

# Beat COVID-19 through innovation

**A**s coronavirus disease 2019 (COVID-19) has spread, public health and economic well-being are increasingly in conflict. Governments are prioritizing public health, but the current solution—social isolation—is costly as commerce remains shut down. Restarting economies could rekindle the pandemic and cause even worse human suffering. Innovation can help societies escape the untenable choice between public and economic health. The world needs effective vaccines, therapies, or other solutions. But how do we achieve these solutions, and achieve them quickly?

Innovation policy can accelerate advances, with high returns. In the United States, COVID-19 has reduced gross domestic product (GDP) by ~30%. **What if additional investment in research and development (R&D) could bring forward an effective vaccine by just 1 day? If this investment costs less than the daily loss in GDP (\$18 billion in the United States alone), it would pay for itself.** Even large incremental funding to support R&D will be miniscule in scale compared to the \$2.8 trillion the U.S. government is spending to compensate for the economic shutdown.

What principles should guide government innovation policy to battle COVID-19? It is critical to support many independent avenues of research. Outcomes from R&D investments are uncertain. Many avenues will be dead ends, so many different paths—each corresponding to an independent effort—should be pursued. Consider funding 10,000 such efforts.

Even if each had only a 0.1% chance of producing an advance in prevention, treatment, or infection control, the probability of at least five such advances would be 97%. By contrast, if efforts crowd into only a few prospects, the odds of collective failure can become overwhelming.

This innovative push must draw widely on talent. Research talent is plentiful, but many laboratories and teams are now shuttered and dispersed by the pandemic. **Private investment gravitates toward marketable solutions, but key insights are likely to come from asking “why” questions (for example, basic research into the pathophysiology of the disease) and not simply from “shovel ready” drug development projects. Moreover, good ideas often come from unexpected corners. Useful solutions may be discovered outside biomedicine, including through engineering disciplines and information technology.**

What would a bold innovation policy agenda look like?

In the United States, funding for R&D must be fortified, as recently called for by the Task Force on American Innovation and 17 other organizations. Also, a principal investigator already receiving public funding should be able to receive immediate support to work on COVID-19 with minimal application burden and decisions within 1 week. The National Institutes of Health (NIH) has taken some first steps with emergency procedures to supplement existing grants, but these efforts need to draw on additional labs and talent, and to accelerate review. The marginal investment through the NIH, at \$3 billion, appears modest in size, equating to the U.S. GDP loss in just 4 hours. Globally, researchers with relevant expertise are essential workers; they should have access to their labs and additional resources to engage in the COVID-19 battle.

Government support for private sector R&D should be delivered at great speed. A “Pandemic R&D Program” could deploy loans that are forgivable later, based on actual investment in COVID-19-related innovations, thus ensuring that financial constraints do not slow down solutions. More support could come through supplementing the R&D tax credit system, which already exists in the United States and other countries.

In June 1940, the U.S. government created the National Defense Research Committee (NDRC), composed of eminent scientists and innovators in the public and private sectors, with the mandate to achieve innovations related to the war effort. This leadership structure drove the rapid development of numerous technologies, including weapons systems but also antimalarial drugs and penicillin manufacturing. A COVID-19 Defense Research Committee could similarly be empowered to coordinate and fund solutions to the pandemic. This group would track R&D efforts, create a public clearinghouse documenting the avenues pursued, fund innovations and the scaling of successful advances, and streamline bureaucracy. The new vaccine effort, Operation Warp Speed, moves in this direction. But we also need efforts beyond vaccines.

COVID-19 presents the world with a brutal choice between economic and public health. Innovation investments are essential to avoiding that choice—yet tiny in cost compared to current economic losses and other emergency programs. Even the slight acceleration of advances will bring massive benefits.

—Pierre Azoulay and Benjamin Jones

**“COVID-19 presents... a brutal choice between economic and public health.”**

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# Science

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