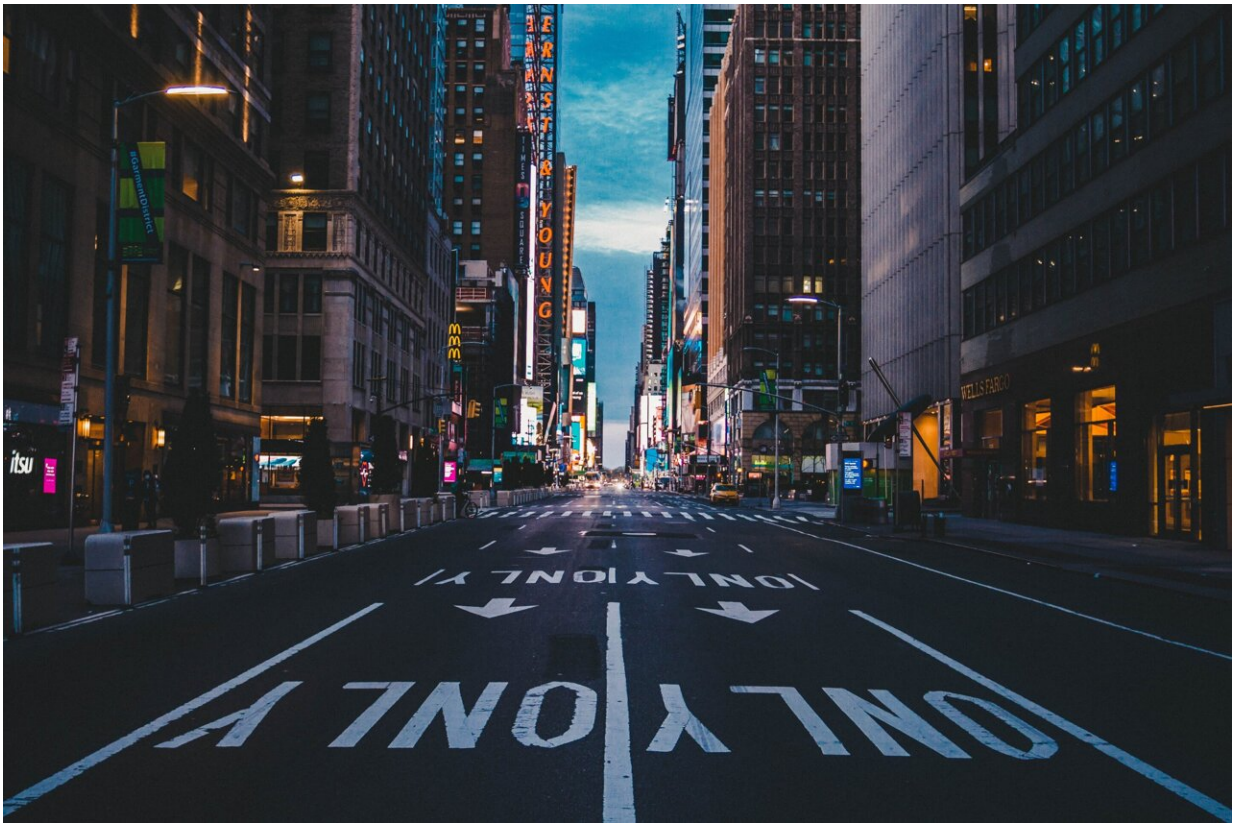


How a novel model resolves the key pandemic policy debates

November 20 2023, by Doyne Farmer



A deserted Times Square during the coronavirus lockdown in New York City.
Credit: Unsplash/CC0 Public Domain

Were lockdowns an effective response to COVID-19 or would it have been better to limit intervention and let individuals spontaneously reduce

their own risk of infection? Three years on from the public health emergency that caught governments across the world off-guard, official inquiries into pandemic policy responses are gathering pace, aiming to provide a definitive answer to this hotly contested question.

In New York City, the [comptroller's interim investigation](#) concluded that the substantial dual cost of the pandemic, both in terms of lives lost and [economic hardship](#) to residents and businesses, meant that it would be "critical" that [decision-makers](#) are better prepared in future to respond "quickly, completely and effectively."

In the U.K., the Independent Inquiry charged with investigating decision-making and political governance during the pandemic has come to a similar conclusion: that government as a whole was unprepared for the significant health vs. economy trade-off decisions that needed to be made. And policymakers did not have the data or models they needed to analyze the potential consequences of the decisions they were making in [real-time](#) in response to the crisis.

Our interdisciplinary team of researchers from institutions across the world has been working since 2020 to produce an epidemic-economic model to fill this gap and this week we launched [our work](#) in *Nature Human Behaviour*. Our model is ground-breaking in being based on real granular data, simulating the economic and epidemic outcomes of each individual of a synthetic population representative of the New York [metropolitan area](#).

New York City's COVID experience played a vital role in the model's development. Some 440,000 New Yorkers volunteered to have their phone movements tracked in a privacy-preserving manner, which provided valuable epidemiological information for our study. Our modeling was then tested using data from New York City's responses to COVID-19 and it accurately predicted both death rates and the impact

on the city's economy of the first wave of the pandemic.

For instance, the model predicted the striking disparities in unemployment between certain areas of Manhattan, where most workers were able to switch to working from home, versus areas in the Bronx and Queens, where the majority of workers were engaged in in-person, non-essential occupations and so lost their jobs. The model correctly predicted that parts of Bronx and Queens were facing up to six times more unemployment compared to the most affluent areas of Manhattan.

So, what does our novel model tell us about pandemic decision-making? Specifically, are the economic costs of lockdowns worth the public health benefits? Those who supported the lockdowns have argued that, if the virus had spread uncontrolled, not only would more people have become ill and died, but the economy would have suffered even more damage than the near-term effects of lockdowns as more illness and more fear would have hurt [economic activity](#) for even longer. So, under this view, there really is not a trade-off between health and the economy as minimizing health risks also maximizes the economic outcomes.

In contrast, those arguing against the lockdowns claimed that letting at-risk individuals (e.g., the elderly and those with compromised immune systems) act individually to reduce their risk of infection while the rest of the population carried on would have led to both better epidemic and economic outcomes, also with no trade-off.

Our quantitative, evidence-based research suggests that both camps are wrong. There are very real trade-offs and poor policy design can lead to risks for both lives and livelihoods. So, the challenge is to find policies that balance those risks. Again, our model provides a tool for doing that and enables policymakers to explore a range of scenarios and responses. While future pandemics would have different specifics, our analyses provided three general conclusions from the COVID experience:

First, closing non-customer-facing industries such as manufacturing and construction is not necessarily helpful, having little impact on infections but significantly increasing unemployment. Untargeted, blanket lockdowns were sub-optimal.

Second, delaying the start of protective measures does little to help the economy and worsens epidemic outcomes in all scenarios. Delays in response were very costly. The faster policymakers respond the better it is for both health and the economy.

Third, low-income workers bore the brunt of economic and epidemic harm caused by the pandemic, including job losses and infections (due to a lower propensity to work from home).

There is, therefore, an important inequality aspect to take into consideration when designing policies. Stricter lockdown and stronger behavior change lead to more jobs lost and to more lives saved among low-income workers, while they make less of a difference to high-income workers. Thus, if policymakers judge that stricter lockdowns are necessary for overall public health, stronger economic relief is required for low-income workers, and likewise if lockdowns are eased or avoided, more public health support is needed for low-income families.

From a policy perspective, the results in our paper show the importance of targeted policies. The quick closure of customer-facing industries is highly effective at reducing epidemic spreading—especially when enacted early. To complement such a policy, income-support schemes could target specific occupational categories, such as [food preparation](#) and serving of personal care and services, rather than workers in general, such as those engaged in construction, maintenance, production, extraction and repair occupations.

Our results could be instrumental to the design of policies aimed at

reducing the health and economic impact of pandemics as well as reducing inequalities by protecting low-income segments of the population in future health emergencies. In this way, New York's painful pandemic experience has helped shape a new tool that will improve the world's response to future events.

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