

What does this economist/epidemiologist think of epidemiologists/economists?

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Since the novel coronavirus outbreak turned into a global health and economic crisis, one of the few silver linings has been unprecedented collaboration across spheres of science, innovation, and policy that have potential for long-term benefits. My training is in economics (PhD) and ecology (PhD) with a specialty in infectious disease modeling. Over the past decade, I have focused on implementing global health delivery programs where the lack of models and technical solutions are rarely the biggest problem – instead, the challenge often lies with breakdowns in the systems of delivering those solutions. That is not the case with COVID-19. We do not have solutions at our fingertips. We do not know the full scope of the problem, and consequently how to best navigate policy tradeoffs. So, I was dismayed to read, “[What does this economist think of epidemiologists?](#)” by [Tyler Cowen](#), which struck me as a reinforcement (maybe even a celebration?) of boundaries that do more harm than good.

We are in the early stages of a pandemic that has already claimed hundreds of thousands of lives. The economic costs are in the trillions. Lives and livelihoods are being destroyed. We need more integrated approaches and collaboration than ever before. While there are substantive differences in the analytical culture of economics and epidemiology, there is overlap in the traditions of each discipline in terms of both quantitative methods and in their incorporation of complex feedback mechanisms. Indeed, they share common origins.

The models used by [Ferguson et al](#) that were instrumental to [Trump’s National Emergency Declaration](#) are part of a tradition of quantitative epidemiology advanced by [Anderson and May](#) since the 1970s. [Bob May](#) sadly passed away on April 28th, having lived as one of the great integrative thinkers of the past century. He made contributions to [physics](#), [applied mathematics](#), [quantitative finance](#), [ecology](#) and [epidemiology](#). Human infectious diseases were of special interest because of the large amounts of available data over long periods of time, useful for developing and testing ecological theory. That, in turn, drew from longer-standing epidemiological and predator-prey models, all of which benefited from the infamous economist, [Thomas Robert Malthus](#).

In 1792, Malthus published his seminal work, [An Essay on the Principle of Population](#), which became known for predicting that resource constraints would ultimately trap civilization in poverty, branding economics as the ‘dismal science’. Economists tend to focus on the doomsday inaccuracy of his conclusions, which have not borne out due to dynamic changes in technology and human behavior. But his greatest contributions weren’t his predictions. Malthus presented two big ideas: 1) a general model of population growth, and 2) a mechanism of dynamic feedback where underlying individual behavior (reproduction and competition) fed back on aggregate effects of that behavior (overpopulation, resource constraints, and disease). In other words, he revealed an economic equilibrium as an emergent property of a complex system.

Thankfully, the fundamental logic of Malthus’s insights was not lost on biologists. It turned out that these forces could be found everywhere in nature, the recognition of which changed science forever. They led directly to [Darwin](#) and [Wallace’s](#) independent discovery of evolution by natural selection. Malthus’s model was foundational to human demography and population ecology (sometimes compared to Newton’s first law of uniform motion in physics), and ultimately to our understanding of infectious disease dynamics.

It seems that as economists have embraced the spirit of competition, they have been missing out on how other social, physical, and life scientists have been working together all along - often with the benefit of learning from economists. This is a shame. The great strength of economics, after all, has always been its ability to distill complex forces by inferring an understanding of individual behavior from observations of emergent patterns, with echoes throughout the sciences. A classic example of this is [Adam Smith's Invisible Hand](#), where market prices and quantities are determined by competition within broader forces of supply and demand. [Friedrich von Hayek's](#) concept of [spontaneous order - the 'marvel' of markets](#) - is akin to what scientists now refer to as 'self-organization'. [John Maynard Smith's](#) evolutionarily stable strategy in biology is a form of [Nash noncooperative equilibrium](#) in economics – though it seems they were developed independently. [Optimization theory](#), the leading analytical framework in microeconomics, has likewise contributed significantly to population biology and understanding of animal behavior.

These common frameworks in economics and the natural sciences have contributed directly to quantitative epidemiology. Models of pathogen evolution have relied on a combination of optimization theory and game theory, advanced by the likes of none other than [Marc Lipsitch](#) and [Carl Bergstrom](#) well before they were modeling dynamics of coronavirus or '[Calling Bullshit](#)' ☺ in science and [social media](#). The [coronavirus models](#) are themselves systems of differential equations, similar to those used for [economic growth theory](#) as well as so many other dynamical systems.

To be sure, there is a significant difference between quantitative predictions and qualitative insights, even if those insights are generated from quantitative methods. Academic epidemiologist and economists too often lose sight of this, and can be pathologically detached from solving problems. It was this kind of fetishization of quantitative methods, that led the Nobel Laureate, Jim Buchanan of George Mason University, to muse that "[most modern economists have no idea of what they are doing or even of what they are ideally supposed to be doing.](#)"

During this crisis, the worst feature of economics is this culture of [insularity](#), competition, and lack of purpose. Scientific progress happens through large collaborative teams with enormous range of expertise. For COVID-19, this includes frontline clinicians, immunologists, biochemists, lab-techs, data scientists, molecular biologists, epidemiologists, mathematical modelers, demographers, statisticians, ecologists, technologists, and policy experts. It requires rapid coordination and cohesion based on common goals.

A principle of global health is that we need to be as close to the problems as possible. Solidarity is both humane and practical. We are all (unfortunately) now closer to the same problem. Epidemiologists should encourage economists and others to jump into the fray of COVID-19 modeling. Economists have the chance to learn from epidemiologists and other disciplines more than it ever has before. Let's not waste another moment.