

ADVANCE MARKET
COMMITMENT FOR
PNEUMOCOCCAL VACCINES

EXPERT GROUP REPORT

Presented to the Donor Committee

April 1st, 2008

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1. EXECUTIVE SUMMARY

This report, prepared by the Economic Expert Group convened by the GAVI Alliance, provides guidance to the pneumococcal AMC donors about key design decisions. Using new information available from industry consultations, demand forecasts, and modeling of returns to industry under various demand and price scenarios, the Expert Group arrived at a series of findings and recommendations. The main results of the Group's work can be summarized:

- Integration of the AMC with GAVI financing, procurement and vaccine introduction system is desirable.
- The original Framework Design would yield benefits, but carries risk and may be structurally inadequate to achieve the AMC objectives. In particular, it is unlikely to lead to significant build-out of manufacturing capacity.
- The \$1.5 billion committed is sufficient to achieve the AMC objectives.
- Introducing a supply commitment would increase the likelihood of expanded manufacturing capacity.
- Obtaining a supply commitment from firms may require donors to mitigate demand-side risk, probably through either additional front-loading of rewards, committing to purchase a specific volume, or a combination of the two approaches.
- A tail price ceiling (hard or soft) should be considered.

2. BACKGROUND

Although vaccines are among the most effective tools of modern public health, the private sector has proven reluctant to make investments to develop and produce vaccines specifically tailored to the needs of the poorest countries because of limited potential for commercial returns. The lack of effective demand further inhibits the rapid development of and access to vaccines that would prevent diseases that kill millions in the developing world.

Historically, responding to an economic calculus, private firms have not tended to create manufacturing capacity to serve global needs, until many years after the product had been sold in the industrial and middle-income countries. At the time of launching a new product, firms have priced their vaccine in the high and middle-income countries at levels that have been generally adequate to recover the full development and production costs. In later stages of the product life cycle, the situation is different: catch-up demand

in higher income countries has been satisfied, producers have recovered the costs of R&D and the fixed-cost investments in production capacity, the unit cost of producing the vaccines has declined significantly due to economies of scale and improved production systems, and competitors have emerged. At that point, perhaps 15 years after licensure, firms have made the vaccines available to developing countries. Under these conditions, at least some vaccine producers could make a viable business case for supplying vaccines to developing countries at prices that were relatively low – but the health benefits for low-income countries have been greatly delayed.

A novel strategy has been developed to address problems associated with weak market “pull” from the developing world. The Advance Market Commitment (AMC) for pneumococcal vaccines is a financial commitment from donors of \$1.5 billion to subsidize the future purchase of a vaccine that is not yet available, if an appropriate vaccine is developed according to the Target Product Profile (including effectiveness and public health impact) and if there is demand from developing countries. This donor commitment is expected to encourage vaccine suppliers to invest in late-stage development and production capacity to serve developing countries’ needs by creating effective market-like incentives. Firms are assured access to a donor-supplied subsidy if they develop a product demanded by the countries, and offer a lower, long-term “tail price” for a defined period of time after the funds in the AMC are depleted.

While the basic concept of an AMC has been articulated elsewhere (particularly with application to vaccines at early stages of development), and a significant amount of background work and deliberations have taken place, many details of the pneumococcal AMC have not yet been finalized. This report presents the findings of an Economic Expert Group (called “Expert Group” here) to provide guidance to AMC donors about key design features of the AMC.

OBJECTIVES OF THE AMC

The objectives of the pneumococcal AMC are:

1. To accelerate the **development** of pneumococcal vaccines that meet developing country needs (e.g. serotype composition and vaccine presentation) as specified in the Target Product Profile.
2. **To bring forward the availability** of effective pneumococcal vaccines for developing countries by guaranteeing the initial purchase price, for a limited quantity of the new vaccines, that represents value for money and incentivizes manufacturers to invest in scaling-up production capacity to meet developing country vaccine demand.
3. **To accelerate vaccine uptake** by ensuring predictable vaccine pricing for countries and manufacturers, including binding commitments by participating

companies to supply the vaccines at low, long-term and sustainable prices after the AMC finances are depleted.

4. **To pilot test the effectiveness** of the AMC mechanism as an incentive for needed vaccines and to learn lessons for possible future AMCs.

PROCESS THE GROUP HAS FOLLOWED

The Expert Group was convened as an independent advisory body to the AMC donors under the chairmanship of Dr. David Fleming, and brought together 10 experts to examine and review the key AMC terms and make recommendations to the donor group to finalize these terms. Hannah Kettler of the Bill & Melinda Gates Foundation and Chris Collinson of the UK Department for International Development were observers for the donor group.

In making its recommendations, the Expert Group was guided by the principle of maximizing the health benefits from spending the AMC funding on pneumococcal vaccines for GAVI target countries. This has involved considering the health benefits of spending the AMC funds on pneumococcal vaccines for GAVI-eligible countries, minus the health opportunity cost of country and donor funds being used for purchase of the pneumococcal vaccine as part of the AMC program (i.e., through co-payments during the AMC and tail price payment afterward).

The group met in person three times: August 2007, September 2007 and January of 2008. Several teleconferences were also held during that time. GAVI supported the Expert Group by commissioning consultants to prepare analyses, organizing meetings and teleconferences and compiling the report. GAVI's PneumoADIP provided specific expert input to the Expert Group on the pneumococcal vaccine market, demand forecasts and cost of goods. The consulting firm Applied Strategies updated the AMC-FIRM model and ran scenarios at the request of the Expert Group and assisted with additional industry consultations. Further, the consulting firm CRA provided additional analytical support to the group. The group also received submissions from the NGO community.

WHO created the Target Product Profile (TPP) through a separate process. To ensure links between the groups, WHO participated in the first Expert Group meeting and the TPP was circulated to the Expert Group. Consideration was given to recommendations in the TPP that would affect pricing.

The methodology used by the Expert Group was a consensus model; not all Group members agree with every conclusion in this report. There was universal agreement on the potential problems identified with the original Framework Design, but not unanimous agreement on all recommendations for how best to resolve them. There was unanimity among Expert Group members about the importance of additional, focused

industry consultation and ongoing work to develop the specifics of the approach ultimately selected by the Donor Committee.

DEFINITIONS

- **Original Framework Design:** AMC structure set out in November 2006 in which an AMC price is specified but firms are not required, in exchange for that price, to install new capacity or dedicate existing capacity to meet the forecasted demand in GAVI-eligible countries or to make a commitment to a particular annual supply level. Firms supplying during the AMC would be required to be able to supply a set amount of product during the tail period, as they did during peak sales under the AMC; they would be required to sell the product for at most the “tail price” set *ex ante*.
- **AMC price:** the total price per dose received by a manufacturer during the AMC period.
- **AMC contribution:** the amount of the AMC price paid by the AMC fund (\$1.5 billion), originally modeled at \$5.
- **Co-payment:** the amount of the AMC price paid jointly by GAVI and the country (originally modeled set at \$1).
 - $AMC\ contribution + Co-payment = AMC\ price.$
- **Country co-payment contribution:** the amount of the co-payment paid by an individual country; this is expected to vary by a country’s ability to pay in accordance with GAVI financing policies.
- **GAVI co-payment contribution:** the amount of the co-payment paid by GAVI; this is expected to vary by a country’s ability to pay in accordance with GAVI financing policy.
 - $Country\ co-payment\ contribution + GAVI\ co-payment\ contribution = Co-payment$
- **Tail price:** the total price per dose received by a manufacturer in phase two of the AMC (after the donor contribution is depleted).
- **NPV – Net Present Value which values money in today’s dollars (future dollars earned are discounted)**
- **Country tail price contribution:** the amount of the tail price paid by an individual country. The country tail price contribution is an extension of the country’s co-payment contribution, and as such is expected to vary by a country’s ability to pay, and increase over time, in accordance with GAVI financing policy.

- **GAVI tail price contribution:** the amount of the Tail Price paid by GAVI; this is expected to vary by a country's ability to pay and decrease over time in accordance with GAVI financing policy.
 - *Country tail price contribution + GAVI tail price contribution = Tail price*

3. OVERVIEW OF EXPERT GROUP FINDINGS

EXPERT GROUP CHARGES NEED TO BE VIEWED AS PACKAGES RATHER THAN AS DISCRETE PARAMETERS

The AMC donors gave the Expert Group a set of charges (see Appendix 1), which served as the starting point for the group's work. Two of the charges (ability and willingness to pay of low-income countries (Charge 4) and currency issues (Charge 5)) could be handled as initially formulated. As the Expert Group conducted its work, however, it became clear that parameters relating to AMC price, tail price and supply obligation in the different charges were linked: changing one would affect the others, and thus they needed to be considered simultaneously, as a package of incentives, to provide an overall AMC framework. Within the packages, as requested by the donors and addressed in section 7, there are choices. Different sets of incentives can be combined with varying impact on the AMC objectives. In some instances the choice among possible options will have to be based on policy preferences and implementation considerations, which are beyond the scope or expertise of the Expert Group.

INTEGRATE AMC WITH GAVI FINANCING, PROCUREMENT AND VACCINE INTRODUCTION SYSTEM

The Expert Group recommends that the AMC co-payment scheme use the existing GAVI construct. Industry representatives have indicated it wants a simple set of payments. Furthermore, countries would prefer a single system for dealing with GAVI co-payments. In light of this, it is proposed that GAVI provide a common co-payment (consisting of a GAVI co-payment and a country co-payment) and that the AMC contribution be added to this common co-payment to reach the agreed AMC price.

This provides simplicity to the mechanism by having the various co-payments managed internally within GAVI, as is the case currently; it allows modifications and increases within the co-payment without it creating multiple payment streams to manufacturers. Key additional advantages to this approach include:

- An already operational mechanism for continuing payment from the AMC period into the tail period that provides companies as much certainty as possible at the outset;

- Recognition of the differences among GAVI countries in ability to pay; integration into a system already designed to deal with that difference (see Appendix 3 – tiering of countries); and
- Alignment and transparency of pneumococcal vaccine introduction and delivery systems with other GAVI/developing country immunization systems.

In light of the current policies, **the Expert Group recommends that GAVI adopt the following principles to integrate and achieve the AMC objectives:**

- A direct linear link between the initial country co-payment contribution and the final tail price.
- A defined payment schedule for the country co-payment contribution that increases over time to the tail price, with an understanding that for some countries, the co-payment contribution will not yet be at the tail price level at the end of the AMC and that GAVI Fund co-financing would continue into the post AMC period in the form of a GAVI tail price contribution. Figure 1 illustrates the relationship among different parts of the total AMC price over time, and the changes in country co-pay.

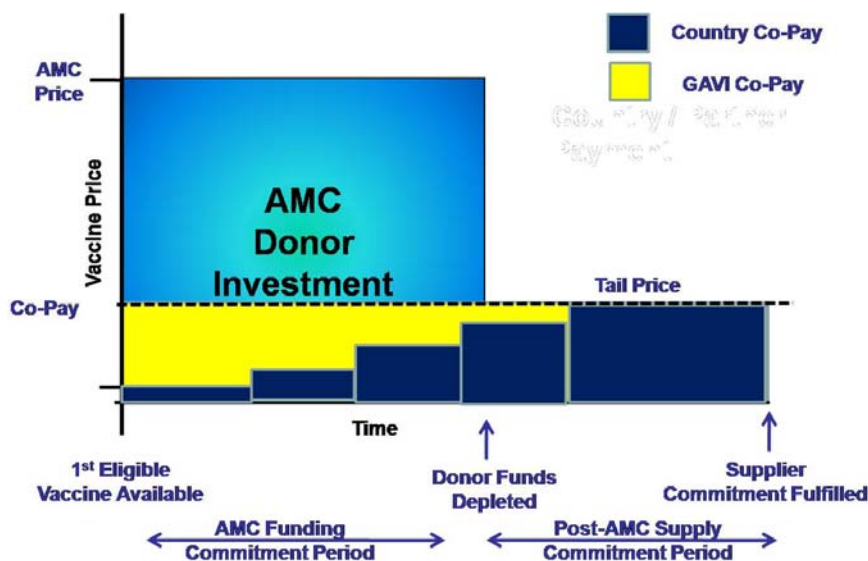


Figure 1: Illustrative diagram of co-financing scheme with GAVI from the perspective of a single manufacturer.

The Expert Group recommends that the combined GAVI and country co-payment should equal the tail price. This has two major benefits:

- Little chance of a “cliff” for countries when the AMC period ends. This increases the likelihood of sustainability and ensuring clarity on GAVI support.

- Greater certainty for manufacturers on post-AMC demand. A clear commitment by GAVI that it would continue to provide a subsidy between the country co-payment and company tail price would provide greater certainty that countries would continue to order and use vaccine.

The Expert Group raises a caution against allowing manufacturers to buy down country co-payment. In the industry consultations and Expert Group discussion, consideration was given to the ability of manufacturers to provide cash discounts to countries. This would mean, for example, that a country co-payment of \$0.30 could be offset by a manufacturer discount of the AMC price from \$6 to \$5.70. Although the group acknowledged that the AMC is a mechanism that should be able to be influenced by market forces, in this case GAVI is a significant third-party payer subsidizing a large proportion of overall vaccine price. As a consequence, small amounts of money could drastically distort the link between the country co-pay and the tail price and thus distort market outcomes.

CURRENCY AND INFLATION ISSUES ARE RELATIVELY STRAIGHT-FORWARD

The Expert Group recommends that pricing be in US dollars. It further recommends that:

- Both AMC price and tail price should be adjusted for inflation;
- The index used to determine the adjustment should be the GDP deflator; and
- The adjustment process should be initiated from when the first supply agreement is issued.

During consultations, manufacturers indicated that they work primarily in US dollars when dealing with GAVI-eligible countries. They suggested that they were well equipped to deal with the risks of hedging in different currencies rather than having AMC donors provide a price in multiple currencies. Expert Group members agreed that the AMC should issue payments in USD and to allow manufacturers to assume the currency risk.

KEY AMC PARAMETERS OF AMC PRICE, TAIL PRICE AND SUPPLY OBLIGATIONS INTERACT WITH ONE ANOTHER

The Expert Group considered the three key parameters of AMC price, tail price, and supply obligation. The AMC price (Charge 1) considers the total price per dose paid to a vaccine manufacturer. The AMC price builds in a premium to ensure the sunk costs are recouped, thus providing an incentive for companies to invest. The tail price (Charge 2) represents the price per dose at which a manufacturer will provide the vaccine after

the AMC funds are exhausted – in the tail period. Lastly, the supply obligation (Charge 3) commits manufacturers to provide vaccine in the tail period.

From the perspective of incentives to firms, the parameters all interact, balancing and counterbalancing each other. The higher the AMC price, the lower the tail price could be while still preserving the overall attractiveness of the AMC to firms, because a manufacturer has a greater assurance of covering sunk costs up front. The length of a supply commitment influences tail price as well: as the supply obligation becomes longer, manufacturers would require a higher tail price to guard against the risk of unknown events that are not covered by *force majeure* provisions.

In setting these parameters, the key drivers are the two AMC objectives of assuring capacity development by companies, and long term, sustainable vaccine financing by the GAVI Fund and by countries that adopt the product. To achieve these objectives, the Expert Group considered how to maximize the likelihood of industry's participation in the AMC by mitigating their risk, to the extent practical, and how to incentivize manufacturers that do participate to expand capacity to meet a significant share of the forecasted demand.

4. FINDING 1: THE ORIGINAL FRAMEWORK DESIGN WOULD YIELD BENEFITS, BUT CARRIES RISK

THE ORIGINAL FRAMEWORK ENVISIONED A FIXED AMC PRICE AND AN OBLIGATION TO SUPPLY AFTER THE AMC PERIOD, BUT NO DIRECT LINK BETWEEN REWARD AND ANNUAL LONG-TERM SUPPLY OBLIGATION.

The original Framework Design has several features that Expert Group members believe have merit, including: simplicity; emphasis on reducing the uncertainty of donor funding from the perspective of both firms and partner countries; “rules of the game” establishing a clear pre-determined path to reward; an openness to multiple participants; similarity to markets in more developed countries; ability for GAVI-eligible countries to choose among available products; and no outlays by donors unless countries expressed demand for the product. The obligations for firms under the original framework are limited to being willing to supply approximately as much product after the expenditure of the AMC funds as were procured during the AMC, at a tail price either set by the firm or established through another mechanism *ex ante*. Under some scenarios, the original Framework Design would produce good results: firms would meet a large share of the demand from GAVI-eligible countries and the tail price would be set at reasonably affordable levels.

However, analyses by the Expert Group, incorporating newly acquired information, show that under a broad range of conditions the original AMC design could result in suboptimal outcomes for an expenditure of \$1.5 billion, compared to the stated objectives of the AMC.

The potential problem with the original design is a function of payment structure, demand uncertainty and limited competition. Under many plausible scenarios, companies would have limited incentive to build sufficient new capacity or dedicate existing capacity to meet the forecast demand in GAVI-eligible countries. As a consequence, potential outcomes include:

- Limited expansion in capacity by companies beyond what they already are planning for high- and middle income country markets; and
- Significant shortfalls in supply to GAVI countries (leaving up to two-thirds of GAVI demand unmet).

The Expert Group's recognition of this problem resulted, in part, from the extensive additional modeling work. The original AMC design proposed for pneumococcal vaccine has limitations that became more apparent as workable parameters for AMC price, tail price and a supply commitment were assessed, and as it became clear that it was plausible there would not be strong competition in production of the vaccine. Because the problem results from limited competition, it may apply to future products.

The specific aim of the pneumococcal AMC – to provide an incentive for sufficient manufacturing capacity – brought into sharp focus the mismatch between the need for sufficient capacity and the tools available to incent it in the original design. This potential problem was further highlighted by developments during the Expert Group's work, including: 1) a significant upward revision of the GAVI estimates of country demand for pneumococcal vaccine, particularly in the early years; and 2) feedback from supplier consultations, which suggested that firms are reluctant to install new capacity and have major concerns about demand risk.

THE \$1.5 BILLION COULD BE EXPENDED WITH INADEQUATE BUILD-OUT OF CAPACITY AND SLOWED INTRODUCTION

Implicit in achieving successful vaccine introduction is the principle that vaccine supply should not be rate-limiting. From a public health perspective, adequate capacity is critical even if there is a chance that it will not all be used immediately. This is based on an analysis of the tradeoff between the risk of leaving capacity unused and the risk of leaving demand unfulfilled. The cost of leaving capacity unused is much less than the costs of leaving a child unvaccinated. Unfortunately, companies see only one side of this equation, and from their perspective, economics are for great caution in building capacity.

Although the original AMC design generates positive net present values (NPVs) for the participating manufacturers, these do not adequately reflect the demand risk inherent in the GAVI market, and the NPVs may be negative if calculated for the incremental capacity in isolation, depending on cost assumption. The positive NPVs therefore represent optimistic figures for industry. Internal risk considerations in manufacturers

whether to invest in a new plant to serve the GAVI market could discount these significantly. As outlined below, in the absence of significant competition, companies have several reasons not to rapidly build dedicated pneumococcal vaccine capacity for GAVI countries, and to reap AMC subsidies primarily by selling pneumococcal vaccine out of surplus in already planned supply.

PERCEIVED RISK IS HIGH, FAVORING A “GO-SLOW” APPROACH

Companies’ greatest fear is that demand will not materialize and the prudent response is to see evidence of demand before building capacity. In the absence of a specific agreement in which compensation to the companies is sufficiently clear, secure and tied to supply commitments, they are unlikely to spontaneously build out enough manufacturing capacity to serve the needs of GAVI-eligible countries. Under several plausible scenarios the net present value of building the incremental capacity to fully serve the GAVI market is negative.

The difference in the cost of goods among manufacturers needs to be considered. The Expert Group also considered a range of data on potential production costs for pneumococcal vaccines. Currently, there are no products that are TPP eligible, and so this modeling was based upon existing products for conjugation vaccines. Differences in production methods suggest that different manufacturers of pneumococcal vaccines are likely to have different costs. In order to consider how the AMC could be most successful, it was important to ensure that modeling could be applicable over a range of different cost of goods.

WITH LIMITED COMPETITION IT MAY BE MORE PROFITABLE TO CONSUME AMC FUNDS SLOWLY

It may be more profitable for companies to serve a fraction of the GAVI market and collect the AMC funds over a somewhat longer period than to build a sufficient capacity to serve the entire GAVI market. This approach – although unfortunate from a public health perspective – would reduce companies’ risk by minimizing the chance a plant would go unused. Furthermore, the updated demand forecast suggests the AMC would be utilized before a third manufacturer (likely an emerging supplier) can enter the market and benefit from the AMC.

GLOBAL DEMAND MEANS HIGH OPPORTUNITY COSTS FROM THE INDUSTRIALIZED WORLD MARKET

Pneumococcal vaccine has a large and growing market in low- and middle-income countries. Regardless of the specific AMC price that is ultimately set, the returns to industry from devoting capacity to the industrialized country market are significant. Given the presence of desirable alternative markets and the significant uncertainty about GAVI demand, in the short-run, companies may view provision to GAVI-eligible

countries as a loss, even under the relatively favorable AMC terms, compared to the revenues that they otherwise could obtain from higher income markets. In the longer-run, the cost of building capacity to serve GAVI is the value of the return on the companies' next-best project.

IN THE ORIGINAL FRAMEWORK AMC DESIGN, AN OBLIGATION TO SUPPLY AS MUCH VACCINE IN THE POST-AMC PERIOD AS IN THE PEAK OF THE AMC PERIOD COULD PERVERSELY REDUCE SUPPLY

The AMC could have a perverse effect on the amount of product available to GAVI-eligible countries. A supply obligation in the tail period is a fundamental feature of an AMC, but because the amount that companies would be required to sell at a low price during the tail period is linked to the peak annual amounts sold during the AMC period, profit-maximizing companies may find that the best course of action is to keep annual sales relatively low during the AMC. In addition, under "rolling supply commitments," firms that supply less annual vaccine each year during the AMC period would have lower annual supply requirements in the post-AMC period. This is particularly likely to occur if there is one dominant supplier.

DIAGNOSING THE PROBLEM: DESIGN, NOT RESOURCES

The potential problem of lack of incentives to build capacity is one of program design, rather than resources. From a financial standpoint, the \$1.5 billion pledged by AMC donors together with the expected GAVI contribution provide resources sufficient to cover the estimated costs of build-out of capacity plus the cost of production.

THE ORIGINAL FRAMEWORK MAY UNDERPERFORM, BUT THE DESIGN CAN BE CORRECTED

The Expert Group recommends that donors consider enhancements to the Framework Design. Although the AMC as originally proposed for pneumococcal vaccines will result in the provision of life-saving vaccines to GAVI-eligible countries, it faces a risk of not fully attaining the primary objectives of the AMC. As described above, a subsidized AMC price by itself may be insufficient to assure that companies will install enough manufacturing capacity to expand supply significantly.

This problem is potentially amenable to correction by adding a supplemental conditionality to the AMC agreement – requiring that firms commit up-front to a long-term supply commitment in exchange for receiving AMC funds. The nature of these supply commitments, as well as provisions to share some of the demand risk as an inducement for companies to participate, are described below.

5. FINDING 2: LINKING EARLY REWARDS AND RISK SHARING TO LONG-TERM OBLIGATION WILL YIELD BENEFITS.

The Expert Group recommends consideration of a **modified design** that preserves the core AMC principles articulated in the original Framework Design and the Center for Global Development's AMC Working Group report, but adds two enhancements that may increase the likelihood of a successful outcome. First, it incorporates **supply commitments** in a way that avoids the potential pitfalls of the tail supply obligation as previously proposed. Second, because a supply commitment alone could impose an additional burden on firms, it includes provisions for **mitigation of demand risk** faced by suppliers, to achieve a more efficient allocation of risk and encourage suppliers to undertake the desired large investments in dedicated capacity.

This modified AMC design extends the Framework Design to incorporate contracts in which firms agree to make a specified number of doses available to GAVI-eligible countries for 10 to 15 years. At the same time, recognizing that firms making supply commitments take on risk, GAVI/Donors could commit to terms that mitigate firms' risk and thereby induce firms to invest in the capacity and associated long term supply commitments.¹

This modification of the Framework Design attempts to create an incentive structure that is more likely to lead to the types of outcomes originally intended by the AMC. In weighing various alternatives, the Expert Group strove to maintain as many of the desirable features of the original Framework Design as possible and to adhere to core principles. Importantly, as the proposed modifications have not been subject to consultation with industry or complete analysis of specific details; these would be important steps to take next.

SUPPLY COMMITMENTS WILL LINK EARLY ACCESS AND STABLE SUPPLY AT SUSTAINABLE PRICES

The Expert Group recommends donors consider **linking a firm's potential share of AMC funds to an explicit long-term supply commitment**, so a company that commits to make available product to satisfy a fraction of the long-term GAVI demand is eligible for a proportional share of the AMC funds. A firm that enters into such a commitment would receive a per dose AMC subsidy for vaccine delivered to GAVI-eligible countries in addition to its GAVI/country co-payment. These subsidy payments would prevail

¹ While risk mitigation was given limited attention in the original AMC design proposed by the Center for Global Development's AMC Working Group, we believe that it is beneficial complement to the supply commitment, if the pneumococcal AMC is to achieve its stated objectives.

until the firm exhausts its share of the AMC funds, at which point the firm would continue to receive its GAVI/country co-payment or the tail price.

Supply commitments create a direct link between the donors' goals of early access to vaccines and stable supply at sustainable prices, on the one hand, and how the money gets spent, on the other. Supply commitments can be structured so that after \$1.5 billion is expended, donors will have obtained long-term commitments to serve the entire forecast GAVI market. As long as the market is not fully served, AMC funds will remain available. From the manufacturer's perspective, this mechanism creates a clear incentive to bring dedicated supply on-line: more dedicated supply equals a larger slice of the AMC pie. A consequence of incorporating this type of supply commitment is that setting the "correct" value of the per-dose AMC contribution becomes less critical. Market competition in this design is for supply commitment. Once agreement on this commitment has been reached, a company's share of the AMC based on this commitment is set. The per-dose AMC contribution influences only how quickly it receives this revenue, rather than how much it receives relative to other companies.

Supply commitments help to stimulate the creation of sufficient pneumococcal vaccine manufacturing capacity for GAVI-eligible countries – a primary goal of the pneumococcal AMC -- if they can be structured in a way that is acceptable to firms. The addition of a supply commitment maintains many of the original AMC elements and principles; the Expert Group's analysis suggests that supply commitments may be needed for future AMCs, except in the case where there is vigorous competition among multiple suppliers, or limited attractive alternative markets.

FORMULA LINKING TOTAL AMC SUBSIDY TO SUPPLY COMMITMENT

If supply commitments were incorporated into the AMC framework, the Expert Group recommends linking the total AMC funds a company is eligible to receive to the proportion of overall demand that company has committed to supply. For example, a firm taking on an obligation to supply 20 percent of long-term forecasted demand would be eligible to receive 20 percent of available AMC funds. Based on bids received from manufacturers, GAVI/UNICEF would then negotiate supply commitments with the bidding firms, to supply up to the projected quantity demanded.²

² Consistent with current UNICEF practice, GAVI could contract with multiple suppliers to keep multiple firms engaged in pneumococcal vaccine production and to assure competition in future supply. As the allocation decision would affect which vaccines were available to GAVI countries, GAVI would be expected to solicit and to use country preferences as part of the decision-making process. In this way, countries would have an opportunity to influence vaccine supply decisions, to create a better match between demand and supply of different vaccines.

Projected GAVI pneumococcal vaccine demand is expected to hit its steady state of 205 million doses in 2021. Therefore, the Expert Group proposes manufacturers bid on the proportion of that demand to determine their share of the AMC. A concrete example of how this would work is outlined below:

- Manufacturer A commits to supply 25 percent of doses, or 51 million doses per year of future annual demand. This means they are now eligible to receive up to 25 percent of the AMC envelope, or \$375 million.
- A per dose AMC subsidy is then drawn from this \$375 million and added to the GAVI/country co-pay, on a per-dose basis, and given to the company for each dose ordered. In the example above, once the \$375 million has been exhausted, the company would continue to receive the tail price for each dose ordered and would be obligated to continue to supply vaccine for the duration and at the level of the agreed-upon supply commitment.³

Each resulting supply agreement would specify a commitment to supply up to an agreed number of annual doses over a specified period of at least 10 years, a subsidy from the AMC fund, and a co-payment to be paid by GAVI and the purchasing country. The time clock for the supply commitment would start at the time the manufacturer is capable of fully supplying its committed level (it seems likely that there will be a tradeoff between length of supply commitment and on other objectives, e.g. long-term tail price). The GAVI/country co-payment, which might vary across firms, would be split between GAVI and the purchasing country following standard GAVI procedures as discussed in Section 3. The supply agreement would set a maximum GAVI/country price (co-pay and tail price) for the duration of the agreement, but over time a firm could reduce its GAVI/country price to spur demand or respond to competitive pressure.

If a supply commitment were incorporated into the AMC framework, the Expert Group recommends that this commitment be accompanied by a phase-out provision, which, in the instance of ongoing lack of demand for a product, would suspend the supply commitment and reallocate the unused AMC funds to other suppliers.⁴ Without such a

³ The firm could be given some time to ramp up its long-run committed supply. This would address the issue that firms might not be able to reach the full annual production immediately in the first few years of production they have to work out kinks in the production process. Its worth noting that plants will be built to serve larger demand than is expected in the year the plant first comes on line so building in some time for the plant to reach its full annual capacity of production should not be costly from a public health standpoint.

⁴ This would also guard against a manufacturer being required to produce a product and run a plant for which no product is demanded. It is likely that a minimum floor of annual doses should be set at which point a company is released from its obligations.

provision, adding a supply obligation linked to a dedicated share of AMC funds introduces the potential complication that country demand for a particular product might not materialize and AMC funds would go unspent unless reallocated.

SHARING DEMAND RISK TO FACILITATE INDUSTRY WILLINGNESS TO MAKE SUPPLY COMMITMENTS

Vaccine demand by GAVI-eligible countries is uncertain and hard to accurately forecast, in aggregate and for specific products. Firms are reluctant to invest the large sum required to build a new plant without some reasonable expectation of sales for their product. The negative incentive effects of this risk are greater when the expected margins on sales from the plant are lower. Thus if the capacity is dedicated to serving GAVI-eligible countries, demand risk becomes of paramount concern.

Demand risk can be mitigated by the actions of GAVI and donors. Vaccine suppliers are not well positioned to influence country adoption decisions, and have little incentive to invest in educating countries of the value of the vaccine if the demand generated may ultimately benefit their competitors. By contrast, GAVI and the donors are well placed to inform GAVI-eligible countries about the value of the vaccine, and to structure financial commitments in ways that reduce risk to firms. Given this dynamic, **the Expert Group recommends donors consider bearing some of the demand risk.** Assuming demand risk, by definition, involves some risk (!), and donors need to assess their willingness to do so. A more subtle potential complication of incorporating demand risk mitigation strategies is that in certain situations these strategies could come in conflict with country choice, if several choices were available, and one for which the AMC had provided demand risk mitigation were performing poorly.

The Expert Group examined two ways for donors to bear a portion of the risk: front-loading pricing and firm order timing. These approaches, which could be adopted separately or in combination, are described below.

FRONT-LOADED PRICING REDUCES THE FINANCIAL IMPACT ON FIRMS OF DEMAND UNCERTAINTY

When prices are front-loaded, companies making a supply commitment would receive relatively higher prices for the initial doses of vaccine supplied under the AMC. Their financial exposure thus is lessened if demand does not fully materialize. Front-loaded pricing is an extension of one of the original AMC concepts. In an AMC supplier agreement, as originally envisioned, the initial price was proposed to be (relatively) high before falling to lower levels in the tail period. Front-loading⁵ mitigates demand risk

⁵ It is possible, although unlikely, that a manufacturer could benefit from the higher priced AMC period and that demand falls off such that they are not obligated under the lower priced tail period. This, however, is also possible in the original design.

because firms receive the bulk of the AMC funds relatively rapidly even if demand is less than anticipated. Front-loading the price also increases the value to companies of AMC financing to some extent by allowing companies to recover their capacity costs more quickly.

Importantly, front-loaded pricing does *not* shift the distribution of AMC funds among firms in the setting where there is also a supply commitment, because the total AMC subsidy for which a company is eligible is preset by its supply commitment. As such, accelerated front-loading would not carry the risk of a windfall to an early entrant. Instead, a larger per-dose AMC subsidy means only that a firm receives its AMC funds faster and over the course of fewer doses – i.e. AMC payments are more front-loaded.

The Expert Group recommends that in a setting where front-loaded pricing was attractive to a firm, the degree of front-loading could vary depending on the ability of the firm willing to offer a low tail price.

A higher initial per-dose subsidy is potentially attractive to companies from a risk-mitigation standpoint because they would receive AMC funds relatively quickly, even if adoption were below forecast levels. Front-loaded pricing could create the perception of “over-paying,” even though the higher price is paid for fewer doses before dropping to the GAVI/country price. In the situation where country demand for a particular product was substantially less than projected, front-loaded pricing could result in an overall high price for the product.

FIRM ORDER TIMING GUARANTEES PURCHASE TO COVER SOME OF THE ANTICIPATED DEMAND

Firm order timing—guaranteeing a fraction of forecasted purchases (or forecasted revenue) for the initial years of the supply agreement—is another way to mitigate demand risk.

In firm order timing, at some point before an order is actually delivered, the order becomes fixed or “firm,” and the company can now count on receiving that revenue. The AMC (or GAVI) could guarantee some fraction of forecasted demand (or revenue) over a near-term, several-year window to a company that takes on a supply commitment. The demand or revenue commitment would be a short-term mechanism to enhance the incentive for companies to dedicate supply to developing countries. It seems likely that firm order timing would be most appealing to companies if provided at the time the company made the supply commitment and applied to the early years that the company agreed to make this supply available.

Recognizing that uncertainty increases the further into the future one looks, and donors themselves have limited risk tolerance, the share of anticipated demand covered through firm orders could decline over time. As an example, the AMC (or GAVI) could

make firm commitments to purchase a volume of vaccines corresponding to 50 percent of forecasted demand in year one, 40 percent in year two, 30 percent in year three, 20 percent in year four and the 10 percent in year five.⁶

The guarantee could be made by some combination of GAVI and the AMC. Such a guarantee could appeal to firms, lead to a more efficient allocation of risk. The disadvantage of this approach is that the AMC donors and GAVI could pay for some vaccine that isn't used.⁷ This risk could be reduced by guaranteeing a smaller proportion of forecasted demand, but would not disappear entirely, and the smaller the proportion of forecasted demand, the less appeal this guarantee would have for industry. As a consequence, **the Expert Group recommends that the proportion of forecasted demand that would be optimal for firm order timing in the pneumococcal AMC should be informed by UNICEF and their experience using this mechanism as well as consultation with relevant parties, including developing countries and industry.** Even modest guarantees could provide benefit and this benefit might be extended by combining firm order timing with front-loaded pricing, as discussed briefly in the next section.

The proportion of firm orders in an AMC agreement would be dependent on formulas set at the outset of the AMC but ultimately put into operation with up-to-date data (demand forecast) at the time a supply agreement is signed. In this way, the initial AMC tender goes out with a set of program rules that create a formula for calculating the purchase minimum; the forecasts are updated annually; and the minimum is set when the firm qualifies under the TPP. Program rules could make the proportion of firm orders a function of the firm's supply commitment. All the variables can be adjusted to optimize the risk mitigation, (e.g. commitment timing, percentage of forecast that is firm for each year, the number of forecast years the commitment covers, price paid per dose etc.) as they can be driven by predetermined formulas and tied to committed capacity.

FRONT-LOADED PRICING AND FIRM ORDER TIMING ARE NOT MUTUALLY EXCLUSIVE AND COULD BE COMBINED.

The Expert Group views front-loaded pricing and purchase guarantees as mechanisms aimed at achieving the same goal, making it more attractive for firms to build out capacity. Moreover, they are not mutually exclusive. To the extent that there is front-

⁶ To determine the proportion of forecasted demand that would have to be covered through firm orders to create an adequate incentive, the Expert Group recognizes that additional consultations with industry are required.

⁷ As discussed in section 4, however, the cost of a purchased but unused dose of vaccine is far less, in economic terms, than the unavailability of that dose if the demand materializes. In simple terms, a wasted dose is less costly than an unvaccinated child.

loaded pricing, a smaller proportion of projected demand would need to be subject to firm order timing to provide a given amount of risk mitigation. Firm order timing would provide better risk mitigation in settings where demand may be feared to be low (below the amount set in the firm order). Front-loaded pricing provides better risk-mitigation in settings where partial rather than full demand materializes (enough vaccine is sold such that the front-loading provides significant revenues). A package that combines both might provide a more efficient solution for covering a wider range of demand uncertainty. Sequential tendering (described below) can be applied to either risk mitigation approach.

SEQUENTIAL TENDERING COULD INCREASE THE EFFICIENCY OF THE MECHANISM

There are two broad options to implement the proposed enhancements discussed in this section:

1. **Donors could issue one offer** to firms and ask them to bid on the total anticipated demand (205 million doses in 2021) at the beginning of the AMC. Each manufacturer would commit to an amount of annual doses as described earlier, which would ramp up as demand increases to their committed level.
2. **Donors could issue two or more offers** At the beginning of the AMC, firms would be offered to bid on the amount of anticipated demand in 2016 (116 million doses) for a 10- to 15-year commitment. Then in 2016, a further offer would be made for the remaining unallocated doses (89 million) for a further set period. Both sets of offers would come with the same system of apportioning the AMC envelope as described earlier.

The Expert Group recommends consideration of sequential tendering, because there are at least two major reasons to favor proceeding in multiple rounds:⁸

- At least some of the initial uncertainty about demand will be resolved through the experience of the first round of tenders and delivery.
- By the time a second round of tenders is solicited, there will likely be additional entrants to the market, allowing for greater competition and a more robust marketplace. Sequential tendering holds open more opportunities for later entrants to participate.

Under the process recommended, GAVI/UNICEF would solicit bids from firms for a 10- to 15-year commitment to supply annual doses up to a set level. Firms would bid with

⁸ This was previously referred to as “tranching.” Depending on the extent to which sequential tendering is combined with firm order timing, it could introduce challenges into country choices about vaccines.

the knowledge that they would receive both a GAVI/Country co-payment and an AMC subsidy, with the total subsidy (or equivalently the number of subsidized doses) tied to their accepted quantity. Over time, the firm would get the AMC price until it exhausted its allocated AMC funds, and then the GAVI/country price.

THE ENHANCED AMC AGREEMENTS MAINTAIN FEATURES OF THE ORIGINAL FRAMEWORK

Under this enhanced design, AMC agreements would retain much of the structure envisioned in Framework Design, both in terms of guiding principles and details. Most importantly, firms receive a subsidized AMC price per-dose in the early years of their supply agreement and in exchange make vaccine available at a sustainable base or tail price over a longer period. Supply commitments do not bind GAVI or countries to purchase vaccines, however, country choice may be reduced if one firm chooses to make and the AMC accepts a supply commitment that covers a very large share of forecasted demand. This concern needs to be balanced against the more fundamental problem that supply commitments are designed to mitigate – specifically that overall vaccine supply may be constrained during this time of introduction and the more likely problem facing countries will be no vaccine choices rather than multiple vaccine choices.

The enhancements recommended for consideration add:

1. A specific way to operationalize supply commitments by creating a direct tie between a firm's supply commitment and the total AMC funds it can receive;
2. One or more mechanisms to mitigate demand risk, which are likely to be required if companies are to be able to offer a meaningful supply commitment; and
3. A proposal for sequential tendering to encourage competition and provide a basis for allocating supply commitments.

6. REVIEW OF OPTIONS

To make most efficient of the \$1.5 billion AMC contribution, the Expert Group is recommending consideration of modifications that will change the structure of the AMC as originally envisioned.

The table below summarizes the essential options and tradeoffs, reflecting the Expert Group analyses and many members' judgments about performance compared to the "base case" of implementing the Framework Design originally proposed. Not all members agree with all statements in all boxes.

If only a supply commitment were added to the original Framework Design (Modification 1), the prospects of full country demand being supplied increase, but there may be an elevated risk of manufacturers not participating. (This can be assessed

through subsequent industry consultations). If a supply commitment is paired with risk-sharing provisions including front-loaded pricing or firm order timing (modifications 2 and 3), the results could be improved along several dimensions relative to the “base case.” It is also quite possible that front-loaded pricing and firm order timing could be combined to obtain the maximum incentive.

To date, none of these possible enhancements have been vetted with potential pneumococcal AMC participants. It is possible that potential vaccine suppliers may view them favorably but also possible they could view them unfavorably, reducing the likelihood of participation. As a next step in developing the pneumococcal AMC, the Expert Group recommends industry consultation to assess supplier perception of these possible modifications and obtain feedback. Working out the details, for example on the time between acceptance of a bid and the start of the supply commitment, the speed of ramp up, and the exit clauses if a product does not receive regulation approval, will require consultations with firms.

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Table 1: Performance of Possible AMC Designs

	AMC Objective 1: Late-stage development	AMC Objective 2: Investment in production capacity	AMC Objective 3: Sustainable long-term pricing	AMC Objective 4: Effective pilot AMC	Overall Impact
Original Framework Design: AMC Subsidy with Tail Supply Obligation	Negligible effect on late-stage development as AMC funds likely depleted before emerging supplier entry.	Important risk of low and slow capacity build-out due to demand risk and little competition. Increased incentive for manufacturers to use excess capacity from existing plants to supply GAVI market	Few incentives for low tail price, and seems unlikely companies would offer this early unless unexpected competition, GAVI bargaining leverage, or imposition of tail price ceiling. Higher tail price could slow introduction.	Will provide test of many elements of AMC. Will provide lessons learned. Limited formal structure of AMC may allow more flexible alternatives for manufacturer participation, but potentially less alignment with AMC objectives.	Likely to be at least partially effective. Potential significant shortfalls in vaccine supply. Likelihood of suboptimal outcomes relative to AMC objectives
Modification 1: AMC Subsidy tied to Supply Commitment	Increased incentive for late-stage development and participation by emerging supplier if sequential tenders as part of implementation mechanism	Primary benefit is that this approach aligns AMC resources directly with desired AMC outcome of adequate supply through dedicated vaccine production capacity. Companies may be reluctant to invest without incentives so risk of non-	Compared to original framework, somewhat more incentive to low tail price: 1) AMC subsidy and tail price are set in competitive tender, and 2) firms will have dedicated capacity and need to assure long term market. May still need to cap tail price for sustainability.	Will provide test of many elements of AMC and lessons learned. Will learn more quickly whether companies wish to build needed capacity and therefore whether the pilot is effective. May be more generalizable -- supply commitments may be needed for future	Match capacity build-out goals to resources; lowers risk of little build-out of new capacity. Provides donors/GAVI with earlier, better predictability of supply. Company reluctance to agree to supply commitment may



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		participation may be higher Acceptability has not been raised with industry in previous consultations		AMCs, except in the case that there is vigorous competition among multiple suppliers, or limited alternative markets.	increase risk of non-participation. Requires a tendering process.
Modification 2: Supply Commitment plus Front-Loaded Pricing [could be combined with firm order timing]	Same as in Modification (1).	Improved incentive to invest due to faster return and reduction in revenue risk when demand is uncertain	Faster AMC payout on fewer doses reduces risk to firms and may lower acceptable tail price. May still need to cap tail price for sustainability	Same as in Modification (1). Future AMCs also may require demand risk mitigation as a corollary	May make AMC more attractive to industry; and increase willingness to participate. Possible perceived or actual risk of “paying too much”. Product pressure to reduce donor risk could conflict with country choice.
Modification 3: Supply Commitment plus Firm Order Timing [could be combined with front-loaded pricing]	Same as in Modification (1).	Improved incentive to invest due to reduction in revenue risk when demand is uncertain.	Assured revenue reduces risk to firms and may lower acceptable tail price. May still need to cap tail price for sustainability.	Same as in Modification (1). Future AMCs also may require demand risk mitigation as a corollary	May make AMC more attractive to industry; and increase willingness to participate. Possible perceived or actual risk of “paying too much”. Product pressure to reduce donor risk could conflict with



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					country choice.
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7. PROPOSED PROCESS FOR OBTAINING ENHANCED AMC AGREEMENTS

A WELL-THOUGHT OUT PROCESS FOR OBTAINING SUPPLY AGREEMENTS IS CRUCIAL

An important part of the AMC design is to specify a process for establishing the terms of the individual company AMC agreements. **Following the decisions about the design elements of the AMC above, the next key decision is determining the level of flexibility built into this structure.** Independent of the specific structure, decisions will need to be made regarding how much the AMC process should be bound by rules decided in advance and how much is left flexible. There is no question that rules need to be established for *force majeure* clauses, allowing firms relief on obligations due to factors outside their control. Beyond this, however, is the explicit issue of the extent to which the procurement authority should have flexibility in negotiating contacts with companies.

Many of the specific terms of the AMC, including the supply commitment, can be thought of as being along a continuum from all elements fixed at the outset to complete flexibility for GAVI to develop terms as an outcome of a tendering process. An advantage of a structured, rules-fixed-at-the-outset approach is that it fits best with the simplicity, transparency, and clarity objectives of the AMC design. An advantage of incorporating a flexible approach into the model is that there are many unknowns, both now and in the future, and flexibility is a key adaptive principle for effectively handling uncertainty. Flexibility might also allow for tailoring of contracts with firms to generate better individualized alignment of company needs and AMC goals.

A middle ground of permitting negotiation within pre-determined ranges of acceptable outcomes may represent a reasonable balance: Key AMC terms would be specified at the outset, either uniformly or by formula, for a competitive tender process. GAVI/UNICEF would solicit bids from manufacturers for supply commitments and GAVI/Country prices and use these tenders as a starting point to negotiate within set ranges of flexibility the individual supply agreements. To the extent possible, this proposed system would enable donors to establish a transparent set of AMC rules that allow equal access to all qualified producers, leaving specific discretionary decisions to be handled by GAVI, UNICEF and the Independent Assessment Committee.

Key to a process that has any flexibility is the AMC Secretariat's (GAVI's) competency to effectively negotiate these supply agreements. Given both the prospective nature of these agreements (negotiating supply before demand has been established) and the novel and somewhat complex nature of the AMC (AMCs are more like a pharmaceutical development agreement than a true supply agreement), GAVI will need to staff these negotiations with competent and experienced experts. While such expertise is available through consultation, GAVI is likely to have greater success with dedicated resources

under its direct control. These experts can represent GAVI and donor interests in these negotiations as well as perform an important business development function crucial to the success of the pilot AMC by generating additional demand within the pharmaceutical industry and the developing world for the AMC.

SEQUENTIAL TENDERING AS AN EXAMPLE OF LIMITED FLEXIBILITY

One advantage of setting supply commitment terms as an outcome of a sequential tendering process, described earlier, is adaptability to the great uncertainty that remains about production costs and firms' willingness to tolerate risk at this stage of pneumococcal vaccine development. Because demand is expected to grow over time, and uncertainty about both demand and company costs will be resolved over this period, it makes sense for GAVI/UNICEF to obtain supply commitments as the supply is needed, while giving sufficient lead time for firms to build out the necessary capacity.

The Expert Group recommends that as soon as possible GAVI/UNICEF seek supply commitments sufficient to meet the forecasted annual demand needed for 2016. And then in 2012, seek the additional supply commitments needed to meet the increase in annual demand above the 2016 level then forecasted, as needed for 2020. If necessary, there could subsequently be a third round. GAVI/UNICEF would use these bids⁹ as a starting point to work out individual supply agreements of the form discussed in the previous section.

Manufacturers would be required to fill orders up to their obligated annual supply, provided these orders were placed with a minimum required advance notice (to be determined based on necessary production lead times), and could choose to fill additional orders. If orders for a particular vaccine exceed available supply GAVI/UNICEF would prioritize these orders among countries, based on prior use and willingness to commit to future demand, to enlist the assistance of countries in contributing to demand risk mitigation.

⁹ If there are multiple acceptable bids, we anticipate that GAVI/UNICEF would seek to contract with multiple suppliers, but would reward a lower bid with a larger share of the expected market, as currently occurs under UNICEF procurement practice, subject to expected country demand.

PURCHASING VACCINE IN 2010-12, BEFORE SUPPLY COMMITMENTS KICK IN

As noted previously, it takes about five years for manufacturers to build a new manufacturing plant. Therefore, the launch of the AMC in 2008 and commitment of new capacity would not become available until 2013, when the commitments would commence. Nonetheless, demand for pneumococcal vaccines from GAVI countries will exist before this, and TPP-eligible products are expected to be available as soon as 2009. Vaccines not meeting the TPP would need to be purchased separately outside the AMC framework.

The Expert Group recommends that suppliers who have signed an AMC supply agreement for the post-2013 period would be able to supply vaccine in the 2010-2012 period at the AMC price, effectively front-loading their benefit to further incentivize the building of supply capacity.

8. CONSIDERATIONS IN ESTABLISHING A TAIL PRICE

Although recommendations regarding tail pricing were part of the Expert's Group initial charge, tail pricing is not an explicit element of the AMC design options requested in this report. We are including the following section on tail price because of its link with these AMC design elements and its effect on overall AMC success.

The AMC tail price is one of the most critical determinants of the long-term financial sustainability of pneumococcal vaccine use in GAVI countries. Tail price is also a determinant of the likely speed of introduction. The knowledge that pneumococcal vaccine will be affordable in the long-run may encourage developing countries to introduce vaccine in the short run.

For the AMC to achieve its objectives, the tail price needs to fall within a range where it is sufficiently low to be affordable by countries and sufficiently high to generate a viable business case for companies. Realistically, for the poorest GAVI countries, significant support will be required in the post-AMC period from GAVI before countries can be expected to bear the full cost of the tail price. Unfortunately, the bounds of this range for pneumococcal vaccine remain uncertain.

CONSTRAINTS AROUND THE LOWER AND UPPER BOUNDS

Companies cannot be expected to sell pneumococcal vaccine below their costs. This cost information is proprietary and highly protected by companies; while the Expert Group has been provided estimates, the accuracy of these estimates is uncertain. And even companies themselves are unsure about the costs of production in the future, when the tail price would apply. Companies may also consider the potential impact of participating in the AMC on other lines of business for example the potential impact on

pricing and other markets. Companies will have different thresholds of acceptability in this domain. The upper bound – recognizing the role of GAVI as a “third party payer.”

GAVI plays a unique role both in global vaccine financing and in the AMC, and this role has important implications for the process of setting the AMC tail price. Although GAVI accords countries primacy in decisions regarding vaccine purchase, the GAVI Fund pays the vast majority of vaccine costs, particularly in the early years of introduction. The upper end of the acceptable AMC tail price range is the price affordable by countries. But because of the GAVI role in vaccine financing, this set point is murky and potentially distorted, at least in the near term. In addition, and importantly, a second potential determinant of tail price affordability is GAVI’s willingness and ability to pay, as the GAVI Fund will be the financing resource most affected by AMC/tail price co-payments.

THREE OPTIONS FOR MOVING FORWARD

Given these realities, there are three options for moving forward:

- Allow companies to unilaterally set their tail price at the time they sign an AMC agreement.
- Set an explicit (“hard”) tail price cap as a conditionality of entering into an AMC agreement;
- Set a flexible (“soft”) tail cap, potentially implicitly.

ALLOW COMPANIES TO UNILATERALLY SET THEIR TAIL PRICE AT THE TIME THEY SIGN AN AMC AGREEMENT

The AMC design could allow companies full latitude in setting their product’s tail price. But without significant competition, a low tail price may be unlikely. With only two suppliers in this market during much of the AMC period, and with available information suggesting a substantial difference in cost of goods between these manufacturers, competition may be too weak to significantly influence tail price, particularly for the lower cost manufacturer.

Some elements of the AMC design do provide an incentive for setting tail price at an affordable level. To the extent there is a link between tail price and country co-payment, a lower tail price could potentially influence a country’s decision to purchase the product. If a supply commitment were incorporated into the AMC design, companies would have additional incentive to set a tail price at a level sufficient to generate demand for the capacity they were now obligated to build. However, models¹⁰

¹⁰ For example, the analysis found that if countries (or their donors) representing 30 percent of the market are willing to pay \$4.50/dose, and countries representing 70 percent of the market are

developed by the Expert Group indicated that in a limited-competition context, and assuming GAVI exerted no buyer leverage, a firm seeking to maximize profit might well set the tail price relatively high, even if some countries would then be unable to purchase the vaccine.

Given the role of GAVI discussed above as a third-party payer bearing most of at least the early responsibility for paying the co-payment portion of the AMC price corresponding to the tail price, even if companies were given extreme latitude in setting tail price, it would seem prudent for GAVI to have some sort of “veto power” relative to a company’s proposal. Similarly, to the extent that donors will be financing the \$1.5 billion in AMC funding, they may wish to place some cap on the tail price to ensure value for money.

SET AN EXPLICIT (“HARD”) TAIL PRICE CAP AS A CONDITIONALITY OF ENTERING INTO AN AMC AGREEMENT

Donors or GAVI could place an explicit cap on the tail-price. This could be done in several ways. GAVI could tell firms prior to the tender that it would be willing to subsidize only a GAVI/County price less than \$X, so a bid with a higher price would be rejected. Alternatively, the donors could specify such a constraint directly in setting out the AMC rules.

A “hard” tail price cap has the benefit of ensuring greater affordability of the product(s) over the long term and protects against inefficient use of AMC resources. A higher per-dose expenditure reduces the availability of donor and/or developing country government resources for other necessities in the immunization program, or the broader health sector. However, deciding what price ceiling to impose is problematic given the intrinsic uncertainty about the firms’ costs. Imposing a tail price ceiling could also lead firms to refuse to participate, or to participate in only a token way, particularly if the tail price ceiling were set too low. Manufacturers have voiced strong opposition to a fixed tail price, particularly far in advance where significant uncertainties exist.

SET A FLEXIBLE (“SOFT”) TAIL CAP, POTENTIALLY IMPLICITLY

Finally, an implicit (or soft) constraint could be imposed. If there is to be a ceiling, it is more likely to be accepted if it is a soft ceiling with provisions for adjustments to reflect general inflation, for relief in the case of regulatory changes or disasters which force major changes in the factory, for ending the tail obligation if only a few countries wish to use the product, and for opportunities to request approval from the IAC to substitute

willing to pay only \$2 per dose, a firm that could not price discriminate would have an incentive to install capacity to serve only 30 percent of the total vaccine market and sell at \$4.50.

other products, potentially from other manufacturers, for the original vaccine if equally good but cheaper products become available.

In one variant of this, donors would leave discretion to GAVI or the IAC. This could involve a statement that GAVI would provide a subsidy of only \$X, with the remainder coming either from country co-payments or other donors, leaving some room for flexibility depending on the bids that were put forth. Alternatively, the IAC could play the watchdog role, with the donors stating that qualifying supply agreements had to demonstrate "substantial cost-effectiveness," and mandating the IAC to approve all supply agreements on these grounds. The donors could provide the firms with guidelines on what this meant -- e.g. that an offer with a tail price under \$X would likely meet the criteria, but higher prices might not. This could or could not be subject to donor approval. One issue that would need to be considered is that GAVI or the IAC might have less bargaining power with firms than donors because its reservation value for alternative uses of the funds would be less.

An additional potentially important enhancement would be to give GAVI some flexibility in negotiation of tail price as part of the overall contract with a specific firm. Concessions on tail price might be offered by firms, for example, at higher supply levels or in exchange for greater demand risk provisions.

TWO BROAD OPTIONS EXIST FOR SETTING THE TAIL PRICE CEILING

Recognizing that if the ceiling on the tail price were set at the marginal production cost it is very likely that firms would not participate, there are two basic options to consider for setting tail prices given the likely initial AMC entrants: 1) setting the price very low to minimize profit and risking non-participation by firms or 2) setting the price low but at a level that would incentivize entry by better assuring a viable business case given all the inherent future uncertainties.

Choices between these options should be informed by a quantitative analysis of the tradeoff on public health and the relative to the potential impact of alternative health spending as well as by qualitative analysis of other considerations.

ADDITIONAL ANALYSIS AND CONSULTATION WITH GAVI AND COMPANIES IS NEEDED

Key parameters in assessing the potential impact of a ceiling on the tail price are subject to considerable uncertainty. In particular, it is very difficult to know the demand elasticity of country response and how a potential ceiling on tail price would affect the probability that different firms would participate. The Expert Group recommends further consultation with firms specifically around the question of tail price, particularly if the new supply commitment and risk mitigation features are adopted.

9. NEXT STEPS

Once donors have come to decisions on the preferred AMC design, these decisions will need to be translated into working documents that will form the basis for the legal framework. As will be provided separately, there are a number of issues, largely independent of the choice between the framework design and the alternatives discussed in this document that will need to be addressed before the AMC could be launched. It makes sense to conduct the development of the basic AMC rules and the rules for the launch of the first set of bids simultaneously and extensive work will be needed over the next few months to make sure that the details are in place and are creating the intended incentives. Experience from other aspects of market design suggests that even apparently small issues in design can potentially have important impacts on the efficacy. Furthermore, the design and policy options described herein will need specific values because many of the recommendations here are presented as ranges. This will require a different set-up than has currently functioned. In effect, the project is moving into the final design phase. This will require a small, dedicated and empowered group who can come to tentative decisions on the remaining issues, prepare draft documents for consultation and review, carry out needed consultations and finalize the documentation.

The Expert Group recommends that the key implementers (GAVI, UNICEF and the World Bank) form a small team constituting both the legal counsel and program experts. The Expert Group also recommends that its work be considered complete; however, Expert Group members could be drawn upon as resources to help translate the group's ideas into structured documents. It is also essential to have dedicated support to the implementation team on the mechanism design/industrial organization economics, who can devote needed time and carry out any additional analytical work as needed to ensure the values used represent an appropriate structure that does not generate inappropriate incentives.

The Expert Group appreciates the responsibility entrusted to us by the AMC Donors. We are hopeful that the analysis and recommendations summarized in this report constitute significant progress toward the launch of an AMC, which we believe represents a major innovation in support to life-saving immunization programs in the developing world.

10. APPENDIX SECTION:

APPENDIX 1: MANDATE AND CHARGES OF THE EXPERT GROUP

The AMC donors charged the Expert Group with the following tasks:

1. **Review the model and assumptions for determining the subsidized price per course.** This would include a review of the model created during earlier preparatory work and possible alternative approaches and assumptions on cost of goods, risk-adjusted cost of capital, manufacturer behavior, the costs and benefits of encouraging multiple suppliers, and identification of appropriate costs to be recouped.
2. **Determine the relationship of co-payment and tail price.** The co-payment is the amount paid by countries per dose during the AMC period. Manufacturers would then receive a subsidy to bring this up to the AMC price. Following the AMC period, manufacturers would commit to a long-term tail price. It would be important to consider the optimal relationship – if any – between the payment countries make and the price paid post-AMC and consider the incentives and trade-offs implied by each choice.
3. **Recommend supply obligations in the post-AMC period.** Consider the required duration of the provision of vaccines by companies; evaluate the current proposal outlined in the appendix as well as IP-related issues, incentives and trade-offs that will be involved in such scenarios.
4. **Assess ability and willingness to pay among low-income countries.** This will include a review of the current GAVI co-financing policy (which will be evaluated and revised by 2010) and consideration of what modifications – if any – will need to be made to this policy to adequately consider the incentive issues raised in regards to co-payment and tail price.
5. **Make currency recommendations for the AMC.** Review the currency that different manufacturers' costs are denominated in, currency risks generally associated with the development of a new vaccine and assess the pros and cons of making the AMC payments in \$US or a basket of other currencies.

APPENDIX 2: MATERIAL USED FOR THIS REPORT

MAKING MARKETS REPORT FROM THE CENTER FOR GLOBAL DEVELOPMENT

The Center for Global Development's report, *Making Markets for Vaccines: Ideas to Action* (2005), presented the rationale for an AMC and proposed a basic design, including a Framework Agreement and Supply Agreement. The work was based on the deliberations and analysis of an expert working group, supplemented by wide consultation with the donor and public health communities. The AMC structure proposed was oriented toward a product in relatively early stages of R&D, with the example used being a malaria vaccine. The report served as a point of departure for interest by the G7 Finance Ministers in pilot testing the AMC approach, and the World Bank was subsequently requested to undertake a series of activities to identify an appropriate candidate vaccine for a pilot AMC, and to determine the necessary size of an AMC commitment.

DISEASE EXPERT COMMITTEE WORK

Delegating the task to the World Bank, the G7 Finance Ministers requested that an Independent Disease Expert Committee be convened to provide guidance regarding key design features. This Expert Committee, convened in February 2006, comprised 13 internationally recognized experts in public health, epidemiology, industry economics, vaccine development and law; a majority hailed from developing countries. The group evaluated six different candidates for the pilot, as proposed by Italian Minister of Economy and Finance Giulio Tremonti in his report to the G8 Finance Ministers: rotavirus, pneumococcus, human papillomavirus, malaria, HIV/AIDS and tuberculosis. The Expert Group reviewed all six diseases, using papers prepared by the corresponding public-private partnerships (e.g. Malaria Vaccine Initiative or PneumoADIP). These papers followed an established format to ensure comparable, consistent and comprehensive information. The Expert Committee concluded that while all six diseases are large public health threats in need of vaccines, the AMC concept should be testing first through application to pneumococcal diseases and second through application to malaria.

INDUSTRY CONSULTATIONS

Eleven vaccine manufacturers were consulted between June and October 2007 by a team consisting of staff from The World Bank, GAVI, PneumoADIP and Applied Strategies Consulting, which had been commissioned by the World Bank and GAVI to develop the AMC-FIRM model to determine the overall size of the pneumococcal vaccine AMC and the vaccine price. The consultations were structured to both provide information to the suppliers and solicit feedback on the key AMC terms and the AMC-FIRM model.

Economic Expert Group Final Report

Vaccine division CEOs from four of the five multinational corporations were present at the meetings, as were senior managers from the commercial, scientific, legal, and public affairs departments. Senior executives and managers were present at the emerging markets meetings. A few companies sent additional written comments. Notes were taken at each of the meetings, and the findings were aggregated and have been provided to the Expert Group creating this report for consideration.

AMC-FIRM MODEL

Applied Strategies, a life-sciences strategy consulting firm, was commissioned to develop a quantitative model that offers insight into how an AMC might be valued by industry. The model is based on valuation methodology commonly used by the industry to compare returns across alternative investments and with the cost of capital. If the investment under review has a positive return, it is prioritized, if not, it is more closely examined and may be dropped. The valuation methodology:

3. Identifies and addresses the timing and risks of each development investment based on the scientific knowledge and the likelihood of success;
4. Assesses the cost of product development, manufacturing and commercialization for the target market (in this case the poorest developing countries) that is not covered by public funding (in the case of this model, only investments financed by the private sector are taken into account);
5. Analyzes numerous product profiles and commercial market scenarios at every stage of development, including the likelihood and impact of competition;
6. Compares each investment decision to other opportunities and the cost of capital;
7. Translates estimates of investment, cost and return into expected cash flows over time (in net present value terms) and (given the inherent uncertainty of whether a candidate will succeed at each stage of development) adjusts this cash flow for risk, (meaning the probabilities of success and failure). However, the financial return on certain life saving products may be bolstered by intangible value associated with being socially responsible.

The AMC modeling estimates the AMC size required to provide firms with a neutral or positive return for pneumococcal vaccines. Different scenarios were run to estimate the AMC size needed to be to meet different objectives including encouraging competition, innovation and investment in adequate capacity to serve the poorest developing countries. The AMC-FIRM model served as the basis for the estimate of \$1.5 billion as the amount required for a pneumococcal AMC.

UPDATED DEMAND FORECASTS

In the spring of 2007, the GAVI Alliance sent out information to all of the GAVI countries providing information regarding pneumococcal vaccine. The impetus for this

April 1st, 2008

was the decision by the GAVI Board to provide funds for countries interested in introducing the 7-valent pneumococcal product (Pneumovax). This process requested countries to submit letters of interest indicating when and if they would be interested in applying for pneumococcal vaccine. While it was aimed at Pneumovax, it also provided information on the two vaccines under development and eligible for AMC support, yielding a clearer demand picture of pneumococcal vaccine. When combined with existing data in the strategic demand forecast, the letters of interest from 34 GAVI-eligible countries resulted in a significantly increased estimate of demand (see the blue line in the figure below).

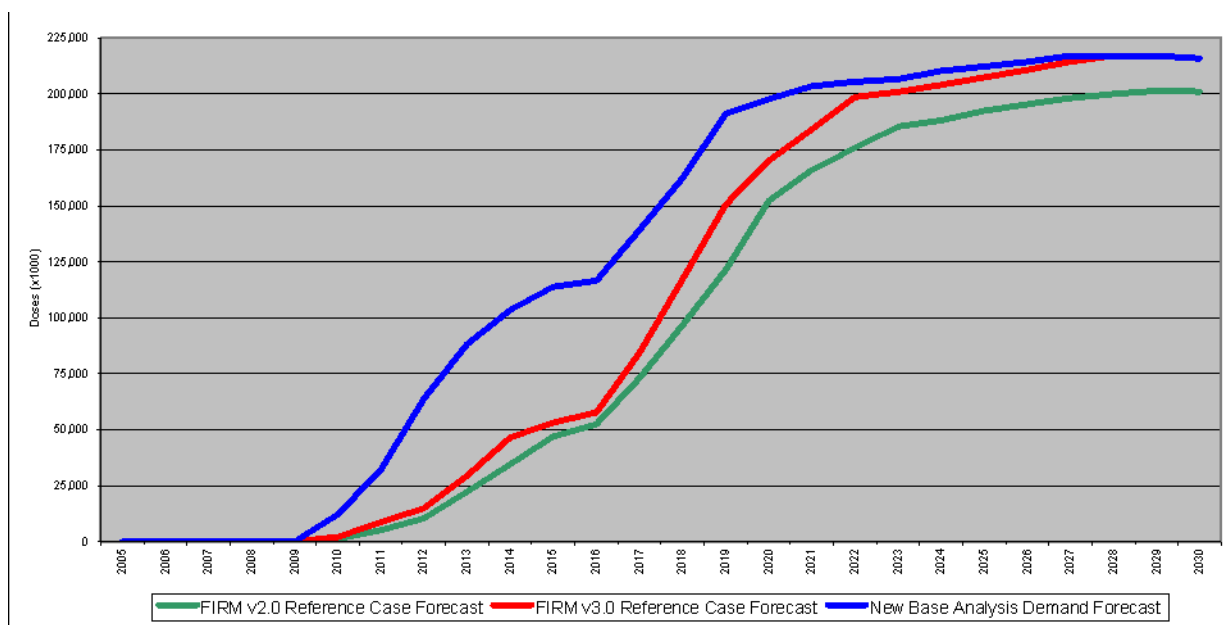


Figure 2: Projected demand from GAVI countries for pneumo vaccines

ADDITIONAL MODELLING WORK

A subgroup of the Expert Group undertook a series of new modeling exercises. The intent of the modeling work was to shed light on likely industry behavior in the face of different AMC structures, assuming that firms would act to maximize profit and would make decisions about the timing and type of AMC participation based on that objective (including tail price and building of capacity).

Recognizing the extent of uncertainty in parameters, modeling was used to track each design for robustness, asking the question, “are there reasonable values of parameters under which the design does not perform well?”

This is a somewhat different approach than that of Applied Strategies, which took obtaining a neutral or positive net present value as the criterion that firms would use to participate maximally in the AMC, rather than assuming that firms choose capacity levels and tail prices to maximize profits, even if this means participating in the AMC at

less than the level needed to provide sufficient vaccine for all GAVI countries. However, when the new modeling was then compared with similar scenarios using the AMC-FIRM model to look at the impact of incremental capacity on profits, results of the two modeling approaches were shown to converge, providing a high degree of confidence in the basic inferences.

APPENDIX 3: GAVI CO-FINANCING DETAILS

The group was presented with and discussed GAVI's co-financing policies. Currently GAVI requires countries to provide modest co payments for vaccines. Countries are grouped into three categories:

- **Poorest countries:** This group includes 41 of the 72 GAVI eligible countries and are those countries considered by the United Nations to be in the Least Developed Countries (LDC) list. GAVI asks these countries to pay the least of the three groups.
- **Intermediate countries:** This includes 18 of the 72 GAVI countries which have a per capita GNI of less than \$1000 per year per capita. These countries are in the middle grouping.
- **Least poor:** This includes 13 countries that have an income per capita of more than \$1000 per year and these countries are considered to have the greatest ability to pay. These countries will be expected to fund the full tail price by the completion of the AMC.

GAVI also has special treatment of fragile states, as designated by the World Bank in conflict or post-conflict. Once the countries emerge from this classification they return to one of the three categories above. While they are considered fragile states, special consideration is given if they are unable to meet the co-payment. These Country co-payment increase over time, in steps.

**ADVANCE MARKET COMMITMENT FOR PNEUMOCOCCAL VACCINES -
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