

## New Rewards for Innovation

Innovation is the core of human progress. It averts much drudgery, disease, and premature death; it brings us leisure, safety, hygiene, and understanding; and it enables us to enjoy, through travel and communication, all the many foods, cultures, entertainments and climates of our planet.

Innovation flows more abundantly when it is rewarded. Rewards provide incentives and help cover the costs of innovation. But **how** should innovation be rewarded? Today, the predominant method is to give the innovator a temporary monopoly — for example, through a patent which allows him to charge as much as he likes for use of the innovation. But in many cases this is not a good reward method because it causes the innovation to be under-utilized during its years of patent protection.

Consider an important new technology that greatly reduces the pollution produced in electricity generation. Power plants using this new technology may not be more expensive to build, but they are nonetheless more expensive because of the license fee that must be paid to the patent holder. Many builders of new power plants will therefore decide not to use the new green technology. As a result, avoidable pollution is harming humanity and the rest of planet Earth.

There is a more intelligent way of rewarding green innovations. We can pay innovators from public funds according to the emissions their technology averts. Such rewards can be structured like those of the patent system, expiring after a number of years. Because pollution spreads all around the world, such rewards should be financed by all countries — perhaps through a fund to which countries contribute according to their gross national income.

We can implement this more intelligent reward method even without modifying the patent regime, which was globalized in the 1990s through the TRIPS (trade-related aspects of intellectual property rights) Agreement. The alternative rewards can be offered in parallel, allowing innovators to choose to be rewarded according to emissions averted if they license their technology for free. The alternative rewards must then be large enough to attract the more important green innovations.

The alternative reward method works best when use of the innovation brings benefits not only to the user but also to the public and when this public benefit can be measured or estimated. These conditions are clearly fulfilled in the case of new green technologies. They are also fulfilled in two other important areas of innovation: in agriculture and in pharmaceuticals.

An important example in agriculture are new plant varieties that can greatly increase the nutrient yield per hectare and greatly reduce the need for environmentally harmful pesticides and expensive fertilizers. Under the current patent-based reward system, farmers must pay dearly for planting such innovative plant varieties. Many farmers are unwilling or unable to afford such high payments for use of intellectual property. As a result, the world's farmers are using much more pesticide and fertilizer than necessary. Moreover, especially in poor countries, farmers are producing less nutrition than they might, thereby contributing to the food crisis in the developing world, which has caused the number of chronically undernourished people to break above 1 billion for the first time in human history. If we value food availability and the environmental benefits of lower pesticide and fertilizer use, then we should offer agricultural innovators at least the option to be rewarded for such gains on condition that they allow their innovation to be used free of charge. These alternative reward

payments, as well, should be funded by all countries collectively because we all benefit from reduced environmental harms and share the responsibility of ensuring food security worldwide.

The case of medicines is especially egregious. The marginal cost of medicine — the cost of producing another 100 pills, say — is typically extremely low. And yet, the price of patented medicines is normally very much higher: 60 or 100 times higher, in some cases. Millions of people are dying each year because, though they could pay for the **cost** of the medicine they need, they cannot pay its **price**. Pharmaceutical companies say that they must charge such high prices to recover their research and development expenses, which are driven up by failed research efforts and expensive clinical trials. And it is true that pharmaceutical companies must be able to cover their costs. But can we not offer them alternative rewards that do not drive the prices of new medicines out of the reach of most human beings?

A detailed blueprint for such an alternative reward mechanism was unveiled in Oslo in August 2008. It would involve creation of a new international agency: the Health Impact Fund (HIF). Financed primarily by governments, the HIF is a pay-for-performance mechanism that would offer innovators the option — no obligation — to register any new medicine. By registering a product, the innovator would undertake to make it available, during its first 10 years on the market, wherever it is needed at no more than the lowest feasible cost of production and distribution. The innovator would further commit to allowing, at no charge, generic production and distribution of the product after these ten years have ended. In exchange the registrant would receive, during that 10-year period, annual reward payments based on its product's global health impact. These payments would be part of a large annual pay-out, with each registered product receiving a share equal to its share of the assessed global health impact of all HIF-registered products in the relevant year. If the HIF were found to work well, its annual reward pools could be scaled up to attract an increasing share of new medicines.

The HIF would foster the development of new high-impact medicines — also against diseases concentrated among the poor, such as tuberculosis, malaria and other tropical diseases, which are now neglected because innovators cannot recover their research and development expenses from sales to the poor. The option of an alternative reward based on global health impact would transform heretofore neglected diseases into some of the most lucrative pharmaceutical research opportunities. The HIF would also promote access to new medicines by tightly constraining the price of any registered product. In addition, the HIF would motivate registrants to ensure that their products are widely available, perhaps at even lower prices, and that they are competently prescribed and optimally used. Registrants would earn money not from merely selling their product, but only from making it effective toward improving global health.

If some pharmaceutical research were financed through tax-funded HIF rewards, much of the cost would be borne by affluent populations and people — just like today. But there are important differences. First, innovators make no profit from the sale of their medicine as such — they profit only insofar as this medicine is actually made effective toward improving patient health. Thanks to this new incentive, patients are more likely to receive medicines that will actually improve their condition. Second, in order to profit from serving affluent patients, innovators do not need to exclude poor patients. On the contrary, they benefit equally from serving poor patients, too, at the

same low price. Health gains achieved for any patients — rich or poor — contribute equally toward the innovator's profits.

The HIF will provide optimal incentives only if potential registrants are assured that the rewards will actually be there in the decade following market approval. Core funding of the HIF is therefore best guaranteed by a broad partnership of countries. If governments representing one third of global income agreed to contribute just 0.03 percent of their gross national incomes (\$3 of every \$10,000), the HIF could get started with \$6 billion annually. This is a reasonable minimum because the high cost of developing new medicines requires large rewards and also because the health impact assessment costs should not absorb more than about 10 percent of the HIF budget.

The HIF would create among innovators an ongoing competition that ranges over all countries and all diseases, with firms earning more money if their product has a larger impact on health. Health impact can be measured in terms of the number of quality-adjusted life years (QALYs) saved. The QALY metric is already extensively used by private and state insurers in determining prices for new drugs, so employing it in calculating HIF rewards is not a big leap. Taking as a baseline the pharmaceutical arsenal before a registered medicine was introduced, the HIF would estimate how much this medicine adds to the length and quality of human lives. This estimate would be based on clinical trials, including pragmatic trials in real-life settings, on tracking randomly selected medicines (identifiable by serial numbers) to their end users, and on statistical analysis of sales data as correlated with data about the global burden of disease. These estimates would be imperfect, at least in the early years. But they would do vastly better than the current system of mark-ups in relating the profitability of a new medicine to its effects on health.

With the HIF so designed, innovators would choose to register products that can reduce the global burden of disease most cost-effectively. Products with the largest health impact would make the most money — creating exactly the right innovation incentives. And because the HIF is an optional system, the reward rate is certain to be reasonable. If rewards were too high, new registrants would enter and reduce the uniform reward rate (dollars per QALY); this reassures taxpayers. If profits were too low, the reward rate would naturally increase as firms would choose, for more of their new products, to forego HIF registration in favor of patent-protected markups; this reassures innovators. Competition would ensure that registered products are rewarded at a rate that is profitable for innovators and maximizes the effect of the HIF.

The HIF illustrates how a fund that rewards innovations according to their measurable impact can — without any alteration to the globalized patent regime — solve three problems simultaneously. It can immediately provide affordable access to new products that would otherwise be greatly marked up, stimulate innovators to promote the optimal use of their products, and incentivize the development of new products in areas that were heretofore neglected for lack of incentives.

By getting a partnership of countries to support the HIF, we would establish a permanent source of new and highly affordable medicines whose optimal use would be promoted even among the world's poor. We would also create an example for how innovation can be rewarded without constraining its optimal use — toward raising nutrient yields in agriculture, for example, or toward lowering polluting emissions. Such reforms in how we reward innovation would be a great step toward a more just world economy.