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Economists can play a crucial role in the development of innovations for serving social, environmental, and other human needs

We know that innovation is a key driver of economic growth, but technical and social innovation has also spurred improvements in health, inequality, and social relations. Contemporary innovations in biology and artificial intelligence have tremendous potential to promote prosperity, improve health and education (including for the world's most disadvantaged), and address global challenges such as pandemics and climate change.

At the same time, many are concerned that these innovations could further endanger the environment, increase inequality, and lead to political polarization. As economists, we can contribute to the design of institutions to better align private incentives for the pace and direction of innovation with human and environmental needs. We can also contribute directly to the innovation process by helping develop and rigorously test social innovations.

Closing the gaps

More than 5,000 innovations have been patented related to control of the European maize borer (a pest that eats grain), but only five for the maize stalk borer, a similar pest, which affects primarily production in sub-Saharan Africa. Economic analysis can help identify cases like this, in which social needs and commercial incentives to invest in innovation diverge substantially under current institutions. It can also inform the design of policies and institutions to address these gaps. Here, I will draw examples from the interlinked challenges of climate change, food insecurity, and agricultural productivity in low- and middle-income countries. As the examples of the maize borers illustrate, this is an area with particularly large gaps between social and commercial incentives for innovation.

Perhaps most obviously, climate mitigation innovations have large positive externalities (benefits to people other than the consumer of the innovation), meaning commercial incentives to invest in them are limited. For example, methane emissions from livestock make up nearly 15 percent of all anthropogenic greenhouse gas emissions, and innovative feed additives could potentially reduce these emissions by 98 percent. However, since farmers lack strong incentives to purchase such feed additives, potential feed innovators lack strong incentives to invest in R&D.

Other innovations are public goods and will be undersupplied by the market. For example, climate change disrupts weather patterns, and advances in AI enable more accurate weather forecasts. Farmers react to these forecasts. Improved monsoon forecasts could produce benefits exceeding $3 billion for farmers over five years in India alone, perhaps 100 times as much as they would cost. Moreover, information services create benefits beyond the buyer of the goods, since farmers who don't subscribe can still access the information from subscribers.

Innovations in government service delivery, such as new technologies for digital agricultural extension, face a monopsony buyer problem, since the government is the most plausible buyer. Innovators may also be reluctant to invest in innovations with limited barriers to entry, such as climate-resilient crop varieties that farmers are able to replant in future seasons without repurchasing seeds.

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Policies for innovation

Economic theory and empirical analysis can also contribute to the design of research funding systems. How should research funding be allocated or divided between basic research and more translational work? What regulations are needed to protect safety? When should funding be allocated to large-scale centralized efforts and when should it be allocated through open calls for proposals from individual researchers with peer review? Are there better ways to identify and nurture potential members of the next generation of researchers who might not otherwise enter the field?

Economics can also provide guidance in designing incentives for innovation that do not require governments to pick winners in advance. There is a large literature on how patents can be optimally designed to balance incentives for innovation and monopoly-pricing distortions. It is also worth exploring alternative approaches for rewarding innovations, such as prizes or advance market commitments, under which funders commit to pay for a future innovation if it meets prespecified technical and pricing criteria and garners market demand. Following a $1.5 billion advance market commitment for the pneumococcal vaccine, three firms developed vaccines that were effective against the strains commonly found in developing economies. These vaccines have now reached hundreds of millions of children, saving an estimated 700,000 lives.

Government procurement procedures can also be designed to spur innovation. For example, cement is responsible for about 7 percent of carbon dioxide emissions. Since governments are major purchasers, accounting for half of US cement use, they could boost innovation in low-carbon cement simply by committing to factoring the social cost of carbon into procurement processes.

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Economists as innovators

In addition to shedding light on the design of policies and institutions for innovation, economists can also participate directly in the innovation process. For example, economic theorists have used market design principles to design kidney transplant matching systems, and development economists are using experimental methods not just to test innovations, but also to help develop them. An analysis of Development Innovation Ventures (DIVs)—the US Agency for International Development's tiered evidence-based social innovation fund—found that 36 percent of awards went to innovations developed by teams including development economists, scaled to reach over 1 million users, compared with just 6 percent of awards to innovations without such involvement.

Furthermore, 63 percent of DIV-supported innovations that had previously been tested in randomized controlled trials reached more than 1 million people, compared with only 12 percent of those without such trials. For example, economists helped develop a credit-scoring approach using psychometrics (psychological testing) to assess default risk for potential borrowers without credit histories, which scaled through adoption by commercial lenders.

Just as biochemists and computer scientists often develop practical innovations in their fields, economists are increasingly developing social innovations in ours. F&D