadweight loss arising from monopoly prices. Of course, outside funding may

help in these cases to reduce the cost of research, thus enabling research that would not have been profitable without the subsidy. (But, as noted above, grantee incentives to conceal information make it very difficult for funding agencies to direct their subsidies to research projects that would not have proceeded without such a subsidy.)

There is thus an important dilemma faced in the case of direct funding for drugs for relatively poor patients. If high prices are charged, access is limited. But if low prices are charged, commercial incentives to invest in distribution are weakened. The HIF effectively addresses this problem because it provides a substantial reward for effective distribution without obstructing access through high prices.

Direct Funding May Be Unstable

Finally, push programs may lack stability over the long-term. Publicly funded grant programs and grants must be frequently re-approved, and are often terminated. Philanthropic support for research may dissolve as sponsors' priorities change. Since direct funding subsidizes pre-determined research targets, financial support will shift together with the interests and sympathies of funders. Such shifts are especially disruptive in the domain of pharmaceuticals where the time from conception to public use of an innovation is especially long. Especially in this domain, potential innovators require a reliable source of financial support.

PULL MECHANISMS

Pull mechanisms are designed to incentivize innovation by rewarding successful innovators through enhanced profits or some other form of reward for the achievement of a socially valuable product. The existing patent system is itself an example of a pull mechanism, which promises a market monopoly for patented medicines. Though the patent system is flawed in some respects, it has proven effective at stimulating innovation for markets that can afford monopoly pricing. As described in Chapter 8, however, the patent system is less effective in certain circumstances, where either great need does not mani-

fest itself in strong market demand at high prices or where patents do not allow potential innovators to capture enough of the surplus their innovation would create to justify their investment.

Publicly funded pull programs are a significant departure from the way in which innovation has traditionally been incentivized, and therefore such programs are often met with skepticism by governments and potential innovators alike. However, given the poor record of existing programs, there is strong reason to seek a better alternative. Pull programs will be successful only if they meet at least these two important conditions. First, the basis for eligibility for rewards must be clearly specified far in advance, so that potential innovators understand the goal they are working towards. Second, the size of the reward must be sufficiently large to incentivize innovation, even given the risk of failure.

A main advantage of pull mechanisms is that they do not pay for failed research, thus encouraging innovators to work quickly and cost-effectively toward the successful development of new treatments (Pogge 2008b, 241; Hollis 2006, 128). Pull mechanisms are also able to overcome the informational asymmetries of push mechanisms by taking advantage of the internal assessment of potential innovators. Firms which believe that they stand a good chance of being the first to achieve the research goal would undertake the R&D, while those that feel they are not likely to succeed will not make such investments.

Pull mechanisms impose significant risks on firms, especially in pharmaceutical markets where it can easily take ten years or longer to bring a successful innovation to market. Firms responding to pull mechanisms face two main risks: their research efforts may fail because they are unable to develop a new treatment, and they may fail because some other innovator is able to develop such a treatment more quickly. For this reason, the size of the reward must be considerably larger than what each firm expects to spend on its effort to capture this reward. However, removing this risk from firms through financing research directly simply imposes the same risks on the public which is supporting the research grant or subsidy.

Although publicly funded pull programs are a relatively new idea, they have the potential to gain

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broad political support from taxpayers and pharmaceutical firms alike. Pull mechanisms can align the interests of profit-seeking innovators with those of society, which seeks efficient pharmaceutical innovation and affordable medicines. By relying primarily on private risk, competition and entrepreneurial innovation, pull mechanisms replicate some of the advantages of the market system. Because they reward only successful innovation and can stipulate the conditions for rewards (including the sale price of the drug) in advance, well-designed pull mechanisms can help increase access to medicines and incentivize innovation for neglected diseases.

Medical Research and Development Treaty

The Medical Research and Development Treaty was proposed by the Consumer Project on Technology in 2005 (Love 2005). The purpose of the treaty is to create a “new global framework for supporting medical research and development that is based on equitable sharing of the costs of research and development, incentives to invest in useful research and development in the areas of need and public interest, and which recognizes human rights and the goal of sharing in the benefits of scientific advancement” (Love 2005, 2). The treaty proposal was submitted to the WHO in February 2005 with the signatures of over 160 researchers, NGOs, politicians, government officials, and other stakeholders.

Under the terms of this treaty, member states agree to support qualified medical research and development, including the development of pharmaceuticals. A committee of representatives from member states would be responsible for determining qualified medical research targets, including vaccine development, neglected diseases, and global infectious diseases. Countries would be free to choose how to spend their required contributions to qualified medical research, though there will be specified minimum contributions to those targets identified as priorities by the committee. State contributions would be proportional to per capita national income, so that the burdens of supporting R&D are distributed equitably. Since these contributions to R&D are

made domestically, they can come in the form of tax credits, direct funding, or product purchasing.

This proposal combines push and pull mechanisms by leaving the form of R&D funding to the discretion of member states. The treaty has potential to resolve problems related to high prices and neglected diseases. By firmly establishing long term commitments to funding, the treaty would provide a stable and reliable source of funding for R&D.

While it is a valuable and interesting proposal, the Medical Research and Development Treaty has some drawbacks. One significant concern about this treaty is that its terms allow too much flexibility in funding allocations. Such flexibility would enable governments to make resource allocations based on domestic political interests, rather than global health needs.

Priority Review Vouchers (PRVs)

PRVs were initially proposed by Ridley, Grabowski, and Moe in 2006 (Ridley et al. 2006). The proposal caught the attention of US legislators, and under the sponsorship of Senator Sam Brownback (R-KS) it was included as the Elimination of Neglected Diseases Amendment in the FDA Amendments Act, which was signed into law on September 27, 2007 (Food and Drug Administration Amendments Act of 2007). Under this scheme, a pharmaceutical company that obtains approval for a drug or vaccine for a specified neglected disease would receive a voucher for priority FDA review of another pharmaceutical. By expediting the FDA review process, the voucher could reduce the time required to gain FDA approval of the second drug by up to one year. The additional profit that a pharmaceutical innovator could earn from this additional year of market exclusivity is estimated at more than \$300 million for a blockbuster drug (Ridley et al. 2006, 315). Vouchers can also be sold to other firms. In either case, the increased revenues from the voucher would offset the R&D costs of the development of the drug targeted to a neglected disease.

As a pure pull mechanism, the PRV is attractive. It does not pay for unsuccessful research. Even the costs associated with expedited FDA review would be paid by the innovator, and would likely consti-

tute only a very small fraction of the resulting profits from a quicker review. The plan can therefore be implemented at no additional cost to consumers or taxpayers. Further, by choosing a broad list of targeted diseases, PRVs would allow innovators to determine which drugs to pursue based on an internal evaluation of the likelihood of success.

While the PRV mechanism has yet to be tested in practice, there are a number of reasons why it is unlikely that it could constitute a complete solution to innovation and access in pharmaceutical markets. First, it is not clear that priority review is really costless. As Ridley, Grabowski and Moe point out, priority review can accelerate approval of new medicines by as much as a year. This could result in three possible outcomes: (a) a lower quality review, with potentially higher risks to patients; (b) the same quality review, but with other medicines being delayed because resources were transferred; or (c) the same quality review, without other medicines being delayed, because the innovator pays a supplementary fee for priority review. Of these three possible outcomes, the first is unattractive since it implies that there may be substantial hidden costs of unknown size. The second is also problematic, as drugs of greater potential health value might be unnecessarily delayed. The third appears to be the outcome envisioned by the bill's sponsors. However, if the reason for slower reviews is lack of resources in the FDA, it appears that the option of paying for a quick review should be available in any case.

Second, it is questionable whether the reward of a priority review voucher is proportional to the value of the neglected disease drug. A new drug for a neglected disease, inferior to treatments which are currently available, could still be approved as safe and effective. Such a product would have little or no health impact, but could result in the award of a PRV worth as much as \$300m. Arguably, the reason the patent system has been effective is because the reward for an invention is roughly proportional to the benefit obtained by consumers. A system in which there is a fixed prize for any innovation, no matter how unimportant, is evidently susceptible to abuse and likely to lead to significant inefficiencies.

Finally, there is little reason to believe that once drugs eligible for reward under the PRV scheme re-

ceive market approval from the FDA, they will be widely accessible to the global poor. The original voucher proposal included a stipulation that innovators forgo patent rights for neglected disease drugs in order to receive vouchers (Ridley et al. 2006, 312). Unfortunately, this condition is not included in the version that was actually implemented. Thus the Act does not ensure that any innovative medicines that are used to claim a PRV will actually be available at affordable prices to the majority of those who need them. It is also important to note that the condition for receiving the reward of the PRV is the achievement of market approval for a neglected disease drug, and not any actual positive health impact of the drug. For this reason PRVs do not address the last mile problem.

However, PRVs can claim one important advantage: they have been passed into law. Though the health impact of PRVs is uncertain and focused only on neglected diseases, the political achievement is highly significant. PRVs were able to assemble broad support by appealing to the interests of all stakeholders, including political leaders, pharmaceutical companies, and global health advocates, allowing the proposal to be implemented in remarkably little time. In this respect PRVs serve as an important example for future reform efforts.

Medical Innovation Prize Act of 2007

This bill, introduced in the US Senate by independent Senator Bernie Sanders, proposes a non-voluntary replacement for the existing monopoly patent system that would eliminate market exclusivity for patented products in favor of a government fund that would reward innovators for the health impact of their patented innovations.⁴ It is intended to impact the domestic US pharmaceutical market exclusively. The legislation establishes a Medical Innovation Prize Fund that would incentivize research into new medicines that improve health outcomes, especially in essential areas, and would expand access to new medicines by separating rewards for innovation from monopoly pricing. Patents would no longer serve to guarantee market exclusivity, but would instead be used only to determine eligibility for reward

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funds. Patent holders would be immediately forced to allow the open use and production of the patented innovations, and the patentee would be rewarded by the government according to the positive health impact of the innovation, much as in the Health Impact Fund. The distribution of prize payments to innovators would be made by a panel consisting of government officials and representatives of stakeholder groups according to the criteria of the incremental therapeutic benefit of a drug and access improvement as compared to the baseline of existing drugs and the degree to which the drug meets health priorities including global infectious diseases, neglected diseases, and rare diseases and conditions.

This proposal achieves a number of important advantages, going far beyond any of the other proposals considered here to address both problems of access and innovation. The prize fund would entirely replace the market monopolies granted by patents to new medicines, completely separating prices from drug valuation. The requirement that all patented medicines be immediately available for generic production is intended to allow prices to drop to the marginal cost of production, increasing access. The proposal also contains provisions for special payments to be made for drugs treating neglected diseases.

Despite these important advantages over the current patent system, the Medical Innovation Prize Act is problematic in some respects. The fact that it is a mandatory, comprehensive system for all pharmaceuticals, not just for those products which opt in, means that its implementation requires a substantial re-organization of the entire pharmaceutical industry, which is unlikely to be politically feasible. At the same time, its comprehensive approach would create problems for innovators developing drugs with relatively small measured health impact but which patients were willing to pay for. In such cases, a willing exchange between innovator and patient could be blocked, since the Act would require only small payments to the innovator, inadequate to incentivize the innovation. There are also questions regarding whether the act would be compliant with the TRIPS agreement.

The HIF has several important advantages over the scheme envisioned in the Sanders bill. The HIF does not aspire to be a comprehensive, mandatory

system. Rather, it would provide an additional option that firms could choose selectively for products with large health impact but small profitability under the existing patent scheme. This makes it more attractive to pharmaceutical companies and to significant numbers of affluent patients and therefore easier to implement and to sustain. In addition, by allowing firms to maintain their exclusivity rights – but not freedom of pricing – for products registered with the HIF, the HIF has an advantage in creating fewer problems related to licensing. Finally, the HIF is clearly compliant with the TRIPS Agreement.

Advance Market Commitments (AMCs)

AMCs are designed to incentivize commercial development of vaccines through the provision of a commitment by sponsors to partially or fully purchase new vaccines that meet certain predetermined requirements (Center for Global Development (CGD) 2005; Kremer and Glennerster 2004). To qualify for the AMC, the new vaccine would have to meet predetermined technical specifications relating to the effectiveness of the vaccine established by a committee. The same committee would also determine which vaccines are to be targeted for AMCs. Targeted vaccines might include those for HIV, tuberculosis and malaria. A “pilot” AMC of \$1.5bn – funded by Italy, the UK, Canada, Russia, Norway, and the Gates Foundation – has been set up for pneumococcal disease, a major cause of pneumonia and meningitis among the poor. An AMC would guarantee a predetermined price per treatment by supplementing the market price up to a certain number of treatments, on the condition that the treatments are sold at a fixed, affordable price. In this manner, the AMC would incentivize drug companies to scale up production and distribution of their new vaccines.

As a pull mechanism, the AMC achieves some advantages in terms of efficiency. The AMC would not pay for failed research, and innovators would have a strong incentive to work quickly toward bringing an effective vaccine to market. The AMC is structured to encourage the firm to sell its product at low prices, thus reducing deadweight losses.

Because AMCs supplement and are consistent with the existing patent system and create new sources of revenue for pharmaceutical companies, they have received substantial political support.

AMCs are likely to be very effective for speeding the distribution of some new vaccines in developing countries. However, they are limited in what they can achieve for several reasons. First, AMCs need to specify in considerable detail the conditions that a successful vaccine must meet (Farlow et al. 2005). Proponents of AMCs recognize this, noting that an AMC “must specify the desired research outputs beforehand, and coming up with the right specification and eligibility requirements may be difficult” (Kremer and Glennerster 2004, 64-65). The Center for Global Development has noted that even the most minimal specification must include the disease that the vaccine prevents, the effectiveness of the vaccine, the side effects of the vaccine, and the ease with which it can be effectively distributed and administered (CGD 2005, 44). This essentially means that AMCs cannot be designed until the product’s characteristics are reasonably well known. An AMC may then be a suitable mechanism for incentivizing only late-stage development of a medicine and its distribution at low prices. That AMCs are limited in what they can achieve is not a criticism, but is a function of their being designed to achieve a particular function.

One possible objection to AMCs is that they must rely on a non-market system for deciding how much to award for a particular product. The Pilot AMC for pneumococcal vaccines has been accused of paying a large sum of money for a vaccine that is already in late-stage development and would have been commercialized with or without the AMC. To the extent that the AMC is designed so that multiple firms may compete to obtain the available funding, this problem is however somewhat mitigated.

The HIF can be seen as a kind of “comprehensive” AMC which addresses effectively the problems encountered by more limited AMCs. Instead of specifying a technical requirement, the HIF specifies that what will be rewarded is measured health impact. This means that any new product – vaccine or drug – can qualify, permitting firms more flexibility and allowing the HIF to incentivize even early stage drug

development. In addition, by setting a fixed fund for which firms compete, the HIF does not need to decide how much to pay for each medicine – instead firms compete for the available funds.

The HIF can be seen as a “comprehensive” AMC which addresses effectively the problems encountered by more limited AMCs.

CONCLUSION

No single complement to the current global pharmaceutical patent regime can solve or compensate all of its problems. However, relative to the other proposals reviewed here, the HIF offers a number of advantages. In particular, it is the only reform that is structured to use a market mechanism to set the reward for innovation; it is comprehensive; and it is feasible. Even with the HIF in place, grant funding for basic research and innovation incentives for orphan diseases will still be needed. But the HIF offers an opportunity greatly to improve global health in an economically and morally attractive way.

NOTES

1. One notable example of this protracted and inefficient process is the case of the combination AIDS therapy ApoTriAvir, which was exported to Rwanda under compulsory license by the Canadian firm Apotex according to the terms of Canada’s Access to Medicines Regime Program, discussed in detail in Rimmer (2008).
2. One recent proposal for a “Multilateral Treaty on Health Technology Cost-Effectiveness Assessment and Competitive Tender” may be able to overcome some of the problems discussed here (Faunce and Nasu 2008).
3. For an extended discussion of the inefficiency of push mechanisms compared to pull mechanisms, see Schwartz and Hsu (2007).

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4. S.2210. An earlier version, H.R. 417, was introduced in the US House of Representatives in 2005 when Senator Sanders was a member of that chamber.