BioBonds: Generating Billions in Private-Sector Investment Speeding Treatment and Cure

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[**] Established in 1971, the Foundation Fighting Blindness is the world's leading private funding source for retinal degenerative disease research. The Foundation has raised more than $816 million toward its mission of accelerating research for preventing, treating, and curing blindness caused by the entire spectrum of retinal degenerative diseases including: retinitis pigmentosa, age-related macular degeneration, Usher syndrome, and Stargardt disease. Visit **FightingBlindness.org** for more information.

BioBonds

It wasn't as if we didn't know that pandemics were possible. U.S. government officials have warned of this danger since at least 2005,[1] when SARS generated alarm among medical experts around the world. And it wasn't that biomedical researchers couldn't find treatments and cures for some of the most likely causes of the next pandemic – many believed they had identified vaccines and other effective interventions to combat widespread contagion and resulting social and economic trauma. And, when the federal government prioritized a COVID-19 cure, it became clear that the problem developing a vaccine wasn't the lack of science – it was the lack of money.

This challenge is sadly evident across the entire biomedical funding construct. Before COVID struck, all of us read about early-stage success with research curing cancer, restoring vision, healing our wounds, renewing mental health, or restoring physical mobility. And each day when we read these stories, each of us thought of ourselves or someone we love and wished research could move faster.

Since the COVID-19 public health emergency, this heartbreak is still more acute because thousands of promising clinical trials under way before the pandemic have been disrupted or even stopped. Even now, over a thousand trials remain on hold, with about 30 percent of those considered pivotal focused on cancer, 13 percent on cardiovascular disease, and another 13 percent on issues affecting the central nervous system.[2] Focusing on cancer, a major study finds that the pandemic threatens "the viability of cancer research as a whole. The consequences of this disruption may cause additional morbidity and mortality in the years to come beyond those directly related to COVID-19, the so called non-viral casualties."[3]

It will take years to restart all this lost biomedical progress unless the funding that was already scarce before the pandemic for urgent treatments is jumpstarted with a new federal program that for the first time encourages billions from the private sector to enter this critical, under-funded arena. This new financial instrument is known as a BioBond and, backed very cost-effectively by the federal government, it will allow institutional investors now on the biomedical sidelines to finance perhaps our most critical social-welfare goal: lengthening life, easing suffering, and facilitating independent, productive living.

The BioBond Bill

We have seen structures like BioBonds in the trillion-dollar plus "green bond" market to fight climate change, and it will work for BioBonds that fight premature death and unnecessary suffering. As envisioned in H.R. 3437,[4] the Long-term Opportunities for Advancing New Studies (LOANS) for Biomedical Research Act introduced by Reps. Bobby Rush (D-IL), Brian Fitzpatrick (R-PA), and sixteen bipartisan cosponsors, BioBonds harness billions in institutional capital with the backing of a limited guarantee from the federal government. Many nations now have similar guarantees for equity investors in translational biomedical research – that is, research bridging the gap between basic work with test tubes and mice and research demonstrating safety and efficacy in people.[5] However, there is no such program in the U.S., in part because the U.S. has a strong aversion to anything akin to an ownership stake in a private venture. This is not only because equity stakes are riskier, but also because U.S. policy is premised on sharp distinctions between public and private finance less common in many other nations.

However, the U.S. has a lengthy history of backing guarantees for debt instruments, including the almost $7.9 trillion of mortgages backed by U.S. taxpayers,[6] energy loans, as well as those to small businesses. As detailed below, the BioBond construct works within this established guarantee context and in several ways improves on it with objective eligibility criteria and more robust taxpayer protections. The bill creates truly translational funding for under-funded biomedical research – that is, for private capital investment to bridge the gap between direct government spending for basic research and high-return, short-term biomedical-funding sources such as venture capital (VC) firms and large biopharmaceutical companies.

The Valley of Death

Media are replete with reports that excite hope about dramatic new medical treatments – "Blind Mice See," or, "First-Ever Patient Cured of Deadly Cancer." And, then, it often takes decades before a promising treatment or cure is approved for widespread use. The period between promising basic research and drug approval and commercialization is called the "valley of death" in biomedical circles because it's where viable research dies all too often not due to a lack of scientific merit, but because of the dearth of funds.

Federal spending such as that from the National Institutes of Health (NIH) and charities fund some of the basic research needed to test hypotheses and then to ready research for clinical testing – that is, for formulating drugs to test dosage, safety, and – of course most importantly – efficacy.

But clinical trials for a single treatment cost millions to ensure rigorous testing, patient safety, and sufficient sample size. And, the more progress a treatment or cure makes, the more it costs – drug development from initial pre-clinical work to final approval on average costs $2.6 billion.[7]

Biopharmaceutical and VC firms often come in towards the end of this process, cherry-picking the most promising treatments for the largest patient populations requiring the most pills at the highest cost for the biggest impact in comparison to other possible treatments and cures. Most of these firms are not able to help as the valley of death yawns before a promising biomedical researcher, because they don't *lend money*. Instead, they make equity investments that give them ownership rights over a drug or device. These rights are of little value to entities under quarter-over-quarter investor pressure if one has to wait years to know if there will be any return on investment – the earlier the investment, the greater the return, but the greater the risk – and then some.

The VC and large biopharmaceutical investment timeframe is typically short – three to five years – and their return on investment objective high – usually at least 20 percent. As a result, too many projects take too long, cure too few patients, or do so at too low a price to warrant VC investment, especially long before proof of success is readily apparent.

And, even when there is early-stage VC or biopharmaceutical money, it often comes with problematic strings attached. Because this money is equity – not debt – researchers usually lose control over their work, often finding their intellectual property used for other purposes or even simply ignored as a major firm diverts resources down the road to focus on other priorities. Sometimes, biopharmaceutical companies even invest in or purchase a start-up company only to defend an existing project or treatment.[8]

Extensive financial-market research bears this out. Andrew Lo at the Massachusetts Institute of Technology has been a pioneer in this field, charting the funding gap for cancer[9] and proposing a novel investment vehicle to encourage institutional investors to speed treatments and cures in this life-or-death field.[10] However, years after his ground-breaking research, institutional investment remains largely sidelined from translational biomedical research, leaving the valley of death almost as deep and its quicksand almost as deadly as before.

In the absence of private-sector translational biomedical funding, foundations such as the Foundation Fighting Blindness[11] and Cystic Fibrosis Foundation[12] have pioneered successful "venture-philanthropy" funds. In these, philanthropic dollars partner with venture capital or biopharmaceutical companies to provide critical resources ranging from deep knowledge gained by years of basic-research investment to millions of up-front dollars to raise the valley floor. However, these venture-philanthropy funds are few because of the financial prowess a foundation must garner to ensure that it demonstrates expertise to partner firms and the targeted scope each such effort addresses.

How BioBonds Work

Because BioBonds are novel financial instruments, the pending legislation stipulates detailed specifics only in areas essential to ensure project eligibility, taxpayer protection, and financial-market interest. The actual structure of BioBonds will be determined under regulations from the Department of Health and Human Services (HHS) in consultation with the Treasury Department. The box on the next page shows how BioBonds are likely to work within the statutory and regulatory parameters established by H.R. 3437:

How a BioBond Works in the Financial Market and for Taxpayers

1. A biomedical venture (university lab, foundation, company) receives FDA clearance for the human trials essential to establish treatment safety and efficacy.
2. The borrowing entity determines that debt financing is an attractive funding source – entities are of course free to pursue VCs or other investment funding.
3. The biomedical entity applies for a loan from a bank or other lender willing to extend credit in accordance with BioBond regulation. The company need not demonstrate the likelihood of scientific success – no lender could judge this beyond the factors taken into account by the FDA. Instead, the borrower needs to demonstrate ability to repay under the terms of a loan, loans structured to ensure affordability thanks to the lender's ability to sell the loan into a BioBond and thus take virtually no risk.
4. Borrower ability to repay may be based on factors such as the likely value of its intellectual property, revenue streams from other sources, and/or a guarantee from a university, foundation, or even just one well-heeled philanthropist.
5. Rules ensure that a wide spectrum of diseases and impairments are funded, with no borrower allowed to receive more than one loan of no more than $25 million each year on demonstration of continuing ability to repay. Further, no group of related diseases may account for more than 15 percent of the principal amount of a BioBond issuance. Clinical trials funded by BioBond loans are encouraged to ensure access and inclusion. A financial institution manages this process, purchasing loans eligible for the BioBond guarantee and structuring them into BioBonds in accordance with applicable rules.
6. In the initial three-year period authorized in H.R. 3437, up to $10 billion a year in BioBonds could be issued backed by a 90% federal guarantee for principal (not interest).
7. BioBonds might have a maturity of ten or more years with no interest due to the investor until the maturity date (i.e., "zero-coupon bonds" common in financial markets). The bond does earn interest at a preset rate (e.g., five percent), but interest payments accrue over many years at which time they are payable to the investor.
8. As a loan for a project is repaid, a trust established for each BioBond must invest the proceeds in U.S. Treasury obligations and approved securities until the bond comes due. This income further reduces taxpayer risk. The trust also addresses any failure to repay, pursuing collateral and otherwise seeking to make the loan whole and thus protect the taxpayer.
9. All cash proceeds received from the repayment of a BioBond are first used to reduce the amount of principal guaranteed by the government and the government has a senior claim on all assets and collateral to the extent the guarantee has not been extinguished.

The Green-Bond Example

Although the BioBonds detailed throughout this paper may seem novel, they follow the very successful financial model that led to the flow of literally trillions of private-sector funds for sustainable-energy and climate-risk projects deemed outside the reach of private-sector finance only a decade ago. A carefully-designed federal guarantee backing well-designed loans for high-quality biomedical projects will jump-start a flow of private finance for even the most complex biomedical treatments and cures just as green bonds now fund renewable energy, lower climate risk, and enhance environmental justice.

Green bonds were the world's first sustainable financial instrument, launched in 2008 with the help of a World Bank guarantee.[13] Although initially small, green bond issuance has grown in each year since the World Bank offered its initial guarantee as investors and markets became more familiar with the concept and as demand for sustainable investments grew in tandem with a broader change in views on climate risk. Total issuance last year crossed the $1 trillion threshold, with a record-breaking $270 billion in new green bonds issued during 2020.[14]

All this market demand reduced the need for government guarantees and similar taxpayer-backed incentives for green bonds – the likely result also for translational biomedical research with BioBonds once financial markets understand the risk, cash-flow, and return considerations critical to success in this essential sector.

Indeed, green bonds are now so much in demand that they have spawned "greenwashing" problems – i.e., insufficient disclosures leading to bonds being dubbed "green" despite considerable underlying "brown" investments. The biomedical sector is at far less risk of "cure-washing" because the U.S. and virtually all other advanced nations require formal clearance for biomedical trials involving human patients. Receiving such clearance is an essential criterion for federally-guaranteed BioBonds to protect the taxpayer and private investors are likely to require similar clearances as biomedical bonds transition into the private capital market.

Federal-Deficit Impact

It is likely that the BioBond legislation would score at only a small cost to the U.S. Treasury, and we look forward to a score from the Congressional Budget Office demonstrating this. Start-up costs to taxpayers are only those accompanied with issuing implementing regulations as the process for requisite FDA clearance is already authorized and no process changes to it are required for costs borne by the private financial institution underwriting the bond. Costs associated with the "trustee" managing it on behalf of the taxpayer and investors also come from bond proceeds, as is usually the case with fully-private financial instruments.

Of course, loans guaranteed by the federal government might go unpaid. In that case, the federal government might incur an expense if loan default occurs before interest payments by the defaulting borrower and all the other borrowers in loans in a single BioBond falls short. Because the amount of each loan is small (no more than $25 million) and each BioBond would be large (at least $100 million), longstanding principles of risk reduction via portfolio diversification provide a significant amount of taxpayer protection atop all the interest payments and investment income held in trust to protect the

taxpayer. Under any conceivable scenario, most loans will be repaid, investment income will be substantial, and the government guarantee will be called upon in only rare circumstances, if at all.

Conclusion

Speeding biomedical treatments and cures is an important social-welfare objective on par with sustainable energy, affordable housing, enhanced education, and many other worthy focuses of social-impact finance and federal spending or guarantees. BioBonds achieve this underserved goal with taxpayer discipline and targeted assistance to biomedical projects deemed possible by the FDA's rigorous approval process. It jumpstarts a private market just as the first guaranteed green bonds created the current $1 trillion-plus largely-private market because, once invested in this arena, institutional investors will learn more, recognize when biomedical loans fit their risk tolerances, and learn to get by with less or even no federal guarantee.

In brief, BioBonds are the most effective and fiscally responsible way to restore and sustain needed funding for clinical trials to develop the biomedical treatments and cures of the future faster.

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