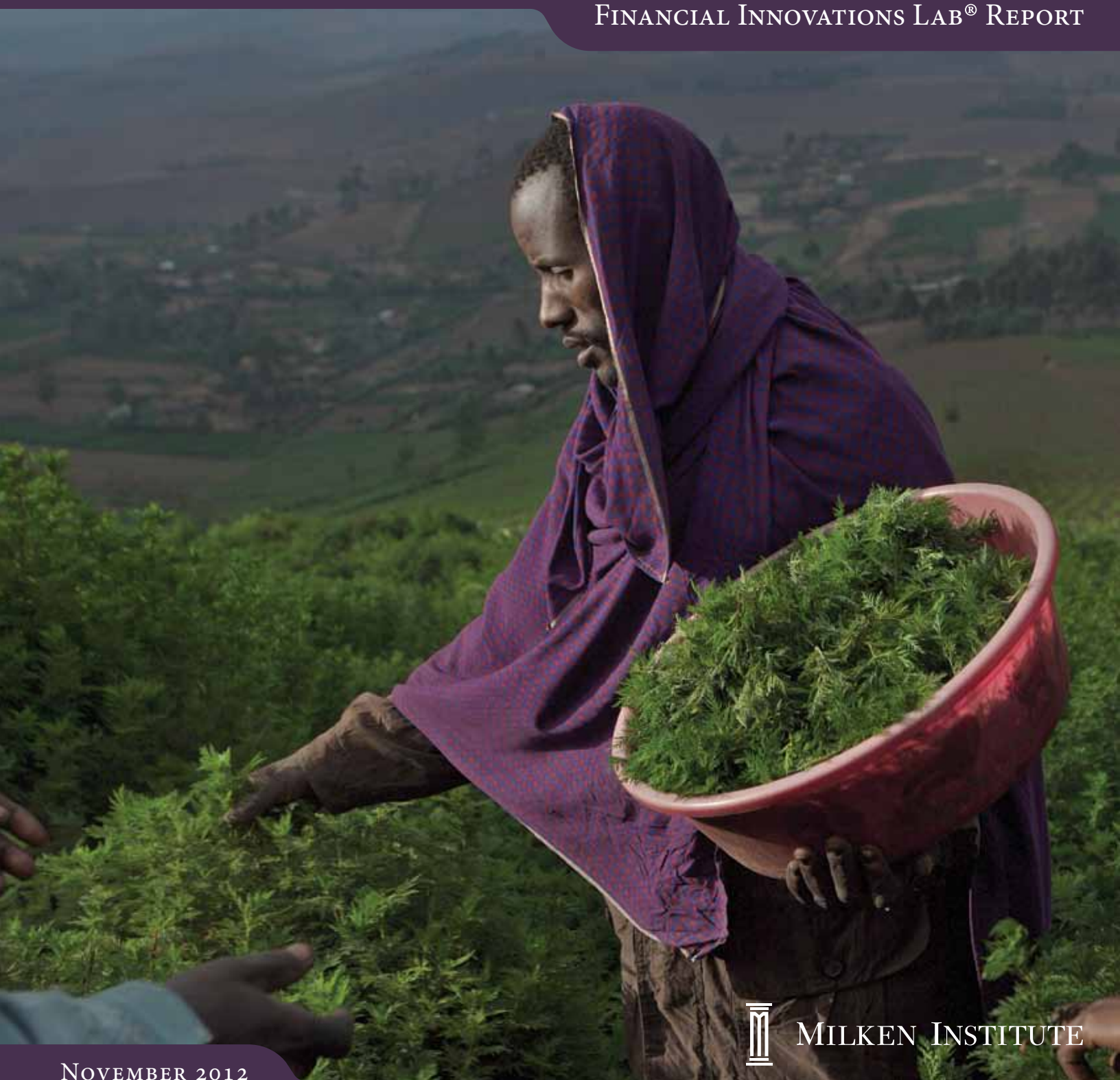


# INNOVATIVE FINANCING FOR GLOBAL HEALTH R&D

FINANCIAL INNOVATIONS LAB® REPORT



MILKEN INSTITUTE

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MILKEN INSTITUTE

FINANCIAL INNOVATIONS LAB<sup>®</sup> REPORT

# INNOVATIVE FINANCING FOR GLOBAL HEALTH R&D

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## FINANCIAL INNOVATIONS LAB® REPORT

Financial Innovations Labs® bring together researchers, policymakers, and business, financial, and professional practitioners to create market-based solutions to business and public-policy challenges. Using real and simulated case studies, participants consider and design alternative capital structures and then apply appropriate financial technologies to them.

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## ACKNOWLEDGMENTS

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We thank the Bill & Melinda Gates Foundation for supporting the project, and especially Jennifer Alcorn for her guidance.

This report was prepared by Caitlin MacLean.

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## ABOUT THE MILKEN INSTITUTE

A nonprofit, nonpartisan economic think tank, the Milken Institute believes in the power of finance to shape the future. The Milken Institute produces rigorous, independent economic research—and maximizes its impact by convening global leaders from the worlds of business, finance, policy, academia, and philanthropy. By fostering collaboration between the public and private sectors, we transform great ideas into action.

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An investment in human capital is an investment in economic growth.

## Introduction

The past few decades have seen vast improvements in the health and well-being of communities worldwide. Life expectancy and access to health services have improved, and technological innovations have made the prevention and treatment of diseases more mainstream. Across continents, the global health community treats minor ailments, chronic disease, and epidemics through public-private collaboration. From local municipalities to multinational corporations, the stakeholders are as varied as the countries in which they operate.

Still, the developing world bears a disproportionate share of the burden of disease. Poverty is inextricably linked to health issues and those nations with the highest occurrences of chronic and epidemic illnesses often have limited resources to combat them, creating an ongoing barrier to development and growth.

From 1975 to 2000, 1,393 medicines were developed for the global market, yet only 16 targeted diseases that primarily affect vulnerable populations in the developing world.<sup>1</sup> This is partly due to challenges of supply and demand. It is unlikely, for example, that marginalized populations in Africa can afford malarial drug treatments. And because a pharmaceutical company may spend up to a billion dollars to develop and market a single new drug, it has few financial incentives to jumpstart research and development (R&D) targeting neglected diseases of the global health sector. This has left much of the financial responsibility for R&D to donor governments and the philanthropic community. Private investors and corporations have also begun to offer support to the global health sector.

However, estimates place a price tag of billions of dollars to meet the needs of the global health burden, and there seem to be increasingly fewer resources to go around. Fiscal budgets are shrinking in an uncertain economic climate, and the private sector grows more risk-averse. But as innovation often accompanies scarcity, current conditions create a need for financing models that leverage the limited funding available effectively and efficiently to attract new investment.



*Developing countries face 90 percent of the global health burden, and yet only 10 percent of current medical R&D focuses on diseases primarily affecting their populations.*

To overcome funding challenges, global health organizations and their donors have developed financing tools, such as the advance market commitment (AMC), debt buy-downs, and pooled funds from tax revenue, that blend capital from the public and private sectors. The result has been great momentum toward models that can maximize impact and potentially generate returns for investors. Yet the creation and implementation of such models has been slow and labor-intensive. There has been measurable success, but also an urgent need to design the next generation of innovative financing products.

To this end, the Milken Institute, with support from the Bill & Melinda Gates Foundation, convened a Financial Innovations Lab® to map current and potential models with the goal of leveraging traditional sources of aid to attract private-sector investment and increase sustainable funding for R&D. With the global health funding landscape broad and diverse, the Lab focused on models that would engage a new tier of investor in terms of both financial capacity and risk appetite for financial products across asset classes. The group of market leaders and experts discussed the barriers to implementation, as well as potential solutions.

## Issues and Perspectives

Despite advances in global health care, such as the development of promising vaccines and the eradication of many infectious diseases, great scientific and funding challenges remain. Each year malaria sickens 222 million people and tuberculosis kills close to 2 million people.<sup>2</sup> New drug treatments and vaccines in the development pipeline can each require an investment of hundreds of millions of dollars, and significant funding gaps remain between the final costs of health care delivery and the funding work of governments, donors, and the philanthropic sector.

The value chain linking research, development, and delivery consists of pharmaceutical companies, academic institutions, and small and medium-size enterprises (SMEs), as well as relatively new public-private model for collaboration—the product development partnership (PDP)—facilitating efforts among all of these players.



*Vaccinations in the developing world are costly for communities and corporations but are desperately needed to achieve disease eradication goals.*



### The PDP: A breakthrough in collaboration

Product development partnerships, which arose in the 1990s, are not-for-profit, public-private organizations that partner with the public sector (governments and governmental agencies) and the private sector (donors, pharmaceutical companies, and academic and research institutions). PDPs pool expertise, facilitate the underwriting of medical R&D, and accelerate the delivery of disease treatments that drug companies would otherwise be unwilling to pursue because they could not recoup their costs. Participating drug companies work with PDPs to develop drugs and bring them to market, enabling them to share the costs of R&D, while still receiving part of the downstream profits.

PDPs are also cost-effective. Twelve of the products they have developed in the past decade, including Coartem, a malaria treatment for children developed by the Medicines for Malaria Venture (MMV) and Novartis,<sup>3</sup> and MenAfriVac, a vaccine development by the Meningitis Vaccine Project (MVP),<sup>4</sup> cost approximately \$4 billion.<sup>5</sup> Had those products gone through the traditional discovery process, they would likely have cost \$12 billion. This savings is partly due to the fact that PDPs work on a portfolio basis, so only the most promising candidates are accelerated through the process. The cost-sharing mechanism of collaborations with corporations and private partners also contributes to reduced costs.

PDPs help emerging nations cultivate pools of experienced scientists committed to solving the problems of their communities. And they build the capacity of people and institutions in the developing world to take more control of product development in the future.

Traditionally, support for public health in developing countries has been seen as strictly philanthropic, with no possibility for investment returns. Unfortunately, given the funding gap, the current resources are insufficient. It has become necessary to develop and implement financing models that can effectively leverage the available pools of capital to attract private-sector investment. Through a better alignment of incentives, investors across the global health spectrum can be more efficiently engaged and may see greater social and financial returns.

At the same time, there are current barriers in the market that prevent broader engagement from a more diverse group of investors as products move from the research lab bench to the patient's bedside. Because information gaps represent large impediments to capital flows, Lab participants agreed that a deep analysis of the economic and financial landscape is needed, just as investors would assess traditional investments.

## MARKET ANALYSIS

Current expenditures for global health-related R&D are estimated at almost \$700 million per year and could reach over \$1 billion annually in the next five years.<sup>6</sup> This spending comes from governments, donors, foundations, development finance institutions, academia, corporations, pharmaceutical companies, and investors.

Lab participants discussed the challenges of quantifying the global health R&D markets, which can vary depending on whether the challenge is region- or disease-specific, uniquely public or private. For example, the market for an organization that focuses on treatments for dengue fever is different from the market for an SME that delivers health technologies for sub-Saharan Africa. Certain diseases will never have a significant private-sector market because they affect the most marginalized populations in some of the poorest countries. For many neglected

diseases, like trachoma (an infectious disease that causes blindness), treatments and vaccines may never be cost-effective for pharmaceutical companies or the populations that desperately need them.

During the Lab discussions, it was clear that the market’s size and characteristics should be utilized to map which disease areas should focus on traditional funding sources, such as grants, and which may be incorporated into innovative financing mechanisms. As seen in table 1, there are opportunities for the development of a stronger, more robust private market, as well as opportunities for a public market that can be subsidized by donor governments and the philanthropic community.

TABLE 1		<i>Potential markets</i>		
		Commercial market	Borderline market	No Market
		HIV diagnostics	HIV vaccines	Neglected tropical disease diagnostics
		HIV drugs	TB vaccines	Neglected tropical disease drugs
		TB diagnostics	Malaria drugs	Neglected tropical disease vaccines
		TB drugs	Malaria vaccines	
		Malaria diagnostics		

Source: Mary Moran, Policy Cures.

A new drug regimen for TB, for example, could represent an opportunity to deliver products at the cost of \$12 to \$14 to the consumer.<sup>7</sup> Because TB is found in both developing and developed countries, with nearly 9 million new cases reported each year, this could be a significant market for PDPs and their pharmaceutical partners.

Lab participants discussed the latest improvements in pharmaco-economic data and the ability to predict market appetite, and thus help attract new investors to drug development. Given the informational challenges in the industry, there was a suggestion to continue to explore these data sets to better quantify market opportunities.

## OPERATIONAL ANALYSIS

Just as the market encompasses a great deal of variation, so too do the specific operations of each PDP or global health organization. There are systemic issues that participants agreed were in need of further review to reduce barriers to investment.

Information gaps are a challenge for many of the organizations, and thus the investors. Measuring social impact, mapping revenue streams, and predicting costs can be prohibitive for small organizations. But these challenges extend across the entire global health value chain, from R&D to delivery. At each stage, there are challenges in data collection as it pertains to potential investment. What is the cost-benefit analysis for a new ACT (artemisinin-combination therapy) malaria treatment if it can move through the development process in seven years instead of seventeen? What is the net present value of the future revenue from a new TB vaccine, and have the costs to deliver such a vaccine been accurately accounted for? Expanding access to improved data to answer these questions would facilitate the appraisal of new financial products to meet funding needs.

Participants also addressed the challenges specific to the various entities along the value chain (the pharmaceutical firms, research institutions, SMEs, and PDPs). In separating out the different stages in drug development and delivery, one could identify upstream and downstream investment silos. Vaccine delivery could attract one type of investor. But what about funding for the vaccine development itself, which is less attractive to investors and even called the “Valley of Death” because this is the stage that carries the most risk of failure? Does one funding opportunity compete with another? Participants discussed the best way to take a more encompassing approach to funding, such as having funding models support eradication levels, not just specific drug treatments or delivery technologies.

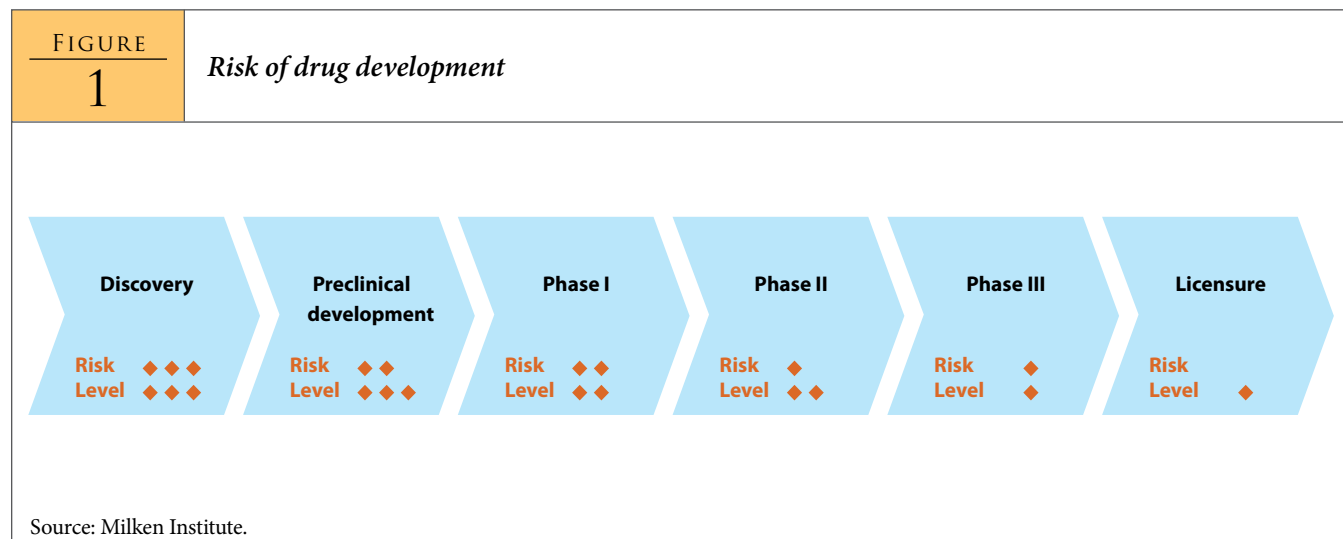
Challenges in organizational capacity exist as well. Given the time, effort, and cost that go into one novel or unique drug, there are only so many new drug treatments or vaccines that can be developed at the same time.

Human capital poses another challenge; many participants concluded that personnel budgets should include allocations of staff that can be responsible for accepting and structuring potential investments. Having someone in-house who can work on innovative finance with donor governments and investors could prove beneficial for resource mobilization teams. Without a conduit between a potential investor and the research organizations, innovation can get lost in translation.

## FINANCIAL ANALYSIS

Because of the variety of entities, and the products and drugs they develop, the financial analysis of potential investments has proved to be a challenge. The due diligence for a potential investor or donor is onerous: information on drug pipelines is technical, data on potential social impact are not standardized and sometimes incomplete, and the risk of potential failure is difficult to calculate based on historical performance.

And yet, certain sector-wide financial characteristics can be mapped to illustrate the financial landscape for potential investors. Lab participants agreed that the most critical component is the modeling of risk and return. Just as new technologies always carry failure risks, so too does global health R&D. The risk of failure may be significant, but it is not completely outside of quantitative analysis. Depending on the stage of drug development, it is possible to design a more specific risk profile that could be used as a variable in a financial analysis (see figure 1).



It is also a challenge to map potential returns, both financial and social. R&D requires large upfront costs, as well as continuous funding, to move a product through the various stages of development and regulatory compliance to market. The clinical trial chain for one vaccine could require \$500 million and involve up to 100,000 volunteers.<sup>8</sup> When a pharmaceutical company or PDP is working in a region with limited infrastructure, this also requires brick-and-mortar development of facilities to support the trials. Luckily, organizations have collaborated to reuse existing infrastructures and create test sites that could be used by similar organizations as both a cost-saving mechanism and source of potential revenue. However, as Lab participant Mary Moran of Policy Cures suggested, if additional cost-sharing mechanisms were put in place, the cost of drug development for a specific treatment could drop from \$1 billion to \$600 million, creating a tremendous opportunity to shift the risk-return profile for potential investments.

An additional barrier is the time horizon facing the product development process. It can take 10 to 15 years to move a product from the early stages to market entry.<sup>9</sup> This makes equity investments a challenge when mapping them against a traditional venture capitalist's benchmarks. The time periods fit more in line with that of debt instruments, such as bonds. But, Lab participants pointed to the challenges of providing the scheduled interest payments required for fixed-income products, as global health organizations rarely have standardized or sustainable revenue streams.

One area of financial analysis in need of more research is the idea of opportunity costs. It may seem intuitive that if a government doesn't invest in the health of its people, it will see significant opportunity costs in the form of lost productivity and GDP growth. However, as capital market investment pours into emerging and frontier countries, it also may be just as intuitive for a private equity fund or institutional investor with exposure in these markets to be concerned about productivity and GDP growth, thus creating opportunity costs for all market participants.

When quantifying the economic ramifications of not investing in global health R&D, economists and global health experts have encountered challenges in measuring and valuing the costs of human productivity, or the loss of it because of disease. The global health industry currently uses DALYs, or disability-adjusted life years, and QALYs, quality-adjusted life years. These measure the impact of disease but have proved insufficient in measuring the entirety of the economic burden and the broader macroeconomic implications. Lost productivity can be factored into loss of GDP, but not into the loss in potential foreign direct investment, because the perceived risk of companies due to an unhealthy workforce is more challenging to measure.

Current analyses suggest that the economic impact of a high incidence of malaria could be a 1.3 percent loss in GDP a year.<sup>10</sup> The economic impact of tuberculosis deaths on sub-Saharan Africa is estimated at \$519 billion over the period of 2006–2015.<sup>11</sup> To date, this information has been used to provide an incentive for governments to think of global health R&D as an urgent need. It has made the narrative more concrete for potential funders and donors as well. But more research needs to be undertaken to incorporate this data into finance models.

The risk-return profile of potential investments in R&D, as well as the time horizons and current and potential costs, underscore the financial challenges facing the global health community. However, just as investors were willing to take on the risk in renewable energy and new technologies markets, there are investors who are willing to shoulder this load. The trick, Lab participants suggested, is to map each investor class back to potential products and companies.

## INVESTOR ANALYSIS

Traditionally, global health R&D has been funded by donor governments and philanthropy, such as the United States, the Netherlands, and the United Kingdom, as well as the Bill & Melinda Gates Foundation and the Wellcome Trust, among others. Donors from Asia, India, and Australia have also become important drivers of R&D support. This funding is usually in the form of one-time or multi-year grants, and is often limited in scope and size; unrestricted funding is increasingly rare. These grants are vital to the survival of PDPs and other not-for-profit organizations, but they can be labor-intensive to secure and narrow in the activities they support. Because they are aid-based, donors' risk tolerance is high and their investment time horizons can be longer. Lab participants stressed the need for longer-term funding and less-restrictive grants from the philanthropic and public sectors. This is especially helpful for diseases outside the scope of any private-sector engagement opportunities, as is the case of neglected tropical diseases.

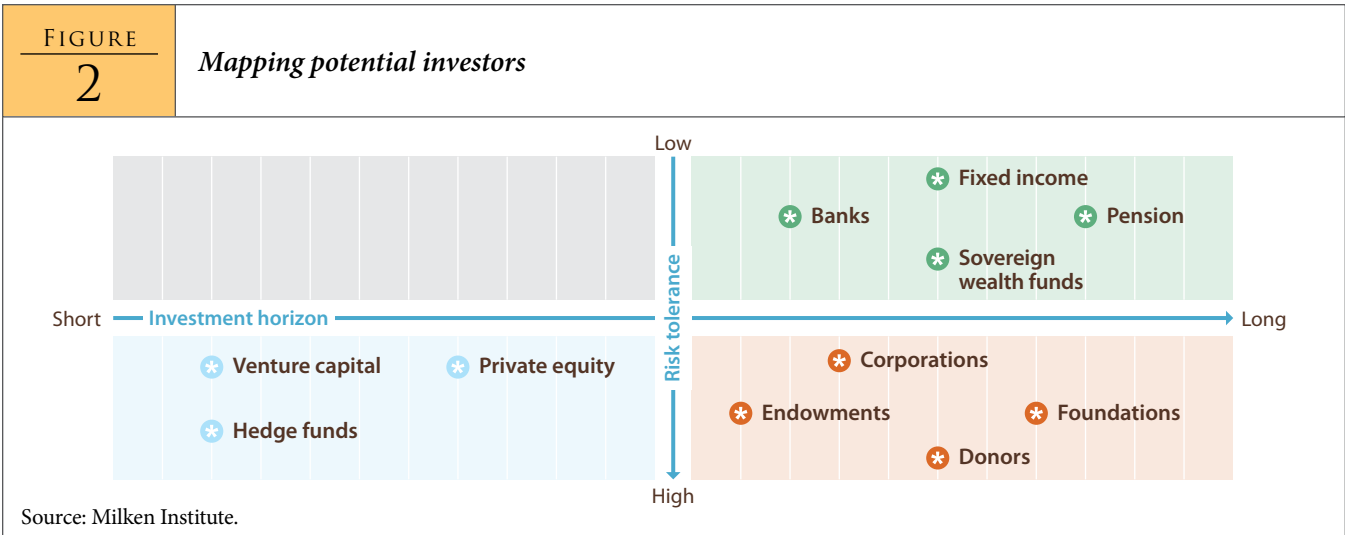
Although equity investors have yet to become truly engaged in global health R&D, there are additional funding sources accessible to companies and organizations like SMEs that complement the work of PDPs and other entities. To facilitate more of this investment, development finance organizations, such as the Overseas Private Investment Corporation (OPIC) and the World Bank's International Finance Corporation (IFC), offer debt-financing and equity investments that could support for-profit companies in the global health sector.

Corporations have also entered the global health sector as partners, both in cost-sharing and in direct funding. Pharmaceutical companies are strong partners of PDPs, providing in-kind services and capital allocations to support the drug pipeline. Their support is often in exchange for downstream profits, specifically the intellectual property rights to deliver the drugs to the market.

Additionally, non-pharmaceutical corporations, such as DeBeers, Heineken and ExxonMobil, that have a geographic interest in the countries affected by disease, have become strong allies and longstanding financial supporters of global health. While not as likely to take on high-risk investments as are charitable organizations, these companies are still more philanthropic than more mainstream investors, through the use of their corporate social responsibility budgets. Anglo American, a leader in the extractive industry, partnered with Aeras, a PDP developing TB vaccines, to sponsor trials using their sites as the location and facility. Many Lab participants agreed that similar efforts should be replicated and expanded.

Lab participants agreed that additional incentive mechanisms to facilitate collaborations with pharmaceutical companies, especially in terms of IP rights, and more effective partnerships with corporations that include direct funding and cost-sharing efforts, would significantly help to expand the overall funding stream.

There have also been recent opportunities to engage more mainstream financial institutions and investors. Increasingly, investors are looking for financial products that offer a double bottom line: both financial and social returns. This concept of impact investing has gained momentum over the past decade, with large financial institutions, banks, investors, and philanthropists working to develop models to expand into new markets. As noted earlier, financial institutions and asset managers are significantly more risk-averse and have shorter time horizons than foundations and donors (see figure 2).



Further, venture capital and private equity firms, which tend to have the shortest investing time horizons, averaging five to seven years, are also more willing to take on additional risk if the rewards are significant. And, similarly, hedge funds invest in riskier companies if the investment can be justified by the compensation. Lab participants agreed that while a portfolio approach to investing in global health companies could diversify some of the greatest risk, it would likely be unable to provide the return threshold needed to attract some of the big players. As more impact investing products are developed, this may change.

Participants also discussed the potential to engage fixed-income investors through structured finance products. To reach institutional investors, such as pension funds, that have a fiduciary duty to absorb minimal risk, but over a longer time horizon, participants suggested different financial models that could provide the needed risk-return profile for investment officers responsible for large pools of capital. And again, given the longer term of fixed-income products, debt investors were also cited as potential targets for funding. As Glenn Yago, senior director at the Milken Institute, suggested, “In the current low-interest-rate, stagnant economic climate, now is the time to test financial innovations in the global health space. With 10-year Treasuries yields around 1.6 percent, a 4 percent return no longer seems massively concessionary.”



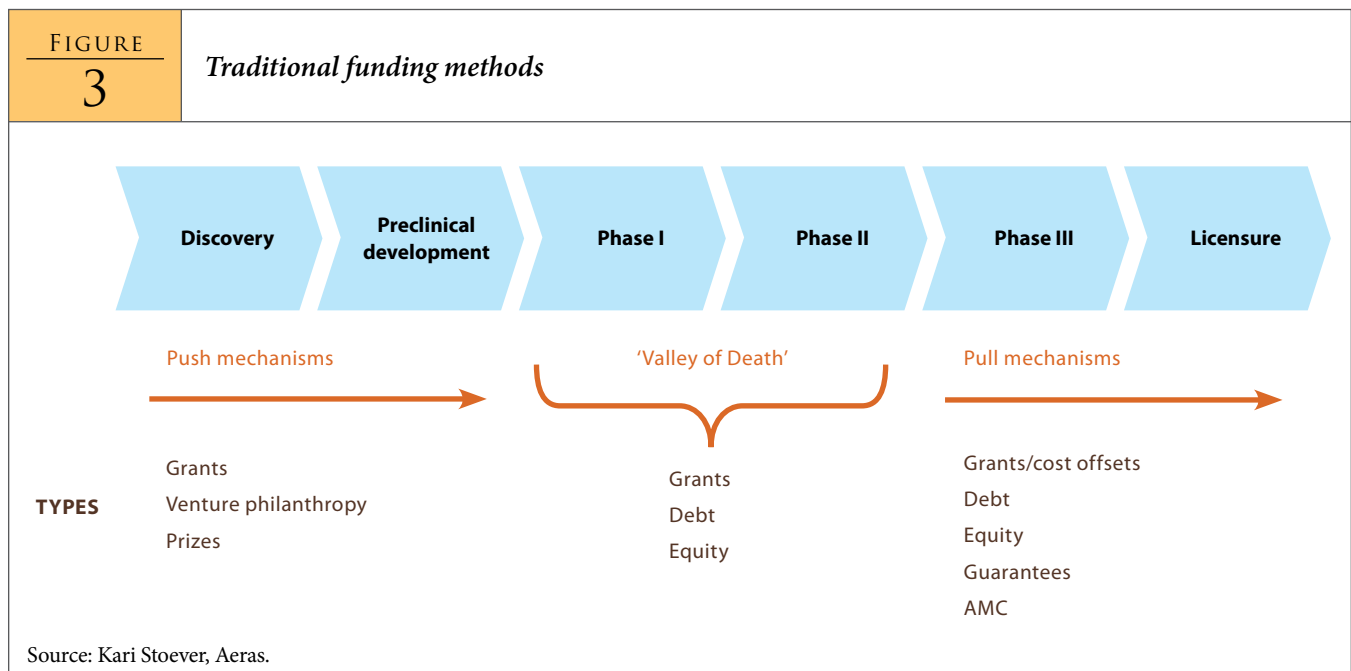
## Financial Solutions

In recent years, governments and foundations have explored innovative mechanisms to utilize their funding as a lever to tap into the capital markets. Lab participants reviewed the most successful of these models to understand how to increase adoption of next-generation financing and improve upon its structure and design to attract more private investment.

### MAPPING FINANCIAL MECHANISMS

As shown in figure 3, traditional funding mechanisms were designed to “push” new drug discovery through the development pipeline. Grants constitute the largest portion of this pool. More recently, there has also been the adoption of prize mechanisms, which reward substantial progress toward the solution of a scientific challenge.

Philanthropic individuals, institutions, and foundations have also seen success in delivering their aid with “pull” mechanisms, models through which funds for later-stage development pull the drugs into the market by securing demand. For example, the advance market commitment was a partnership between the GAVI Alliance (a public-private partnership that delivers vaccines), donors, and vaccine producers to offset the cost of vaccines in developing-country markets. The philanthropic funding was used as a price subsidy, lowering the cost to make it viable for the countries but providing pharmaceutical companies the needed revenue to recover their costs.



Lab participants agreed that the spectrum of products should include more debt and equity products to appeal to the entire range of potential investors. They reviewed current models used by donors and philanthropy to incentivize capital market investment, and looked at new financing models undergoing implementation in a variety of sectors that may have applications in the global health sector.



Lab participants agreed that a suite of options would best ensure a more sustainable and diversified funding channel. In mapping the options and understanding the potential stakeholders, participants agreed that greater due diligence is needed to market these products to a wider audience of investors.

## SOLUTION

### 1

#### Develop More-Efficient Donor Mechanisms

Lab participants discussed the most successful donor-focused mechanisms to attract private-sector investment. There has been success in using each model as either a financial incentive or a conduit through which aid flows can be timed to better match drug development.

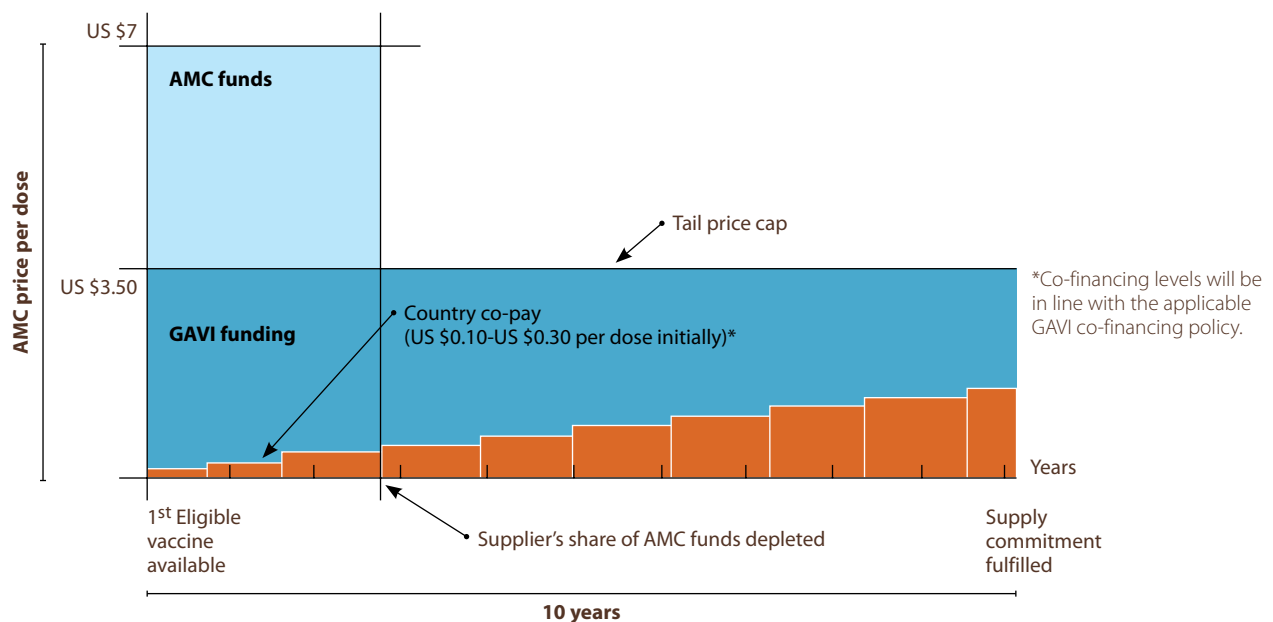
### The Advance Market Commitment

The AMC proved extremely successful in incentivizing pharmaceutical corporations to produce vaccines designed for low-income markets throughout the developing world. Through collaboration between the GAVI Alliance, donors like the Gates Foundation, and pharmaceutical companies like Pfizer Inc., the AMC lowered the cost of the vaccines. As seen in figure 4, in the case of the pneumococcal virus, the vaccine price went from \$7.00 to \$3.50 per dose. The pharmaceutical companies agreed to produce 200 million vaccines sold on a tiered price basis over the course of 10 years.<sup>12</sup> It is estimated that through the AMC, the GAVI Alliance will help save 7 million lives by 2030.<sup>13</sup>

FIGURE

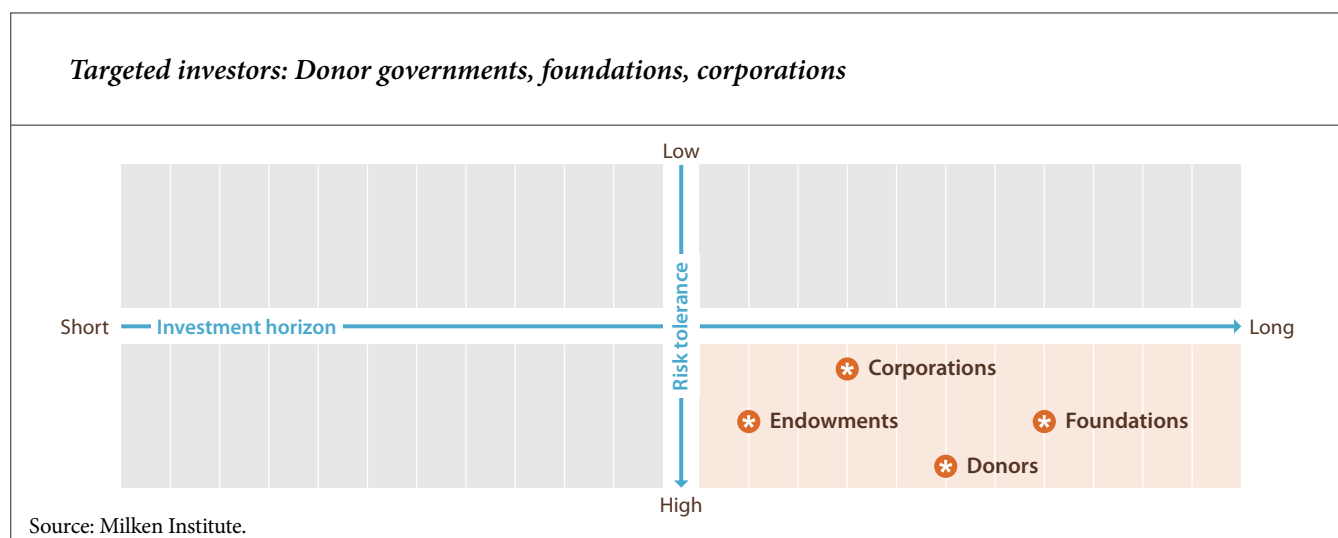
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Advance market commitment



Source: GAVI Alliance.

The AMC undertook significant due diligence and preparatory work between pharmaceutical companies, donors, developing governments, and GAVI to design the right partnership, the right vaccine, and the right price. These transaction costs have proved a deterrent to a new AMC. But, Lab participants agreed that the leverage factor of the philanthropic funding and the ability to achieve measurable impacts make it an ideal candidate for further adoption. Some participants suggested that the next generation of AMCs should be on an eradication level, not just a vaccine level. As noted earlier, this would allow for more of a portfolio approach to the products covered by the AMC, the higher-risk vaccines or treatments being counterbalanced by the lower-risk products further down the pipeline.

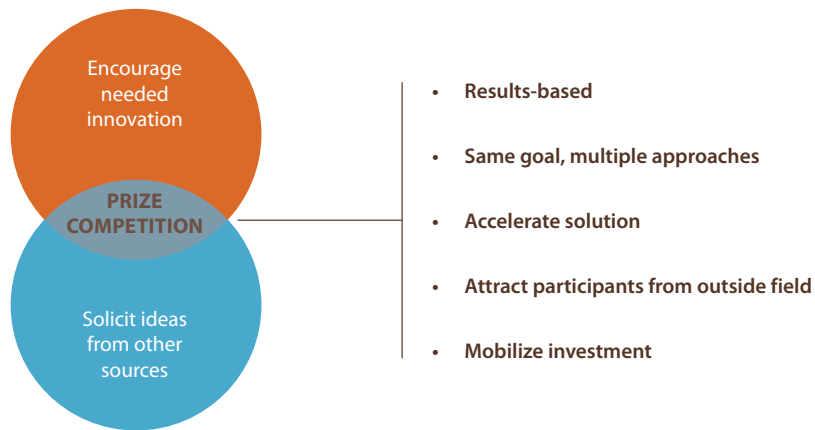


## Prizes and Innovation Challenges

Another effective donor-based funding mechanism has been the awarding of prizes. To push innovation, a competition is created, with benchmarks established for success, and then opened to the scientific field to generate the ideas that would otherwise not receive sufficient funding to move into early-stage development. As figure 5 shows, the prize competition is designed to accelerate the creativity process and mobilize investment, and as both the catalyst and the stamp of approval to attract potential investors. The X Prize Foundation, founded in 1995, has a series of awards for challenges in space travel, energy, and life sciences. Sponsors have collaborated with Qualcomm, Nokia, and other corporations to generate millions of dollars in investment for projects that would otherwise not have received funding.<sup>14</sup>

FIGURE  
5

*Prize competition structure*

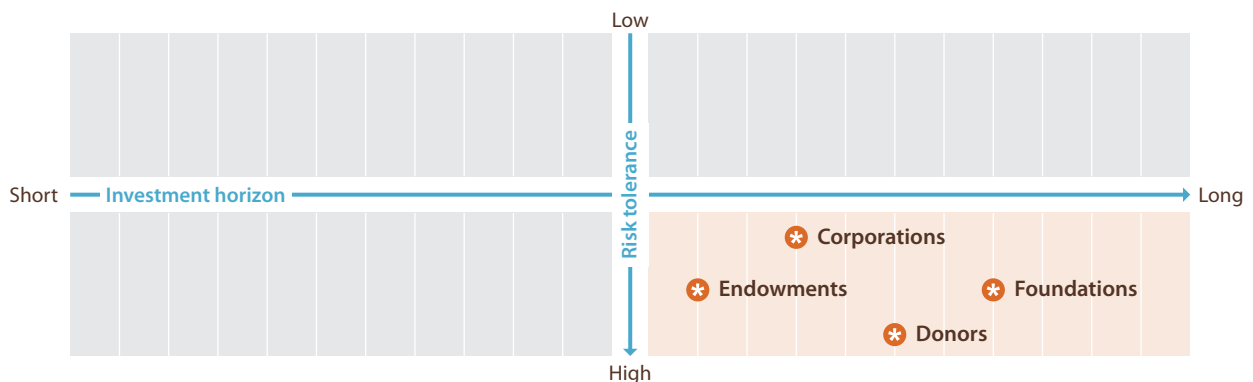


Source: Stewart Paperin, Open Society Foundation.

In 2003, the Gates Foundation launched the Grand Challenges in Global Health Initiative to enable innovators to address specific challenges, create new industry partnerships, and demonstrate a measurable impact.<sup>15</sup> The Grand Challenges platform has spread to other countries, including Canada, where the government recently established its own Grand Challenges platform to test, integrate, and align innovation with funding. Winners will receive \$100,000 grants, with an option to receive an additional \$1 million in growth capital, if the winning technology proves effective.<sup>16</sup>

Participants agreed that prize and challenge competitions are important components to the funding continuum and should be expanded. Scaling up successful models is an important action item in promoting wider adoption of innovative financing, and thus far, prize competitions have proven extremely valuable. Smaller amounts of funding may generate long-term investment that could supplant future donor aid.

*Targeted investors: Donor governments, foundations, corporations*



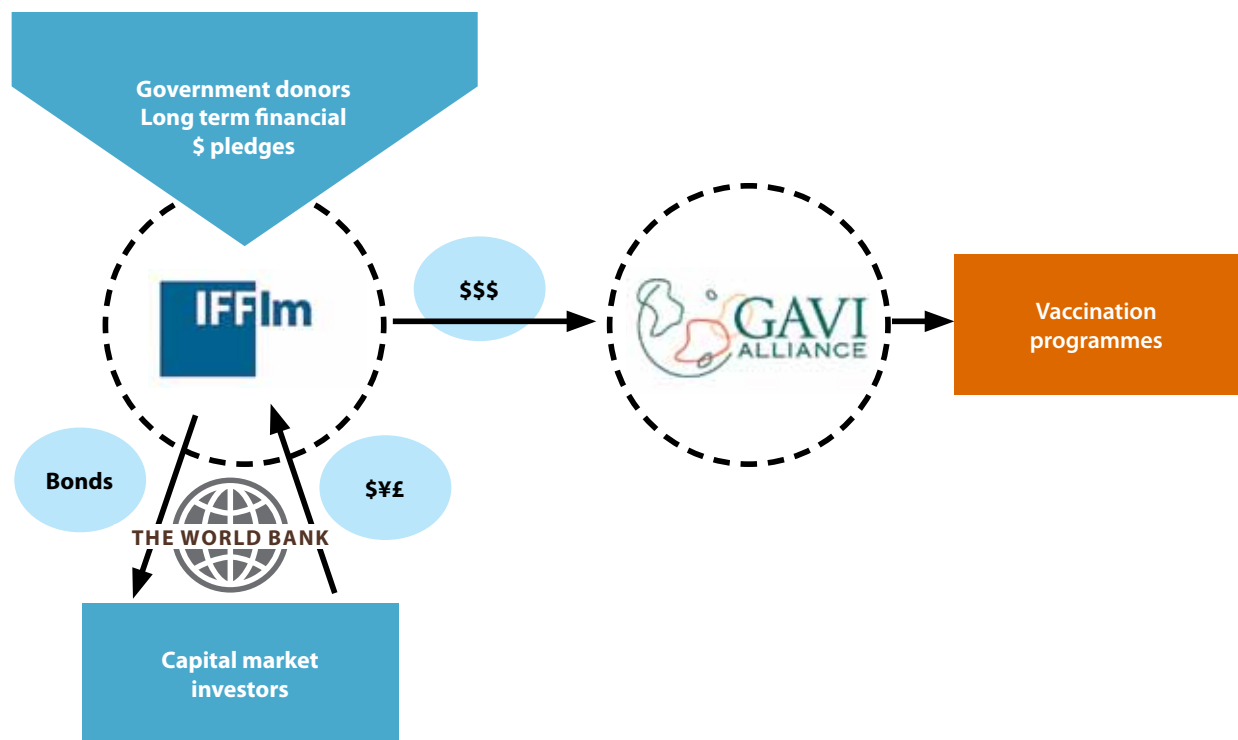
Source: Milken Institute.

## International Finance Facility for Immunization (IFFIm)

The GAVI Alliance, a pioneer in the field of innovative finance for global health, has also been the driving force behind the International Finance Facility for Immunization, which front-loads pledged donor funding into a pool of assets that backs a bond offering to the capital markets (see figure 6). Managed by the World Bank, IFFIm provides much-needed liquidity for vaccination programs. The four rounds of AAA/Aaa/AA+ rated bonds have raised over \$3.6 billion in funds since 2006, offering a 6:1 leverage of donor funds.<sup>16</sup>

FIGURE

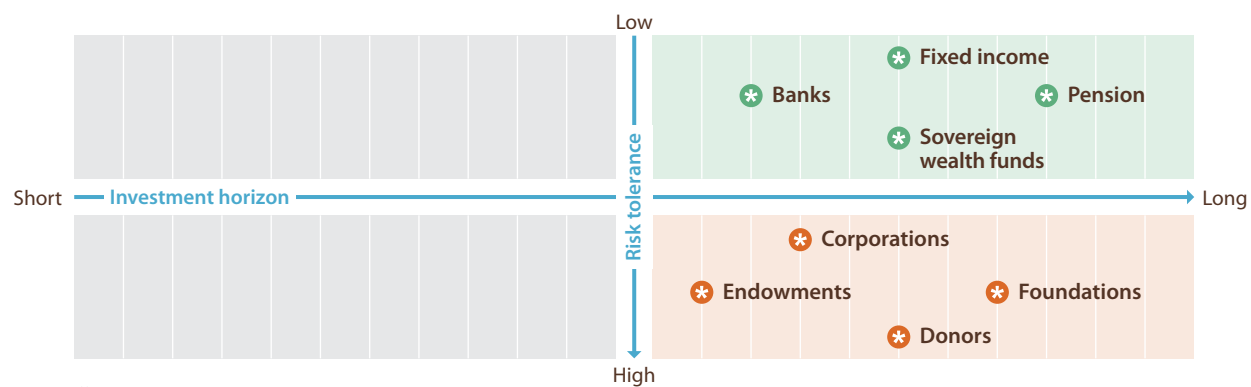
6

*International Finance Facility for Immunization*

Source: GAVI Alliance.

When IFFIm was introduced, there were funders interested in structuring a similar mechanism specifically for earlier-stage work, encompassing more of the R&D value chain. Unfortunately, donor fatigue ensued because of the labor-intensive negotiations of the first IFFIm and the changing appetite for a variety of disease- and geographic-specific factors for grant-making. Lab participants agreed that a new version of IFFIm, geared toward R&D or on an eradication level, would be useful to complement other funding sources. But given the current economic climate, large upfront pledges by governments seem unlikely at this time. Participants agreed that the idea could be developed now and implemented when government budgets return to pre-crisis levels.

*Targeted investors: Donor governments, foundations, corporate investors, institutional investors*



Source: Milken Institute.

## RECOMMENDATIONS FOR SOLUTION 1

- Begin due diligence for the creation of an AMC on an eradication level
- Expand the use of prizes to spur innovation in global health R&D
- Begin due diligence for the creation of an IFFIm model specifically for R&D

SOLUTION  
2

*Implement Blended-Capital Mechanisms*

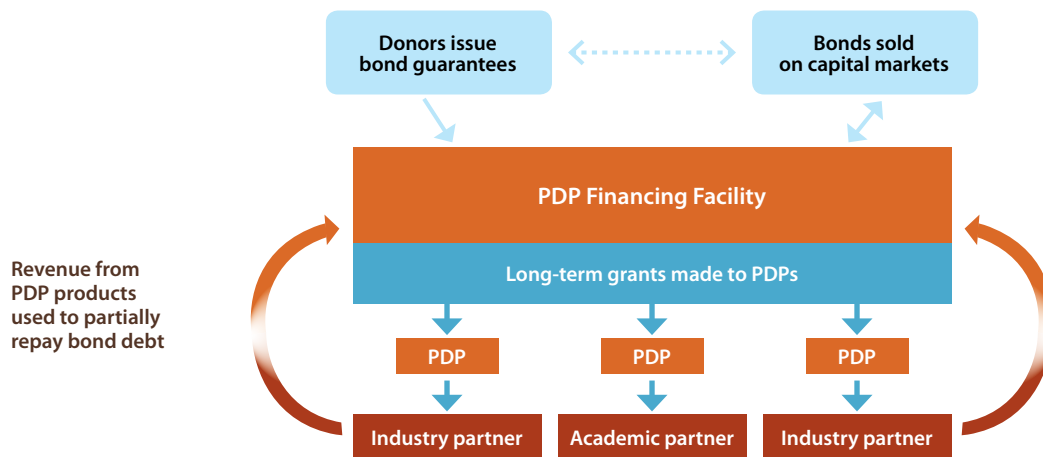
### PDP Financing Facility

One way to get around some of the IFFIm challenges in targeting funding at various points along the global health value chain is to create a pooled finance facility that could be used by various PDPs across disease areas and product expertise. Several models have been suggested, and Lab participants agreed that a pooled facility has merit, depending on the incentive structure for the various donors and PDPs.

As seen in figure 7, the revolving structure of one of the proposed models would provide grants on a long-term basis to PDPs, with future revenues used to back a bond offering that would secure a competitive rating because of a reserve fund of donor guarantees. The variation involves recycling the revenues from the drug treatments, vaccines, or delivery technologies into the facility to repay the bondholders.

FIGURE  
7

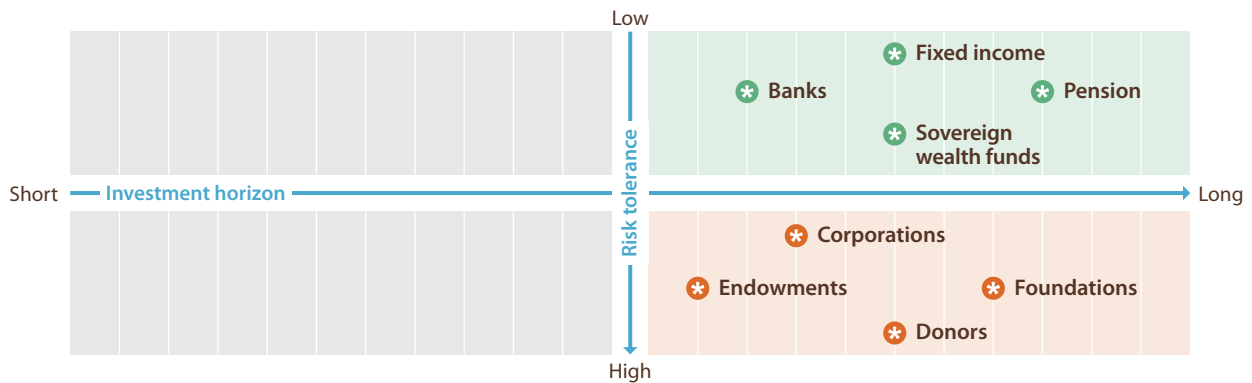
*PDP Financing Facility*



Source: "Financing the Accelerated Development of Vaccines for AIDS, TB and Malaria: Design of the PDP Financing Facility and an Analysis of Its Feasibility," February 2009.

Unlike the AMC and IFFIm, a pooling mechanism, such as the PDP Financing Facility, has yet to be implemented. During the Lab, it was suggested that greater study of feasibility should be undertaken. Because blended-capital mechanisms are increasingly championed by stakeholders like the Gates Foundation and financial institutions like the European Investment Bank, it is clear that these models should be considered.

*Targeted investors: Donor governments, foundations, corporate investors, institutional investors*



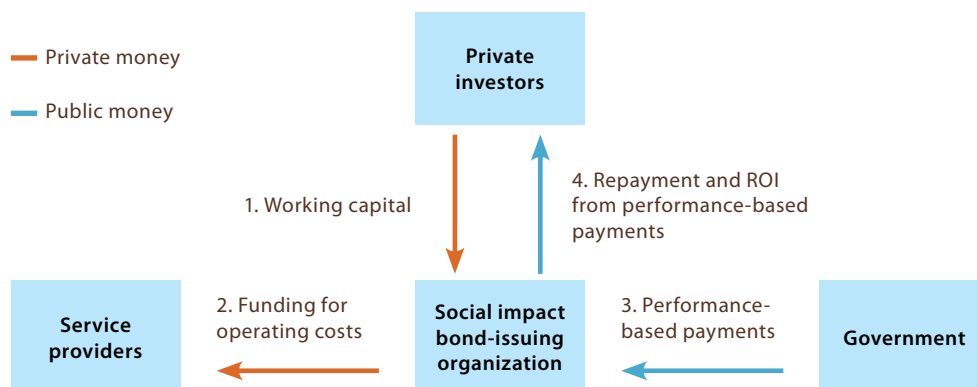
Source: Milken Institute.

### Pay-for-Performance Models

The social impact bond (SIB) is one blended-capital model that has had success in the United Kingdom and is beginning to see implementation in the United States. The SIB was created to prevent recidivism: based on the cost to incarcerate a prisoner at the Peterborough prison in Cambridgeshire, England, the UK government created a contract with a financial intermediary to sell bond-like instruments to investors, the capital from which would provide liquidity to social services organizations that work to prevent offender reincarceration.<sup>17</sup> The repayment comes from government funding upon meeting performance benchmarks, based on the amount of savings the government receives. Any success above the targeted benchmark earns investors additional return on their investment. As seen in figure 8, each stakeholder has financial exposure and thus, skin in the game, spreading the risk to make the funding stream attractive to all.

FIGURE 8

*Structure of a social impact bond*

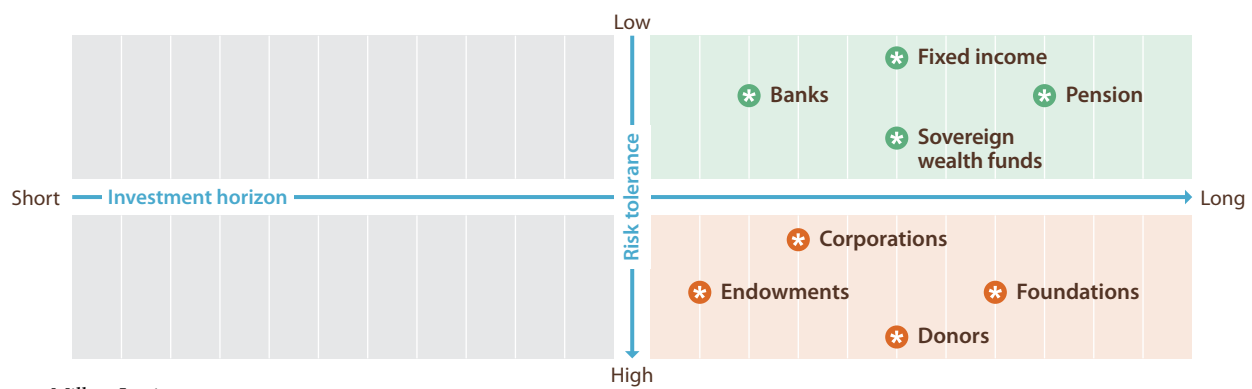


Source: The Monitor Group.

Lab participants discussed the applicability of the SIB model to the global health R&D space. The biggest challenge would be the metrics around performance targets. Government cost savings are not as directly linked to the activities of PDPs and other global health organizations. However, a similar performance-based mechanism exists in the form of a buy-down of sovereign debt. In this model, once a country meets specific performance goals in terms of delivery of vaccines, the International Development Association, part of the World Bank, buys down the debt (lowers the interest rate of the repayment) of the country in question.

As pay-for-performance models expand into additional sectors and demonstrate success, there could be greater opportunities to test the model for global health R&D. For now, participants agreed that using an unproven financial product to fund unproven scientific products would be difficult. With the addition of philanthropic guarantees, however, the models could become more practical and attractive to investors, and therefore participants agreed they were worth further study.

*Targeted investors: Donor governments, foundations, corporate investors, institutional investors*



Source: Milken Institute.

## RECOMMENDATIONS FOR SOLUTION 2

- Conduct additional research on the feasibility of PDP financing facilities
- Identify potential sector-specific applications of the SIB or other pay-for-performance models



SOLUTION  
3

*Implement Capital Market-Based Models*

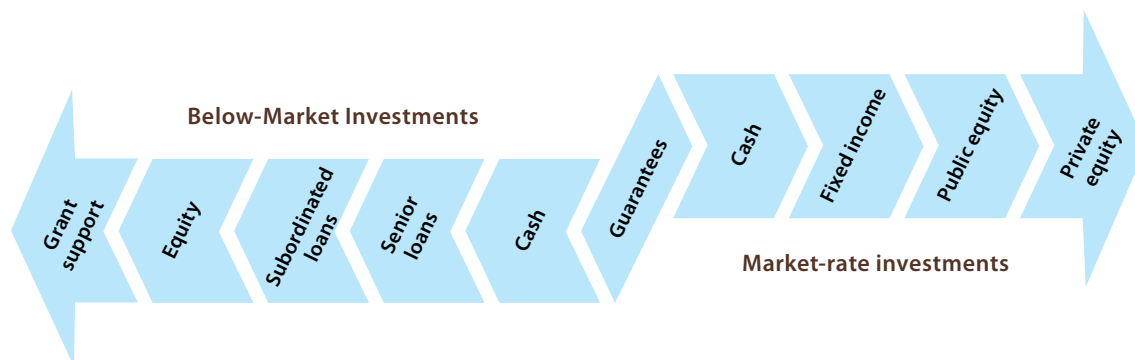
Donor-based funding models and blended-capital mechanisms offer a variety of tools to use aid more efficiently. Lab participants also discussed other capital market-focused mechanisms to engage new investors to support the research and development of products for which there is a visible market.

The past decade has seen a rise in financial products that serve to provide both financial and social returns. These double bottom line investments are part of a new brand of socially responsible activities called impact investing. Major financial institutions, in collaboration with governments and foundations, have begun to structure mechanisms that can give either concessionary returns, as part of a philanthropic portfolio, or market rates of return for more traditional investors (see figure 9). Over the next 10 years, the market for impact investing is estimated at \$500 billion.<sup>18</sup>

These products vary from equity funds to structured finance debt instruments, and could be used by institutional investors, asset managers, and other investors. They may offer only market-rate returns and not the high payoffs investors are used to, but they still may play an integral part in a balanced portfolio. Pension funds, like the California Public Employees' Retirement System (CalPERS), make targeted investments in economically distressed areas. CalPERS, for example, created a "California Initiative" to spur job creation and community development, with \$460 million in allocations with return on investment targets between 15 percent and 20 percent.<sup>19</sup> Given the pools of capital managed by large international funds, such as sovereign wealth funds, Lab participants agreed that additional capital market-based innovative financing models are needed to match investor appetite.

FIGURE  
9

*Spectrum of impact investments*



Source: The Global Impact Investing Network (GIIN).

## Equity Models

Some equity funds have been structured to lessen the risk to investors and still achieve modest returns through the blending of capital market investments and philanthropic or government guarantees. Lab participants reviewed existing models to see how they may need to be altered to increase adoption in the future.

JP Morgan recently established the Global Health Investment Fund in collaboration with the Gates Foundation to invest in late-stage drug development. Working with PDPs, the pipeline of global health products would include a variety of treatments and vaccines across disease areas, using a portfolio approach to mitigate failure risk.

The fund's structure was built around a 60 percent guarantee from the Gates Foundation and other donors, with the foundation taking a first-loss position to secure additional investment from private investors and high-net-worth individuals, family offices, and endowments as limited partners, much like a traditional private equity fund. With a seed investment from Grand Challenges Canada, the \$100 million fund is scheduled to reach financial close by year-end 2012 and is expected to have an ROI of 4-6 percent, with a payback horizon of five years.

Because the fund is in its nascent stages, Lab participants were unable to assess the real impact the small amount of funding would have on the PDP pipeline, especially given the amount of capital needed to move drugs through development. Additionally, because the products chosen would be later-stage, participants agreed that this model would need to be complemented by other financial products to support the entire R&D pipeline.

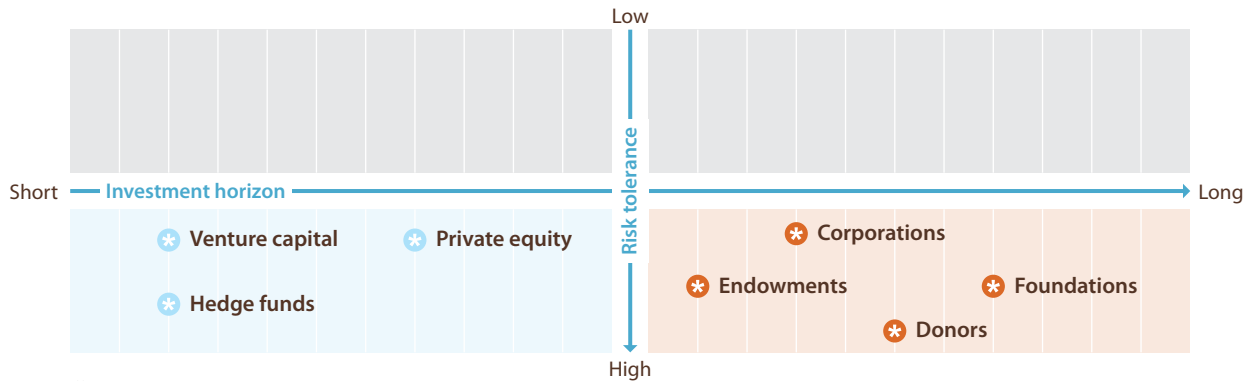


*Participant Christopher Egerton-Warburton of Lion's Head Global Partners describes the Global Health Investment Fund, an innovative new financial product from JP Morgan Chase.*

However, participants were extremely optimistic about the fund as a case study for using philanthropic guarantees more effectively. Despite the fund's relatively small size, it could be a useful first step in the creation of subsequent funds of much larger size and transaction volume.

Similar models have been established, for example, in Israel, with the government taking the first-loss position, attracting investment from venture capital firms to provide additional funding for the country's biotechnology sector. As these models begin to invest and returns are realized, there will be greater opportunity to replicate success and learn from mistakes to create new funds.

*Targeted investors: Donor governments, foundations, corporate investors, venture capital, private equity, hedge funds*



Source: Milken Institute.

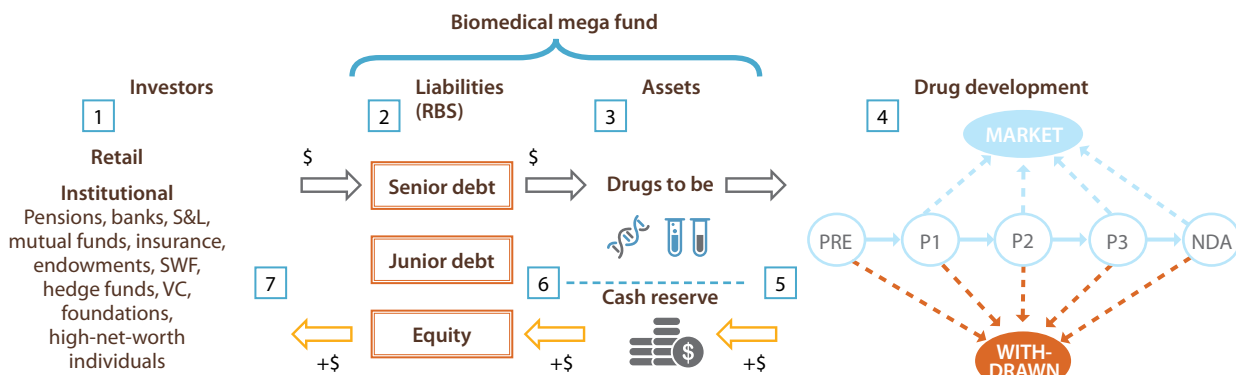
### Debt Models

Part of the challenge of using equity models is the time horizon usually associated with those types of investments. Mapping financial mechanisms back to potential investors, the risk-return and time horizons of debt instruments match more specifically to some of the larger pools of capital, including pension funds and other institutional investors.

One proposed fixed-income model is a structured-finance product designed by a team at MIT led by Andrew Lo, Roger Stein, and Jose-Maria Fernandez. The model would be based on a portfolio of products, such as drug treatments, vaccines, and delivery technologies. This portfolio would be the underlying asset for a security as part of a research-backed debt obligation (RBO). The RBO, a structured finance product, would include different tranches of debt and potentially have an equity tranche to match the return profile of a more versatile selection of investors. With the addition of investment-loss guarantees or reserve funds from foundations and donors, the modeling of the fund suggests that the portfolio approach would be able to diversify away much of the traditional risk (see figure 10).

FIGURE 10

*Research-backed debt obligation*

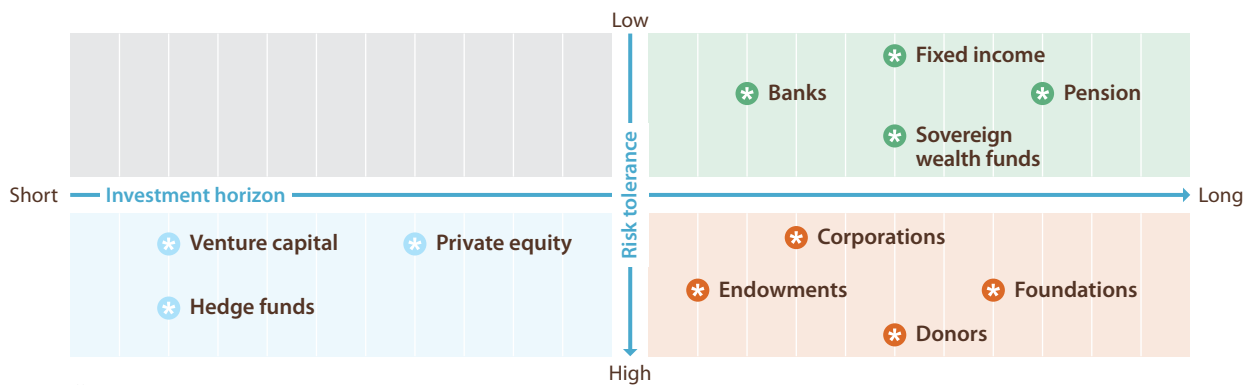


Source: Andrew Lo, Roger Stein, and Jose-Maria Fernandez, MIT.

Similar to other securitized products, the biomedical mega-fund could be rated and attract the entire spectrum of investors in the capital markets. And while Lab participants acknowledged a general hesitation toward securitized products after the 2008 economic crisis, collateralized debt obligations, and derivative products still trade and provide much-needed liquidity over a longer time horizon, which is extremely attractive to global health organizations.

Participants debated the feasibility of this model for global health R&D. Throughout the Lab’s discussions, there was a question as to the size of the product pipeline across PDPs and whether the pipeline would be large enough to deliver enough diversification for a financial portfolio. Further research is required to assess whether the current product volume is substantial enough for the RBO model to be applicable to the global health market. Combining, within a single portfolio, drugs and vaccines for TB and malaria with products for a more diverse list of diseases like heart disease or cancer may help to overcome the challenges of the size limitations of the global health portfolio.

*Targeted investors: Donor governments, foundations, corporate investors, institutional investors, venture capital, private equity, hedge funds*



Source: Milken Institute.

### RECOMMENDATIONS FOR SOLUTION 3

- Utilize current equity fund models as case studies for future models that can increase in scope and size
- Map potential drug products and technologies that can be used within a structured finance product and conduct financial analysis on this portfolio

## SOLUTION

## 4

*Explore New Private Sector Models*

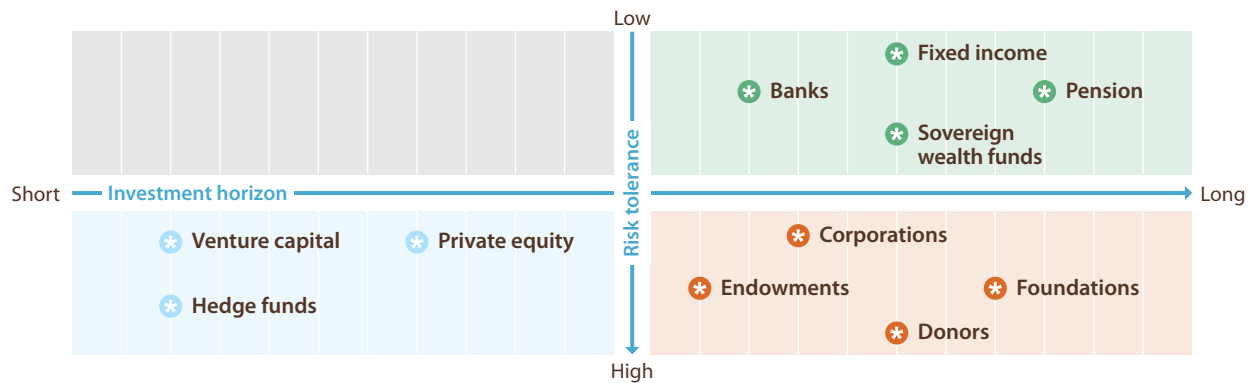
Other solutions based in the capital markets have been proposed over the past few years to support global health R&D. Most of these models involve transferring capital from traditional financial market transactions into funds that would support global health.

These could include:

- **Fund-of-fund fee models:** Various PDPs have explored the option of transferring a small portion of transaction fees from hedge funds or a fund of funds to a pool to finance the drug pipeline.
- **Exchange-traded funds (ETFs):** The Global Fund to Fight AIDS, Tuberculosis and Malaria, in coordination with Deutsche Bank, created an ETF that tracks an index created in partnership with Dow Jones, which lists companies that support global health and then makes investments with this index as the benchmark. Again, some of the fees collected on the transactions are pooled and directed toward the Global Fund.
- **GDP-linked securities:** Adapted from a model introduced by Robert Shiller, multilateral banks could issue bonds, with the coupon linked to the increases in GDP that result from improvements in human capital and labor productivity because of new and improved drugs and vaccines.<sup>20</sup>
- **Impact-focused compensation incentives:** Certain private equity funds link general partner compensation bonuses and “carries,” the additional financial incentives linked to fund performance benchmarks, to the social and environmental impact of the fund. UBS and Aureos Capital’s Africa Health Fund are two examples.<sup>21</sup>

Participants agreed that much more work was needed in this area to complement current models. UNITAID, an international drug purchaser facility, has successfully rechanneled funds with a small airline surcharge, and if this model can be successful for asset management models as well, there could be opportunities to engage new investors without having to compromise ROI and without the “middleman” of a financial intermediary, as there is in some impact investing products.

*Targeted investors: Donor governments, foundations, corporate investors, institutional investors, venture capital, private equity, hedge funds*



Source: Milken Institute.

## RECOMMENDATIONS FOR SOLUTION 4

- Conduct a survey of investors to determine appetite for various financial products (ex. transaction fee models, ETFs)
- Explore funding models that have seen success in other sectors for potential replication (ex. compensation models and others)

SOLUTION  
5

*Create Innovative Partnerships*

Directly engaging the capital markets is only one of the avenues to expanding the innovative finance tool chest. PDPs have already been highly successful in creating valuable partnerships with the pharmaceutical industry and other corporate partners, but more can be done to structure public-private collaborations.

Lab participants discussed the ability of government institutions to incentivize these partnerships. For example, the Overseas Private Investment Corporation (OPIC), the U.S. development finance institution, offers long-term debt financing, both through direct loans and guarantees, and supports the creation of externally managed private equity funds to make direct investments.



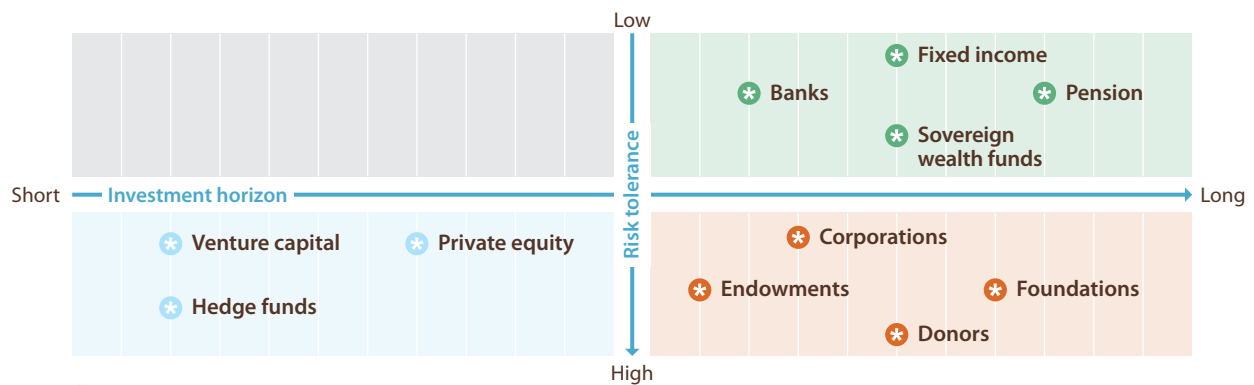
*Lab participants discuss the most efficient uses of capital to support treatments for neglected diseases. (Pictured are David Ferreira of GAVI; Amie Batson of USAID; and Tara Hayward of Sabin Vaccine Institute.)*

OPIC financial products are successful in catalyzing additional investment in developing countries, which makes them interesting in terms of replication by other development finance institutions to support global health-related activities. The OPIC model is simple but impressive in its leverage capabilities. Because of its strong investment criteria and extensive due diligence, it has a track record of success that perpetuates the strength of its products.

Lab participants discussed how these models could be replicated to provide direct support to segments of the market and serve as potential revenue offshoots for the PDPs. For example, many PDPs have an extensive infrastructure network in developing countries where they run clinical trials. These facilities could be reused by new technology companies needing research or production space, generating revenue or cost-saving flows back to the PDPs. And these companies could be supported by OPIC guarantees or investment from the World Bank's International Finance Corporation (IFC).

Another potential collaboration and revenue stream could stem from expanded flexibility in IP rights between PDPs and pharmaceutical partners. IP agreements could provide PDPs and other research organizations with additional capital once the drugs are brought to market, which also opens up more opportunities to use these as assets for structured financial products.

*Targeted investors: Donor governments, foundations, corporate investors, institutional investors, venture capital, private equity, hedge funds*



Source: Milken Institute.

## RECOMMENDATIONS FOR SOLUTION 5

- Conduct additional research on how to best utilize guarantees and investment from development finance institutions to support the global health value chain
- Map previously unidentified revenue streams for PDPs (expanded use of infrastructure and service delivery for SMEs and other related companies and organizations)
- Explore new collaborations with corporate partners, including expanded IP rights



Groundbreaking R&D partnerships  
have the potential to eradicate  
diseases of poverty.

## Conclusion

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In an economic climate of austerity and risk-aversion by governments, investors, and corporations, traditional funding for global health R&D has been spread thin, threatening global economic growth. To meet disease eradication goals, to meet the current needs of the product development pipeline, and to meet the basic health needs of the global population, additional innovative financing must be created and implemented to ensure that efficient and effective capital is accessible to health organizations for decades to come.

Technological innovation, as part of the ever-growing trend of globalization, can turn today's diseases into tomorrow's memories. It can put in place health delivery mechanisms for even the most remote villages. And it can strengthen the ties that promote collaboration and partnerships to facilitate improvements to global health and development.

What will bring these innovations toward implementation is a renewed spirit of creativity that promotes innovative models for collaboration that carve out smarter channels of capital to spur real change.

## APPENDIX

*Financial Innovations Lab Participants**Affiliations at the time of the Financial Innovations Lab***Labeeb Abboud**

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**Mary Moran**

*Director  
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**Tracy Palandjian**

*CEO and Co-Founder  
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**Peter Potter-Lesage**

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## ENDNOTES

1. Grace, Cheri, "Product Development Partnerships (PDPs): Lessons from PDPs Established to Develop New Health Technologies for Neglected Diseases," London: June 2010.
2. World Health Organization. World Malaria report 2010. Geneva: WHO; 2010.
3. See [www.mmv.org/achievements-challenges/achievements/coartem-d](http://www.mmv.org/achievements-challenges/achievements/coartem-d). Accessed August 14, 2012.
4. See [www.meningvax.org/developing-conjugate-vaccine.php](http://www.meningvax.org/developing-conjugate-vaccine.php). Accessed August 14, 2012.
5. Presentation by Sarah Ewart, Bill & Melinda Gates Foundation.
6. RAP analysis, interviews with SPTs/BMGF functional teams; strategy documents; team analysis
7. Laxminarayan, Ramanan, Eili Klein, Christopher Dye, Katherine Floyd, Sarah Darley, and Olusoji Adeyi (2007) "Economic Benefit of Tuberculosis Control," World Bank Policy Research Working Paper No. 4295, World Bank, Washington, D.C.
8. "Clinical Trials: Steps in Malaria Vaccine Development," PATH Malaria Vaccine Initiative, <http://www.malariavaccine.org/rd-clinical-trials.php#phase2>. Accessed August 12, 2012.
9. Ibid.
10. Roll Back Malaria Partnership. Economic costs of malaria [Internet]. Geneva: World Health Organization; [cited 2012 August 9, 2012]. Available from: [http://rbm.who.int/cmcc\\_upload/0/000/015/363/RBMInfosheet\\_10.pdf](http://rbm.who.int/cmcc_upload/0/000/015/363/RBMInfosheet_10.pdf).
11. Laxminarayan, Ramanan, Eili Klein, Christopher Dye, Katherine Floyd, Sarah Darley, and Olusoji Adeyi (2007) "Economic Benefit of Tuberculosis Control," World Bank Policy Research Working Paper No. 4295, World Bank, Washington, D.C.
12. "Creating Markets to Save Lives," The GAVI Alliance, <http://www.gavialliance.org/funding/pneumococcal-amc/about/>. Accessed August 8, 2012.
13. Ibid.
14. "Prize Development," the X Prize Foundation, <http://www.xprize.org/prize-development/life-sciences>. Accessed August 8, 2012.
15. "History," Grand Challenges in Global Health Initiative, <http://www.grandchallenges.org/about/Pages/History.aspx>. Accessed October 25, 2012.
16. "Our Grantees," Grand Challenges Canada, <http://www.grandchallenges.ca/grantees/>. Accessed August 8, 2012.
17. "IFFIm Overview," <http://www.iffim.org/about/overview/>. Accessed August 8, 2012.
18. Jitinder Kohli, "Financing What Works: Social Impact Bonds Hold Promise," Washington: Center for American Progress, November 18, 2010, [http://www.americanprogress.org/issues/2010/11/financing\\_what\\_works.html](http://www.americanprogress.org/issues/2010/11/financing_what_works.html). Accessed August 8, 2012.
19. Monitor Institute, "Investing for Social and Environmental Impact," January 2009.
20. Hebb, Tessa, "Public Pension Funds and Urban Revitalization," Oxford University Centre for the Environment, May 2006.
21. Shiller, Robert, "Macro Markets: Creating Institutions for Managing Society's Largest Economic Risks," New York: Oxford University Press (1993).
22. "Impact-based Incentive Structures," Global Impact Investing Network (GIIN), December 2011, [http://www.thegiin.org/binary-data/RESOURCE/download\\_file/000/000/332.pdf](http://www.thegiin.org/binary-data/RESOURCE/download_file/000/000/332.pdf). Accessed August 8, 2012.



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