Vaccine Advance-Purchase Agreements For Low-Income Countries: Practical Issues

An idea with theoretical merit that deserves testing in the real world.

by Ernst R. Berndt and John A. Hurvitz

ABSTRACT: There are strong theoretical arguments for the creation of advance-purchase agreements to increase incentives for the development and production of vaccines for diseases concentrated in low-income countries. A Center for Global Development working group recently concluded that such agreements could be implemented successfully. We consider the practical economic and legal arrangements for such advance-purchase commitments. We identify several practical issues that we believe the public health and policy community should consider further in the design of an advance-purchase commitment.

IMMUNIZATION HAS BEEN ONE OF THE GREAT SUCCESSES in global health. In 1974 about 5 percent of the world's children were vaccinated. Thanks to the Expanded Program of Immunization (EPI), which grew out of the successful initiative to eradicate smallpox, three-quarters of the world's children are now immunized, saving about three million lives a year.[1] Although these EPI vaccines have been vitally important in low-income countries, they were, for the most part, originally developed for industrialized countries. Access to vaccines at prices affordable to low-income countries has historically been delayed; in the case of recent vaccines for *Haemophilus influenzae* type B (Hib) and hepatitis B, access has been delayed by more than ten years, resulting in more than one million vaccine-preventable deaths annually from these two diseases.[2]

■ **Market failures in R&D for developing-country diseases.** There is relatively little research and development (R&D) on vaccines for diseases that primarily affect low-income countries. Half of global health R&D in 1992 was undertaken by private industry, but less than 5 percent of that was on diseases specific to poor countries.[3] Understandably, pharmaceutical companies are focusing their R&D investments on

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DOI 10.1377/hlthaff.24.3.653 ©2005 *Project HOPE–The People-to-People Health Foundation, Inc.*

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diseases prevalent in high-income countries, for which the prospect of market returns are greatest.

Pharmaceutical companies' R&D priorities are influenced in part by the expectation that they can sell the products they develop at prices that will cover their risk-adjusted costs.[4] The expected return on investment in vaccines for poor countries is low, because of the poverty of the relevant populations and the severe distortions in markets for vaccines for these diseases.[5]

Two significant market failures are felt most acutely in low-income country vaccine markets.[6] First, the knowledge generated by research is a global public good. The benefits of scientific advances are enjoyed by many countries, so that none of the individual countries that would benefit from a vaccine has an incentive to encourage research by offering to meet the costs through higher prices or direct funding. Second, governments and other agencies that buy vaccines for these diseases face a time-inconsistency problem. Once pharmaceutical companies have invested in the research necessary to develop a vaccine, public-sector purchasers have every incentive to use their powers as dominant purchasers to keep prices down to maximize access to these life-saving products. But a large part of the industry's costs are fixed R&D costs, so if prices are kept close to the variable costs, companies would suffer losses. Knowing in advance that purchasers will face these incentives once a product is developed, drug companies are understandably less likely to make the needed investments in products for these countries in the first place.

■ **The rationale for advance-purchase commitments.** Vaccines are arguably the most promising approach to overcoming diseases concentrated in low-income countries. Unlike many drug treatments, vaccines do not require individual diagnoses; also, they are typically inexpensive and easy to administer. Only a small proportion of the population in many low-income countries have access to life-saving drugs for malaria, tuberculosis, HIV infection, and other serious diseases. In contrast, more than 100 million infants each year receive basic vaccinations, even in the most remote corners of the world and even in the face of major civil and environmental upheavals. Going beyond the basic vaccines, however, requires attention to market failures that constrain R&D for new products.

One way to address these market failures would be for purchasers to commit, in advance of product development, to financing the purchase of vaccines for low-income countries, at a fixed price specified in advance. This commitment would rectify the most significant market failures specific to low-income countries.[7] It would reduce economic uncertainty for pharmaceutical companies and give investors confidence about their expected returns, thereby putting R&D for diseases concentrated in low-income countries on a more equal footing with that for diseases that affect affluent populations.

One benefit of this proposal for sponsors who commit in advance is that no costs are incurred unless and until a vaccine is successfully developed. Moreover,

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advance-purchase commitments can be implemented alongside existing global health initiatives, such as public and private funding of specific research programs and existing health interventions. An advance-purchase contract would be a complementary measure that would increase the total amount of R&D for these diseases, contributing to and accelerating the important work that is being done under existing arrangements. Indeed, we expect that a combination of pull-type mechanisms, such as advance-purchase commitments, and existing push-type arrangements, such as targeted research grants and consortia, will be necessary to stimulate the successful development of early-stage vaccines, particularly where there are complex scientific hurdles, such as with malaria and HIV.

■ **Designing a practical mechanism to implement the idea.** A working group comprising economists, public health specialists, and representatives of the research-based biotechnology and pharmaceutical industry, working with business attorneys with expertise in the pharmaceutical industry, was convened by the Center for Global Development to consider whether a commitment could be designed that would create the appropriate incentives to accelerate the development and production of new vaccines that would be available to low-income countries at affordable and sustainable prices.[8] The group concluded that it is possible to design a practical, contract-based, advance-purchase commitment that can reasonably be expected to accelerate the development and commercialization of new vaccines and, in its report, set forth in general terms the essentials of such a commitment.[9]

Following the publication of the working group's draft conclusions, the government of the United Kingdom announced that it supports the principle of advance-purchase agreements and proposed to work with other sponsors to put such an agreement in place for malaria.[10] It subsequently extended this to HIV.[11] The finance ministers of the G7 countries agreed in February 2005 to "explore the use of advance purchase commitments to drive private sector investment."[12] The U.S. government is also attracted to this approach: The 2005 *Economic Report of the President* states that advance-purchase commitments are "particularly promising because they encourage research without disallowing competition once a drug is developed."[13] The approach has also received support in the mainstream press, including the *Economist* and the *Washington Post*.[14]

This paper explores the robust opportunities that advance-purchase commitments present to emulate, for low-income countries, the market forces that help stimulate the development of pharmaceutical products for more affluent countries. We first describe the broad parameters of a proposed advance-purchase agreement, adopted by the working group, that could be used to accelerate the development of an early-stage vaccine candidate. We then review some issues that must be considered in implementing these commitments, identify several areas where further analysis and consultation might be warranted, and offer proposals with respect to some of the challenges presented by practical application of the general scheme endorsed by the working group.

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Main Features Of A Proposed Purchase Commitment

The goal of an advance-purchase commitment is to achieve a balance between the interests of the sponsoring donors, who would fund it; potential vaccine developers and manufacturers, whose activities would be influenced by such a commitment, and their investors; and low-income countries, which would be the beneficiaries of such a commitment but also the co-payers of the resulting vaccine.

■ **An outline commitment.** The main elements of the commitment endorsed by the working group are as follows: (1) Industry and sponsors would work together to define a technical specification—in terms of outputs—for a new vaccine. (2) The program would set a minimum price guarantee, which would be available up to a fixed number of persons immunized; this price and quantity would be set in advance, to create an overall market size comparable to the market for which medicines are developed for diseases of affluent countries. (3) The sponsors would implement the price guarantee by committing themselves to copayments for products meeting the specification, which would augment a low price charged to low-income countries, turning an affordable purchase by low-income countries into a high revenue proposition for the manufacturer. (4) Once the full quota of treatments had been purchased, manufacturers would be obliged to sell further treatments in eligible countries at a fixed, sustainable price (close to marginal cost); this would ensure that once manufacturers have received a fair return on investment, low-income countries could continue to access the vaccine at an affordable price. (5) The price guarantee and copayment mechanisms would be defined in advance in a legally binding contract set out by the sponsors. (6) There would be an independent adjudication committee, with primary responsibility for determining whether a vaccine meets the technical specification and hence qualifies for the minimum price guarantee, and for granting waivers with respect to certain of the technical specifications.

■ **Pricing.** It is not possible for drug companies or sponsors to predict with certainty how much it will cost to develop a new vaccine. In the face of this uncertainty, the policy challenge is to determine a price that provides sufficient revenues to increase R&D, and so accelerates the likely timescale for the development and distribution of new vaccines; and ensures good value for money—that is, cost-effectiveness—for the purchasers of the eventual vaccine.

One way to estimate the level of revenues needed to encourage companies to invest in R&D is by looking at the actual market sizes for existing, recently developed new chemical entities (NCEs). Drawing on a previous review of sales revenues for pharmaceutical products, we have found that the mean net present value of total market size for NCEs produced in the early 1990s is about $3.4 billion (in 2004 dollars).[15] To the extent that it is more costly to produce a vaccine than to produce other medicines, the appropriate payment would be greater; on the other hand, the preliminary results of the recent GlaxoSmithKline malaria vaccine trials may suggest that the case of a malaria vaccine may not be as technically challenging as many had thought it would be.[16] Adjusting down by 10 percent for

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lower expected marketing expenditures, it has been estimated that a prospect of $3.1 billion in total revenues would match the average revenue of existing NCEs and likely be sufficient to attract private-sector R&D.[17] For some diseases, there is the possibility of a market for a vaccine from industrialized countries, such as travelers or the military, and from middle-income countries. In such cases, the size of the purchase commitment could be adjusted accordingly.

A range of combinations of price and quantity would provide attractive returns to companies, while still delivering good cost-effectiveness for sponsors.[18] The working group report considers a scenario in which 200 million treatments for malaria are purchased for $15 per treatment. For companies, this would provide a return, including estimated market sales, with a net present value of approximately $3.2 billion. For sponsors, this would result in a cost of about $15 per disability-adjusted life year (DALY) saved: Interventions costing less than $100 per DALY are considered cost-effective in poor countries.[19] By comparison, it has been estimated that the cost per DALY of antiretroviral drugs (ARVs) for HIV in low-income countries exceeds $600.[20] Health interventions in the United States are considered cost-effective at $50,000–$100,000 per DALY saved.[21]

Issues In Contract Design

Within the broad parameters of a possible agreement, there are several key choices to be made. These choices will depend in part on the views of donors and other policymakers, potential developers and manufacturers, and low-income countries, as well as on the current state of scientific progress with respect to the disease target. Therefore, in some of the discussion below, we consider variations on the scheme outlined by the working group—not because we dissent from the group's conclusions, but to highlight the rich range of policy options available to the global health community.

■ **Winner-take-all versus multiple winners.** The working group considered whether and how to consider subsequent entrants in the event that more than one qualifying vaccine is developed. A "winner-take-all" arrangement, in which the first product would be the sole beneficiary, is superficially attractive because it is simple and would streamline the procedures for administering the advance-purchase commitment. Moreover, the promise of receiving 100 percent of the commitment might appear to provide the greatest incentive for the lead developer.

However, in practice, the development of pharmaceuticals often results not in a single product that is clearly superior to others, but rather in several products with varying benefits and risks. A winner-take-all prize would discourage companies from entering the race if they judged that they would reach the finish line second, even if they expected their product to be much better than the lead product or to meet the needs of a particular segment of the population that would not be met by the lead product. Also, in the event that a subsequent improved product were developed, a winner-take-all purchase contract would oblige the pur-

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chasers to buy the first, inferior product instead, which would be inefficient and arguably unethical.

Because of this, the working group proposed a contract in which subsequent products that met the specification would also be eligible for the guaranteed price, provided they represent an improvement on existing products—for example, for certain target populations or epidemiological conditions. This creates competitive pressure on the lead developer to develop the best possible product, so that it will capture and retain market share, and it also creates an incentive to bring a product to market as quickly as possible, to maximize the period of market exclusivity. It also creates incentives for product diversification, where this is necessary to tackle different strains of a disease or differing environments. In some respects, this would parallel the orphan drug procedures that exist in the United States and Europe.

A variation on this approach would be to allow all products that meet the specification and that are the result of independent R&D activity to be eligible for the price guarantee. This would extend the guarantee to products that are not superior but that have been arrived at independently (and so exclude purely "generic" products). The challenge would be to delineate the appropriate standard for independent R&D.

Opening the guaranteed market to competition would benefit consumers by stimulating the development and introduction of improved products. It would increase the likelihood that products would reach a larger percentage of the affected populations and would likely increase the continuity of supply. Moreover, over time, having multiple product options would likely place a favorable downward pressure on the price of these new vaccines.

Our preliminary view is that it would be preferable to allow as much competition as possible, by permitting any product based on independent research to be eligible for the guaranteed price (this is a slightly more expansive variant than the conclusion of the working group). Further analysis and industry consultation would assist in determining the balance that would best create incentives for manufacturers to invest in vaccine R&D.

■ **How much front loading?** The pricing structure seeks to balance two competing considerations: static and dynamic efficiency. On the one hand, static efficiency requires that the price be set at marginal cost. If the price is set above this, access to the vaccine is suboptimally restricted. On the other hand, the dynamic efficiency concern is that the price paid should provide sufficient return to the companies to develop an appropriate product quickly, and for companies to develop subsequent improvements.

The proposed two-part pricing mechanism aims to address these two objectives. The dynamic efficiency problem is addressed by setting a sufficiently high, guaranteed price for a finite number of treatments, enabling the manufacturer to charge a price well above the cost of production and so recover R&D costs. The

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static efficiency problem is addressed in the short run by providing guaranteed donor funding for the doses purchased at the guaranteed price, ensuring immediate access for low-income countries, and in the long run by requiring pricing close to marginal cost when the original sponsors are no longer paying for the vaccine. This long-run pricing also facilitates financial sustainability.

The extent of front loading of the payments is determined by the relationship between the guaranteed price and quantity. Front loading is achieved by paying a higher price for a smaller quantity of treatments. This provides more reward to early developers and less for those who develop products later. It gives a strong incentive to develop an appropriate product quickly, enabling the manufacturer to sell as much as possible at the higher initial price, because the value of the incentive for the first developer depends on the interval until other products may become available.

Front loading is desirable because it increases the incentive to bring products to market quickly, which enables millions of lives to be saved very inexpensively. Efficient pricing also points to front loading, as it helps to align the rewards with social value: The development of the first vaccines is most important to society if there are no other products in the pipeline. However, a heavily front-loaded contract reduces the incentive for subsequent improvements and relies on contract commitments and, if necessary, available legal remedies to ensure continued supply once the guaranteed payments have been exhausted.

Our view is that the extent of front loading should find a balance, in which there are major benefits to being the first manufacturer to market (to encourage a competition that accelerates development) while still leaving sufficient incentive for subsequent improvements. The subsequent supply obligation can be ensured by contractually committing qualifying manufacturers to continue to supply developing markets at reduced prices (near marginal costs) once they have received a contractually specified adequate return on their investment. This could be buttressed with a forced license, requiring the technology to be put into the public domain, or more standard contract remedies, such as liquidated damages, if the qualifying manufacturers fail to satisfy their ongoing supply obligations.

■ **Should there be a quantity guarantee?** The proposed advance-purchase agreement mirrors a third-party payer system that is familiar in certain high-income countries. This guarantees that sponsors will pay a floor price for a fixed quantity of qualifying product that is purchased (at a minimal price, similar to a copayment) for use in a qualifying country. The advance-purchase commitment does not guarantee that any quantity of qualifying product will be purchased; it only guarantees that if the product is purchased for use in a qualifying country at a price that equals or exceeds the required copayment, the sponsors will top the price up to the guaranteed price in a direct payment to the manufacturer.

An alternative approach would be for the sponsors to guarantee the purchase of a certain quantity of qualifying product. In such a scheme, manufacturers of

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"Advance purchase harnesses market forces to guide the research, development, and commercialization of new products."

qualifying products would be guaranteed all—or, if there are multiple qualifying products, a portion—of the sponsor's financial commitment, irrespective of whether the products are actually used. This has the benefit of reducing the demand risk for the manufacturers, which is an important benefit for pharmaceutical companies in light of the existing deficiencies in the forecasting and procurement systems used in some low-income countries.

However, there are several reasons not to prefer a guaranteed purchase commitment. First, it would substitute sponsors' preferences for market preferences, which could result in the development of a suboptimal product that does not meet the demands of the market. Moreover, an advance-purchase commitment, by definition, requires sponsors to predict future circumstances. The product profile that would accompany the sponsor's commitment will inevitably be imperfect, and it is likely that conditions will change over time—possibly ten years or more—before a vaccine is developed. The copay system provides a safeguard by ensuring that an advance-purchase commitment would only be spent on products for which there is a market demand at the time the qualifying product is available for distribution. Another shortcoming of a quantity guarantee is that it is difficult to combine it with a scheme that allows more than one product to qualify. With a quantity guarantee, there would have to be an administrative decision on the allocation of the guaranteed purchase commitment among qualifying products.

The appeal of the advance-purchase commitment is that it harnesses market forces to guide the research, development, and commercialization of new products. The copay scheme endorsed by the working group allows the market to be the arbiter of whether an otherwise qualifying product participates in the purchase commitment.

■ **How to set the long-term price.** Vaccines must remain affordable in the long term once the purchase commitment has been exhausted; otherwise, low-income countries will stop (or never start) buying them. In the design of the contract, the guaranteed price is well above the marginal cost of production, to enable the manufacturer to recoup its R&D costs. In return, the manufacturer has an obligation to sell further treatments in eligible countries at a lower, sustainable price, near marginal cost. It is not known in advance what the long-term cost of production will be. The challenge is to determine, in advance, a long-term price that covers the cost of production but is low enough to be affordable for low-income countries.

One option would be to determine a "cost plus" formula in advance. This has the advantage of setting a price just above the cost of production. But its disadvantage is that it creates no incentive for the manufacturer to keep costs down.

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Another option is to set a cash price in advance; however, this might turn out to be insufficient to cover production costs. A third option would be for the manufacturer to grant the sponsor licensing rights once the quota has been met, and then let the sponsor either auction off the right to manufacture the product or put it in the public domain to allow generic competition. More complicated hybrid options exist. For example, the contract could set a cash price, with the option for the long-term production to be put out to tender for the market to determine the price if the cash price is too low; or a formula could be used to share the benefits of lower manufacturing costs between the supplier and the purchasers.

Moreover, the possibility of multiple qualifying vaccines introduces further complexity, as a manufacturer may not fully recover its R&D investment if it receives only a portion of the advance-purchase commitment. Where there are multiple qualifying products, the working group proposal permits the manufacturers to continue to sell their qualifying products at a premium above their marginal cost, but below the guaranteed price, after the advance-purchase commitment is exhausted, until they recoup a predetermined return on their R&D investment.

■ **The Independent Adjudication Committee.** The credibility of the advance-market commitment is inextricably linked to the credibility, composition, and powers of the Independent Adjudication Committee (IAC). The purpose of the IAC is to solve the time inconsistency problem: Once a vaccine has been developed, donors may seek the lowest possible price to minimize the cost to their aid budgets. The contract avoids this by removing discretion from the sponsors and putting the decisions in the hands of an independent committee. (This is similar to the argument for having an independent central bank.)

The main decision for the IAC is whether a vaccine qualifies for the purchase commitment, including interpreting the technical specification and determining whether waivers should be granted. For second and subsequent vaccines, it would also determine whether a qualifying vaccine is eligible for the guarantee—for example, assessing whether it represents independent R&D.

The working group proposed that the IAC should have asymmetric discretion: that is, it should be able to award the contract to a vaccine that falls short of the specification but that is sufficient to meet the public health objectives, but it should not be able to raise the bar by failing to award the contract to a vaccine that meets the specification in full.

The key decisions for the IAC may be made nearly a decade after it is first established. Arrangements will need to be made for the evolution of its membership in that time, for making interim decisions and providing guidance, and for its funding. The last point is of critical importance to ensure that the sponsors are not able to compromise the IAC's independence through the power of the purse.

Further consultation and analysis is required to better define how the IAC can work with existing institutions and procedures so as to minimize the transaction

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costs associated with implementing an advance purchase commitment.

■ **Early- and late-stage products.** New vaccines vary in their state of scientific advance, from malaria and HIV, which are early stage (require many years of further R&D before they will be available), to rotavirus and pneumococcus, which are late stage (close to being available for public use). There clearly are differing objectives for each of these extremes.

With early-stage situations, the contracts aim to incentivize research, including proof of concept, development through clinical trials, manufacturing scale-up, and capital investment and commercialization. The identity of the participating manufacturers will not be known, nor will the specific characteristics of the qualifying products. A decade or more may elapse before a qualifying product is tendered, and in the intervening years there may be advances in technology and changes in the need for a vaccine. An advance-purchase commitment will need to be predictable enough to pull these many activities, but flexible enough to conform to changed circumstances.

In contrast, for late-stage situations, both products and manufacturers may be identified at the time an advance-purchase contract is executed. However, an advance-purchase commitment can still play a vital role. It could accelerate the development of a product that has only limited market potential in high-income countries, such as an 11-valent pneumococcal conjugate vaccine (PCV), or accelerate investment in manufacturing scale-up or capacity by manufacturers of promising products, thereby speeding the products' introduction into low-income countries.

Historically, vaccines developed for high-income countries eventually—sometimes after a lengthy delay—become available to low-income countries. The delay may be because of constraints in manufacturing capacity, caused by either uncertain demand or strategic pricing behavior by a monopolist or oligopolist supplier. In the meantime, millions of vaccine-preventable deaths occur annually. An advance-purchase contract can create incentives to scale up manufacturing capacity rapidly and to move as quickly as possible to marginal cost pricing.

Advance-purchase contracts might also be used to create incentives to modify existing vaccines to meet specific technical requirements of low-income countries, such as increased stability, improved dosing schedules, convenient combination products, or to develop second-generation products.

A common feature with each of these late-stage scenarios is that the uncertainties are mitigated—there are specific products that have been identified, there are known manufacturers, and there are unique challenges that may vary among the products and manufacturers. For example, even with respect to a particular disease, we could find that one product needs to be reformulated to be administered with other childhood vaccines while the manufacturer of another vaccine lacks manufacturing capacity. In these circumstances, it would be more efficient to negotiate separate agreements with each of the manufacturers, tailored to their

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specific needs, that would guarantee a purchase commitment if specific results are achieved.

Early-stage contracts, by contrast, would not have reference to the particular circumstances of individual manufacturers. The sponsors would guarantee a purchase price for a fixed quantity of a product that meets certain predetermined specifications, without regard to the specific circumstances of the product or the manufacturer.

Late-stage contracts provide immediate, real-world opportunities to test the model and the use of advance-purchase commitments, which would increase the visibility and familiarity of these mechanisms for both early- and late-stage products. With success, these late-stage programs would also increase the credibility of the early-stage commitments and thereby increase their effectiveness.

■ **Interim payments.** One of the most attractive features of an advance-purchase scheme is that sponsors only pay for success. The working group measured success in terms of delivering an approved vaccine that meets certain predetermined specifications. However, in certain limited circumstances it may be desirable to specifically influence select interim outcomes. For example, interim payments may be used to supplement a purchase commitment to eliminate bottlenecks or compensate for potential inefficiencies in the R&D market. In addition, if coupled with interim payments, a purchase commitment could be structured to reflect the fact that sponsors are potentially sharing some of the development risk.

Such interim payments would be similar to milestone payments, which are a common feature in industry agreements with biotechnology companies. Biotechnology investors, particularly venture capitalists, typically look at an investment horizon of several years, which is much shorter than the time required to research and develop an early-stage product. Moreover, milestone payments provide a barometer by which investors measure the success of a biotechnology company's platform; the fact that sponsors or pharmaceutical companies are willing to make success payments can serve to validate a biotechnology company's technology. Similarly, interim payments would provide sponsors with an early measure that an advance-purchase commitment is actually affecting industry behavior. Structuring the purchase commitment to mirror existing contract structures that are familiar to industry and investors might also serve to make the advance-purchase commitment more attractive to industry participants. Interim payments could also be implemented outside of an advance-purchase program, as independent investors could on their own decide to enter into an agreement with developers, providing them with interim payments.

One important concern with interim commitments made by donors or policymakers is that they would be intervening in the R&D market and could distort research priorities toward scientific priorities they erroneously believe to be promising. Clearly, if the market for R&D operates efficiently, it would be preferable to provide for a final purchase commitment; this in turn would stimulate

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pharmaceutical companies, which have much experience in drug R&D, to structure the appropriate incentives to pull the necessary R&D. In this view, companies would make more efficient decisions as to whether and when to partner with biotechnology companies and what sort of milestones and other stimulus would be necessary to develop a successful product.

There are, however, those who believe that the market for R&D in the life sciences industry may have systematically erred recently, particularly with respect to early research.[22] While not dispositive, that analysis suggests that drug companies may not have been influencing research activity in the biotechnology sector in an efficient manner. There may also be certain discrete circumstances where, because of competing or uncertain patent estates regarding a particular disease or public information concerns, market forces do not function efficiently.

A pure advance-purchase commitment is clearly preferable if there is an efficient market for R&D that is effective in translating the demand for the final product into contracts and payments for intermediate advances. An advance-purchase commitment would certainly be the mechanism of choice for late- and mid-stage products for which there has been proof of concept. However, we believe that further consideration should be given to using interim payments, either within or external to an advance-purchase commitment for early-stage products, especially with respect to complex vaccine challenges. It would be useful to examine the effectiveness of the market for R&D for these early-stage products, with a view to identifying appropriate policy interventions.

THERE IS A COMPELLING THEORETICAL CASE for advance-purchase commitments. Furthermore, the Center for Global Development working group has documented that such commitments can be implemented in a simple, practical framework and that affordable commitments can create incentives that will accelerate the development, production, and distribution of new vaccines. We recognize that in their current form, markets for vaccines for diseases concentrated in low-income countries may not be as efficient and mature as those for products in high-income countries and that there are other defects in the operation of these markets that should be addressed; however, we believe that the advance-purchase commitment would be an efficient and effective means to address the market failures that delay the development of new vaccines.

Within that framework there remain a number of technical, legal, and economic issues relating to the contract design to which we believe the public health community and industry can contribute by giving further consideration. We welcome those conversations.

The authors thank Owen Barder, Ruth Levine, Michael Kremer, Alice Albright, Heidi Williams, and other participants in the Center for Global Development Pull Mechanisms Working Group. All errors and opinions are those of the authors.

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