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Investing in Vaccines to Mitigate Harm from COVID-19 and Future Pandemics

Based on BFI Working Paper No. 2024-118, "Investing in Vaccines to Mitigate Harm from COVID-19 and Future Pandemics," by Rachel Glennerster, University of Chicago; Catherine Che, University of California Berkeley; Sarrin Chethik, University of Chicago; Claire T. McMahon, University of Chicago; Christopher M. Snyder, Dartmouth College

During pandemics, rapid vaccination can significantly reduce mortality, economic losses, and societal disruptions. Vaccine manufacturers often lack incentives to expand their speed and capacity, however. This market failure can be addressed with strategic policies that realign incentives both during and in advance of a pandemic.

While the COVID-19 pandemic is waning, the threat of future pandemics persists. According to experts, we should expect three pandemics at least as severe as COVID-19 every century, along with less severe pandemics and regional epidemics occurring more regularly. While vaccines were developed with unprecedented speed during COVID-19, their distribution was stymied by supply shortages and inequitable access. How can we better prepare for future pandemics?

In this paper, the authors draw on existing research to make a case for investing in vaccine research, development, and manufacturing capacity. A key challenge is the insufficient incentive for companies to produce vaccines, despite their enormous social value. The authors propose policies designed to correct this **market failure** by aligning private investment incentives with the broader social benefits of vaccines.

The authors begin by summarizing the leading current research on estimates of expected harm from future pandemics. They synthesize their own previous work by combining estimates of the arrival rate of pandemics of varying intensities with estimates of mortality, economic damage, and learning losses to forecast expected global social losses of about $700 billion annually, detailed below.

Figure 1 · Expected Annual Global Losses from Pandemics Caused by All Pathogens

Loss Category	Expected Losses (Billion $)	% of Total Losses
Mortality	519	73
Economic Output	112	16
Learning Losses	81	11
Total	**712**	**100**

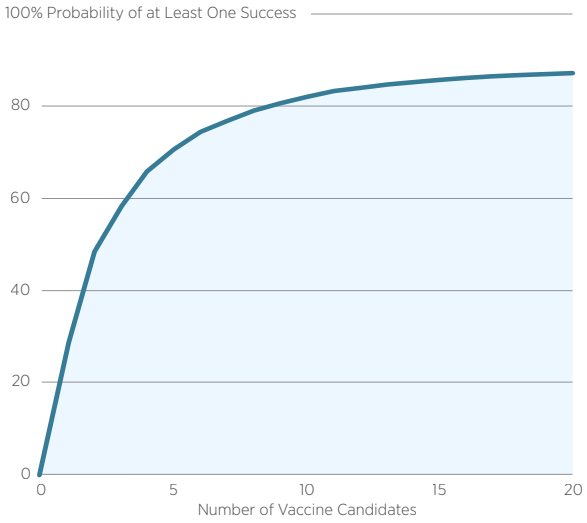
Note: Mortality losses are estimated using Sweis' (2022) $1.3 million VSL estimate.

Market failure: A situation where the market fails to allocate resources efficiently, leading to outcomes where the private sector's incentives do not align with the broader social good, often justifying government intervention.

The authors then describe vaccine's ability to mitigate future pandemic harm and survey preparation and response investment policies that could increase vaccine production and access. Their findings suggest the following:

- Investments in vaccine research, development, and capacity made *before* future pandemics have the potential to accelerate vaccine development during the next outbreak. They identify priorities including targeting pathogens with high epidemic risk; prototyping vaccines for entire virus families to create generalizable solutions for novel pathogens; advancing vaccine technologies such as universal vaccines and novel administration routes like intranasal; and enabling technologies to support vaccine research, trials, and production.
- Pre-pandemic investments in vaccine manufacturing capacity could accelerate vaccine production and lead to more equitable vaccine distribution by reducing global shortages.
- A combination of funding mechanisms could be used for advance investments in vaccine research and development. They suggest that both **push funding**—which supports early research—and **pull funding**—which ties payments to outcomes (e.g., **advanced market commitments**, **advance purchase agreements**, and prizes) can be effectively used to invest in vaccine research and development before the next pandemic occurs.
- *After* a future pandemic arrives, there are policy tools that can be used to accelerate vaccine availability. The authors point to research that shows that investing in a diverse portfolio of vaccine candidates for research, development, and capacity investment during a pandemic increases the likelihood of successful outcomes. They also suggest expanding investments in vaccine manufacturing capacity before a vaccine has been fully developed to reduce the lag between vaccine approval and wide-scale deployment.

Figure 2 · Probability of a Success in Optimal Vaccine Portfolio



Note: This graph shows the likelihood of a successful vaccine among portfolios of vaccine candidates selected for research, development, and capacity investments. As you can see, the likelihood of success rises and then plateaus, demonstrating that investing in multiple vaccines increases the chances of success, with diminishing returns.

Source: academic.oup.com/oxrep/article/38/4/742/6896146

Push funding: Financial support provided upfront to fund research, development, or production costs before the outcome is known.

Pull funding: Incentive-based funding that rewards firms after achieving specific results or delivering a successful product.

Advanced market commitments: Agreements where governments or organizations commit to purchasing or subsidizing a product, like vaccines, once it is successfully developed, guaranteeing a market for manufacturers.

Advance purchase agreements: Contracts in which buyers, typically governments, agree to purchase a product from a specific supplier in advance of its development or approval, providing firms with guaranteed demand.

- Finally, the authors suggest using financial tools like advance purchase agreements and hybrid contracts that combine push funding for upfront costs with pull funding to reward successful vaccine delivery to incentivize firms to build capacity during a pandemic, despite the uncertain payoff.

The COVID-19 pandemic laid bare the profound consequences of market failures on social wellbeing. Compared to vaccines' immense importance, firms had little incentive to produce and distribute them quickly. This review shows that there is enormous social value in investing in vaccine research, development, and manufacturing capacity to prepare for and respond to pandemics. Tools that tackle market failures head on can help realign incentives so that companies make crucial investments before and during future pandemics.

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