Further Reflections on Mechanism Design and the Pandemic

E. Maskin

Professor, Harvard University

Science Board Fellow, Santa Fe Institute

August 2021

In April 2020, I participated in an SFI panel on complexity and the COVID-19 pandemic. My particular angle was to offer some suggestions about how mechanism design – the "reverse engineering" part of economics – might be useful in dealing with the pandemic.

I noted then that, in normal circumstances, ordinary markets do an excellent job of ensuring that the goods and services people want and need are produced and distributed. If, for example, there is currently greater demand for potatoes than available supply, we can expect the price of potatoes to rise. This will have two effects: (1) demand will be curtailed, but, more importantly (2) potato growers will be induced to sell more potatoes, thus ameliorating the initial shortage.

However, as I discussed, there are at least two reasons why a laissez-faire approach is not likely to work very well for certain critical goods during a pandemic: (i) there may be no existing market for a good and yet it is needed right away, and (ii) the good is, at least in part, a *public* good (its benefits go not just to the person using the good but to everyone else as well).

Suppose, for example, that a country needs to acquire millions of SARS -COV-2 test kits quickly. This exact good hasn't been produced before, since the virus is new. Thus, there is no existing market (although there do exist companies producing similar products).

In principle, the country's government could leave matters to the market: suppliers that wish to produce kits would produce them and sell them to citizens (or hospitals or employers) who wish to buy.

But there are several problems with this solution. In particular, how is a supplier to know (at least at first) how many test kits to produce? After all, this is a new good and demand for it is uncertain. Furthermore, the supplier doesn't yet know who else will be producing test kits and how much they will produce. Under such circumstances, the supplier may be reluctant to incur the significant setup costs entailed in production until the uncertainties are resolved. Given time, the market would ultimately resolve them through the equilibration of supply and demand. But that process isn't instantaneous, and test kits are needed fast.

Furthermore, given that supply can't be ramped up immediately, prices are likely to be high at first, which will disproportionately hurt poorer citizens and businesses (the very groups that are worst hit by the pandemic).

And, finally, the market approach ignores the public good aspect of test kits. If I buy and use a test kit, I will get some benefit - - I will know whether or not I have the virus and can take proper precautions and seek treatment if I do. But most of the benefit goes to *other* people, who will be protected from infection if I quarantine as a result of testing positive. Since I have little incentive to take into account those other benefits, I am likely to *underpurchase* tests kits. And so the market system will result in too few kits being supplied and used.

An alternative solution – at the opposite extreme – would be for the government to step in, pick some potential suppliers, and *order* them to produce test kits, i.e., a command economy approach. Indeed, this approach was actually used to some extent in the United States for ventilators.

But it gives rise to some difficult questions. Which suppliers should the government choose? Clearly, it would like to choose the ones with the lowest production costs, but it doesn't know which ones those are. Indeed, the government might not even know the identities of all potential suppliers. Moreover, how many test kits should the government order? And, how do the suppliers' costs get covered (if, in fact, they do)?

For all these reasons, I proposed a mechanism-design solution at the April 2020 panel. In this mechanism, the government first announces its intention to buy test kits and invites potential suppliers to furnish information about their costs. Then, on the basis of this information, the government gives each supplier a target output level (possibly zero if the supplier costs are too high) and a corresponding price that it is willing to pay for this output. After the kits are delivered, it then turns around and resells them to society for a very low or zero price. I showed that it is possible for the government to design the mechanism so that suppliers are induced to provide accurate cost information and the production targets maximize the net social benefit from test kits.

To what extent did the U.S. government actually use a mechanism like this for critical pandemic goods? In the case of virus test kits and personal protective equipment, the answer appears to be: almost not at all. And, as a result, there were dangerous shortages of both, especially in the first year of the pandemic. Our country has endured a staggering death toll - - over 600,000 people lost already - - due in large part to government mismanagement. And, when the final reckoning is done, the absence of test kits and protective equipment is almost certain to be an important part of the story.

The one bright spot for mechanism design was vaccine development. There, instead of leaving everything to the market, the Trump administration created Operation Warp Speed. In

particular, the administration picked a number of pharma companies on the basis of their reputation or promise and covered a lot of their upfront development costs. It also offered them futures contracts: if they successfully developed a vaccine and got it approved (at least on an emergency basis), the government promised to buy a large number of doses at a specified price. And, indeed, we ended up with several vaccines in record time.

But Operation Warp Speed didn't go far enough, at least as far as the developing world is concerned. Although there have been enough vaccine doses for almost everyone who wants them in the U.S. and Europe, only about 2% of Africans have been vaccinated so far. Furthermore, the fact that successful pharma companies retain patent rights over their vaccines is proving to be a major stumbling block to getting enough doses to the Third World.

A far preferable solution would have been for pharma companies to give up their intellectual property in exchange for a hefty buyout and for the vaccines to have been put in the public domain. That would have allowed doses to be manufactured on a far more massive scale.

Had it been used properly, mechanism design could have saved hundreds of thousands – perhaps millions – of lives. As it was, I would giveve the United States and the developed world a grade of D. Not a complete failure, but not something to be proud of either.