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Calculating the Costs and Benefits of Advance Preparations for Future Pandemics

Based on BFI Working Paper 2022-140, "Calculating the Costs and Benefits of Advance Preparations for Future Pandemics," by Rachel Glennerster, University of Chicago; Christopher M. Snyder, Dartmouth College; and Brandon Joel Tan, International Monetary Fund

Without additional action we should expect to lose an average of at least $800 billion every year to future pandemics. Investing to expand vaccine production so that we could vaccinate 70% of the global population against a new virus within six months would cost $60 billion up front and $5 billion a year and generate an expected net present value of over $400 billion. If the US went it alone it would generate $47 billion in net benefits or $141 per head, just from the first significant pandemic.

Despite record-setting speed in the development, approval, and distribution of effective vaccines, the COVID-19 pandemic is responsible for excess global deaths of 7 to 13 million, reduced economic input of nearly $14 trillion (by 2024), and lost future wages resulting from school disruptions of over $10 trillion. It was more than two years before there was sufficient supply of vaccines globally for anyone who wanted a vaccine to have access, exacerbating the human and economic toll.

With such strong demand for vaccines, why did private pharmaceutical companies fall short in delivering supply? Social and political

Figure 1 • Baseline Results for Program Outcomes

	Costs and Benefits of Program to Undertake Vaccination Campaign in Next Significant Pandemic		
	With Advance Investment	Without Advance Investment	Difference
Current Value of Expenditures			
Initial Advance Investment	$60 Billion	0	$60 Billion
Annual Maintenance of Advance Capacity	$5 Billion	0	$5 Billion
Additional Expenditures in Pandemic	$22 Billion	$53 Billion	-$32 Billion
Present Value of Program Outcomes			
Expected Program Costs (Net of Rental Income)	$48 Billion	$21 Billion	$27 Billion
Expected Gross Benefits	$636 Billion	$199 Billion	$437 Billion
Expected Net Benefits	$587 Billion	$178 Billion	$409 Billion

Notes: All entries are in billions of 2019 dollars rounded to the nearest billion. First set of rows report current value of expenditures in year undertaken. These are actual, not effective, expenditures, so do not net out rental income. Second set of rows report present values (from the perspective of the base year) of costs and benefits of program leading to vaccination campaign in next pandemic of at least half the intensity of COVID-19.

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pressure kept vaccine prices low: the value of being able to produce one course of vaccine in Jan 2020 was $1,500 but the price was between $6 and $40. With low prices and a high chance of failure investing in large scale vaccine production facilities before FDA approval was very risky, despite the huge societal costs of delay. The solution is not allowing companies to charge more for vaccines during a crisis but to reduce risk by subsidizing large scale vaccine production plants and associated inputs.

By combining data on the frequency of pandemics of different sizes with estimates of the economic costs, the authors estimate the expected annual social value lost to future pandemics across a range of scenarios. Under conservative assumptions their base scenario implies losses of over $800 billion from future pandemics worldwide, with some plausible scenarios approaching $2 trillion.

What to do? Advances in vaccine technology, such as mRNA vaccines, have increased our ability to rapidly develop vaccines for new diseases although traditional vaccine technology also remains powerful. Putting additional vaccine production capacity in place now so that we can rapidly produce new vaccines would sharply reduce the time until sufficient vaccines were available worldwide, saving both lives and livelihoods. Specifically, spending $60 billion to expand production capacity for vaccines and supply-chain inputs, and $5 billion annually thereafter to maintain these facilities, would guarantee production capacity to vaccinate 70% of the global population against a new virus within six months, generating an expected net present value (NPV) of over $400 billion. If the United States went it alone with contracts to firms to build capacity and agree to turn it over to pandemic production would generate benefits (net of program costs) of $47 billion or $141 per capita just from the next significant pandemic.

Investment by one country in expanding the capability to produce vaccines in advance of a pandemic has positive benefits to others, unlike fighting over a fixed supply of vaccine once it is produced. These positive spillovers mean that the most efficient way to do the investment is a coordinated global program but individual countries who go it alone will in most cases reap substantial gains because they will have first access to supply. For example, an advance-investment program would provide Brazil net benefits of $57 per-capita.

While much of the world suffers from pandemic fatigue, now is not the time to relax. Expected losses form the next pandemic are too high to ignore. Investing now in building the capacity to rapidly vaccinate a large percentage of the population against a new virus is a highly effective way to dramatically reduce the cost of future pandemics. And time is already running short. Valuable mRNA vaccine capacity at threat of being decommissioned, suggesting that we have failed to learn the lesson of Covid-19: Advance global investment in vaccine capacity is key to dramatically reducing the human and economic toll of a pandemic.

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