

Why the World Needs a COVID-19 Vaccine Price Guarantee

Beginning with SARS, Ebola, Zika, MERS, and now COVID-19, the world has witnessed the magnitude of the threat from the outbreak of an infectious and deadly disease. The subsequent scramble for a vaccine, and the long delays involved, makes it clear that we are unprepared. Why are we underinvesting in the R&D necessary for the rapid deployment of crucial medicines? The answer is a lack of incentives for the pharmaceutical sector to invest: the risks are high and the financial rewards from producing vaccines are low. This problem can be fixed by changing those incentives. The government should commit to a guaranteed payment for effective vaccine or drug treatments delivered in the event of an outbreak.

Consider the current scenario where the spread of the global COVID-19-pandemic threatens to stop the global economy in its tracks. The economic costs imposed by the virus are staggering. A very conservative estimate of a 10% loss of U.S. annual output amounts to about \$2 trillion lost per annum, or, equivalently, \$160 billion per month. The losses for the entire world economy are 4 to 5 times larger. And these economic costs are dwarfed by the individual costs of illness, death, and the sharp restrictions on the mobility and activities of billions of people around the world.

Absent a vaccine or effective treatment, this pandemic is likely to be with us more than a year, and long periods of intermittent social distancing may be required.¹ Speeding up the development of vaccines and effective drug therapies is a decisive way to limit the economic losses and shorten the duration of the crisis. Based on the economic losses in the U.S. alone, the federal government should be willing to spend at least \$80 billion on COVID-19 R&D, hoping to reduce the expected duration of the crisis by just 2 weeks. The large losses to the world economy suggest that the E.U. and other G-10 partners should also be willing to spend similar amounts to speed up the development of an effective treatment or vaccine for COVID-19 vaccine.

But aren't there existing research teams that would develop vaccines targeting COVID-19 without such government spending? Indeed, there are a number of research teams in large pharma companies such as Roche, Eli Lilly, Sanofi, Pasteur and Takeda, and smaller biotech companies such as CureTech, BoiNTech, racing to develop a vaccine. However, these firms stand to capture only a small fraction of the large economic benefit that will accrue to society when they successfully produce a vaccine or an effective therapy.² Social and regulatory pressure is likely to force a developer to offer a future successful vaccine at a low price, reflective of production costs, and not the very high and highly uncertain R&D

¹ Source: [Imperial College COVID-19 Response Team](#), March 16, 2020.

² Source: [NYTimes, March 19, 2020](#). Indeed many large pharma companies previously lost money developing vaccines for prior outbreaks, such as Ebola and SARS. And although one of the most promising drugs for COVID-19, Remdesivir, was originally developed for Ebola, [analysts still expect](#) its maker Gilead will not profit from the drug.

costs. Even now, as companies work feverishly on a COVID-19 vaccine, incentives are undermined by a public outcry to sharply limit future profits from such a vaccine.³

The result is a significant underinvestment in the development of vaccines which are likely to have large social benefits. A simple way to see this would be to note that the *total U.S. spending on all pharmaceutical R&D* in 2020 was projected to be \$80 billion -- equivalent to loss of two weeks of U.S. economic output -- with only a small fraction of this directed to infectious disease R&D.⁴ Another trend that points in this direction is that while 26 Pharmaceutical companies produced vaccines in 1967, and 17 in 1980, only four --GlaxoSmithKline, Merck, Pfizer, and Sanofi Pasteur-- undertake significant production today.⁵ Finally, while a vaccine targeting COVID-19 may not be conceivable before the specific virus existed, some of the ongoing COVID-19 research is focused on similarities with SARS. More prior research on other vaccines and viral treatments may well have been useful for current research on COVID-19.

Even today, with the current pandemic raging, many biotech firms are watching from the sidelines. And many researchers around the world with specialized expertise in infectious diseases and vaccines have not yet been mobilized to work on the current crisis. This is not surprising. The current environment is characterized by high R&D costs and low chance of success -- recent estimates suggest that development of a new vaccine requires capital investment of between \$500 million and \$1 billion, but only 7% of development projects reach the preclinical development phase⁶. Consequently, biotech and pharma executives might find that the benefit from the successful development of a vaccine is not high enough and too uncertain to compensate for the large development costs.

This cost benefit calculus is reflected in the numerous startups in infectious disease vaccine development that have gone bankrupt.⁷ Smaller biotech companies are constrained financially and typically rely on a hybrid funding model for COVID-19-vaccine development, backed by a patchwork of foundations and government initiatives. For instance, two of the most promising developers of a COVID-19 vaccine, Inovio and Moderna, work with funding from the Coalition for Epidemic Preparedness Innovations (Cepi), a coalition of charities and governments.⁸ Similarly, Moderna, a Boston-based biotech company with several candidate vaccines, but no sales, has accumulated 9 years of losses, and could not fund the

³ See “Drug Companies Will Make a Killing From Coronavirus” NYT Op-Ed March 18, 2020, by Mariana Mazzucato and Azzi Momenghalibaf, which warns of drug company “price gouging”, and Presidential Candidate Bernie Sanders’ call (Source: [MarketWatch](#).) for free distribution of any future COVID vaccine. Pharmaceutical companies lost money developing successful vaccines for prior outbreaks, such as Ebola. Source: [FT, March 4, 2020](#).

⁴ Source: The History of Pfizer and Penicillin, and Lessons for Coronavirus, [WSJ Op-Ed, March 20, 2020](#); and [Plotkin, Mahmoud, and Farrar](#), in *The New England Journal of Medicine*, 2015.

⁵ Source: [Plotkin, Mahmoud, and Farrar](#), in *The New England Journal of Medicine*, 2015.

⁶ Source: [Plotkin, Mahmoud, and Farrar](#), in *The New England Journal of Medicine*, 2015; [Gouglas, Le, Henderson, Kaloudis, Danielsen, and Hammersland](#), *The Lancet*, 2018.

⁷ Source: The History of Pfizer and Penicillin, and Lessons for Coronavirus, [WSJ Op-Ed, March 20, 2020](#)

⁸ Source: [FT, February 9, 2020](#).

costs of developing a COVID-19 vaccine by itself.⁹ The freezing of credit markets that has accompanied the current outbreak has made it even harder for these firms to finance new R&D initiatives.

While developing and testing vaccines always takes time, experts in the field have learned from previous episodes, such as the Zika-virus, that there are major bottlenecks in the development and the subsequent large-scale manufacturing process of vaccines.¹⁰ Once a COVID-19 vaccine has been developed, its supply is likely to fall short of demand for a long period of time. Additional financial resources can help to relieve these production bottle-necks and fast track this process significantly.¹¹

We ask that the government fundamentally alter the private sector's risk-reward calculus and better align the incentives of private companies with those of society at large by guaranteeing a significant financial payment to whoever first develops a successful vaccine.¹² One way to do this would be to commit to a high price for each administered dose of an effective vaccine or treatment therapy.¹³ This would go a long way in reallocating resources to the development and large-scale manufacturing effort. The price for the vaccine could be paid by individuals who have the means, and by the government for those who do not.

Just as an example, if the U.S. government promises a price of \$250 per administered dose to the developers, spending a maximum of \$80 billion to vaccinate all Americans, then society will have earned back its investment even if the additional spending only speeds the development up by only two weeks. As an upshot, this initiative will not add to the considerable fiscal burden of the Treasury unless an effective vaccine or treatment is developed. When that happens, the Treasury will be in much better shape to take on this additional burden. There would be strings attached to the price guarantee. The vaccine should be made available at marginal cost to developing countries. At the same time, the price guarantee cuts through red tape, sidestepping the need for government agencies to approve grants after a lengthy review process.¹⁴

Our proposal should also foster collaboration among different research teams -- not only in the biotech and pharma industry but also at its leading research universities -- who can join efforts to avoid duplication and build on each other's discovery. The government could further stimulate collaboration by also committing to large, lump-sum awards for successful clinical trials and other milestones provided

⁹ Source: [FT, March 4, 2020](#).

¹⁰ Source: [Drury, Joliffe, and Mukopadhyay](#), *Vaccine*, April 2019.

¹¹ The Coalition for Epidemic Preparedness Innovations, a partnership between governments, charities and industry, has just asked for \$2 billion in new funding in early March 2020 to fund the vaccine development effort. Source: [FT, March 4, 2020](#).

¹² Prize awards have been used effectively as mechanisms for accelerating technological development. Recent examples include the X-Prize Foundation's award for suborbital space flight and the Google moon challenge. Source: [Brunt, Lerner and Nicholas](#), *Journal of Industrial Economics* (2012).

¹³ Pharma companies typically license the vaccine from its developer and then scale up production. As a result, the developers will also benefit from these price guarantees.

¹⁴ On March 19, the leaders of U.S. universities wrote to Congress, asking for an additional \$13 billion in the federal government's budget allocated to basic research. This funding would flow to main funders of basic research in the U.S., the NSF, the NIH, NASA and the departments of energy and defense. Some of this funding would go to COVID-19 research. Source: [Science](#), March 19, 2020.

that the research is fully disclosed. These milestone awards would be of particular help to small and innovative biotech firms that are unlikely to mass-produce the vaccine or therapy but can quickly tap into this capital and contribute to part of the overall discovery.

If the E.U. were to make a similar commitment to this prize per dose administered in the E.U., the total monetary incentives could be strengthened from \$80 billion to over \$200 billion.¹⁵ Joint price guarantee commitments by the U.S. and the E.U, and other G-10 partners, would contribute to reducing each individual country's incentive to stockpile the supply once a vaccine has been produced inside its borders. Having several countries participate induces complications. Each government might want to limit the exports of the vaccine when their local research team successfully develops a vaccine. To resolve this, our government, as well as other governments, should commit not to restrict exports of the vaccine in case of successful vaccine development in their country.

The price guarantee commitment would increase the expected payoff and reduce the uncertainty faced by private firms and their investors as they pursue development of vaccine or therapy to combat COVID-19. Additional capital that is needed to fund the most promising development efforts on this front could come from both company reserves as well as outside investors. Today, U.S and foreign private equity funds have billions in dry powder¹⁶ and are actively searching for impact investments. It's hard to conceive of a more impactful way to invest for these investors.

We are not asking the U.S. government, or any other government, to pick winners. Government agencies do not have a comparative advantage in selecting the most promising projects, but the governments of the U.S. and Europe do have a funding advantage. We are asking the government to make an ironclad commitment right now, backed by legislation, to reward those companies who successfully lead the fight against COVID-19. Beyond what we are facing right now, the government can fix the chronic underinvestment in vaccine development by appropriately incentivizing innovation through a price guarantee.

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¹⁵ To date, the E.U. has adopted a different model. The Commission has secured 47 million Euros of funding for 17 research projects that it has selected involving 136 teams. [Source: E.U. Commission.](#)

¹⁶ The most recent estimate is \$2.5 trillion in dry powder or capital waiting to be deployed. Source: [Bain Capital.](#)