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Market in need

Extreme situations such as the corona pandemic disrupt the system of supply and demand. Targeted intervention by the state can then help to avoid dangerous bottlenecks.

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The demand for protective equipment, ventilators and other medical devices soared in the Corona crisis. Governments tried to replenish and prevail in price competition on world markets. The prices for many goods have multiplied. At the end of February, professional face masks cost six times more than before the pandemic. Other goods were no longer available. Doctors in Italy had to make dramatic decisions about which patients should and should not be ventilated. Elsewhere, protective clothing was sewn or the rules on the use of protective equipment were relaxed so that it could be reused. Germany has managed the infection process relatively well so far, but there have also been complaints in Germany that important goods are missing.

According to which rules and algorithms should medical equipment be distributed in a crisis? We are not bureaucrats or medical ethicists, but deal with the design of markets. Our goal is to repair markets that fail and to develop market solutions for new challenges. These include markets for mobile radio frequencies, for emissions trading and electricity, for traffic control, for internet trading and sharing platforms, right up to markets that distribute students to seminars - without any prices - or find as many donor-recipient pairs suitable for kidney transplants as possible. Over the years, market design research has developed many tools, including tools that can help distribute scarce medical supplies.

The virus hits some regions harder than others, and at other times. Only if reliable information about the individual needs is gathered can scarce medical goods be distributed in the best possible way over time and space. Therefore, in the event of a crisis, a clearing house is recommended that coordinates national procurement strategies and the distribution of the centrally available medical goods to the hospitals.

On the supplier side, rising prices create incentives to expand production. But on the demand side, they are sometimes unacceptable for ethical and economic reasons. Hospitals should be given preference over the commercial and private use of protective equipment; they should not, and cannot, pay exorbitant prices for urgently needed equipment. Auctioning to the highest bidder would take insufficient account of social priorities. Other distribution rules are also required.

In the hustle and bustle of a crisis, centrally available resources are often allocated on call or based on need registrations from hospitals. This was also partly the case in Germany. One of the problems with such procedures is the incentive to report needs quickly and excessively. Healthcare facilities are worried in times of crisis that important equipment will not be available. Just as many people bought toilet paper until the shelves were empty, hospitals want to stock protective equipment that is in danger of becoming scarce. But this is missing where it is more urgently needed.

Crisis management in American electricity markets follows a different approach. In the event of catastrophic weather events that lead to extreme shortages, the market mechanism is partially suspended. On the demand side, very high prices help to reduce the scarcity. Large electricity-intensive companies and private customers with smart electricity tariffs reduce consumption. At the same time, the supply side is rewarded so that the electricity producers generate as much as possible. This is done on the basis of estimates so that electricity producers cannot use their market power to drive up prices in times of crisis. In the event of a catastrophe, the need for electricity is met reliably and at acceptable prices for consumers.

Blackboards in the United States already use an artificial currency to distribute food

Similarly, in the health sector, the clearing house could estimate the needs of hospitals in an emergency and thus help optimize the allocation of scarce resources. The more data available about the dynamics of infection numbers in time and space and about the offer, including local reserves, the better an algorithm can find the allocation of the available protective equipment to the hospitals, which protects the lives of the patients as best as possible. When the demand in a hospital drops, the supply is directed to other facilities, where increasing numbers of infections are predicted and reserves become scarce. The algorithm makes a recommendation that decision-makers can use as a guide.

The clearing house could also introduce a special currency that can generate prices that can further optimize distribution without simply sending the goods to the richest institutions. There is

experience with such special currencies in the distribution of food donations to the food banks in the USA. The goal is to help as many people in need as possible. One table needs more fruit, the other one needs more bread, and others have already received donations from local traders. Auctioning food donations to the highest bidder is not acceptable. Instead, the panels have introduced a distribution system in which each panel initially receives money in a specific currency, in proportion to the estimated number of people in need in the region.

With the special currency, the boards can buy and sell food donations in the clearing house. As with normal money, scarcity signals are generated that help coordinate the allocation and motivate the boards not to hoard their own reserves but to leave them to those who need them most. Analogously, a special currency could help to distribute essential medical goods in a fair and transparent manner in times of crisis. The available offer and reserves are distributed as best as possible, taking into account the information available on site and the preferences of the hospitals.

Markets can fail. But they can also be repaired and further developed. As in the electricity market and on food bars, shortages - including blackouts - will not always be avoidable. But market design research helps to limit the scarcity and to distribute medical goods for the benefit of patients even in times of crisis.

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