

“Flattening the Curve”: What Does it Cost, and What Does it Buy Us?

By John Mullin, Jessie Romero, and Sonya Ravindranath Waddell

In mid-March, states and localities across the United States began taking measures to reduce or delay the acceleration of new cases of novel coronavirus infection and the related illness, COVID-19, which epidemiologists refer to as “flattening the curve.” The goal has been to avoid exceeding existing healthcare capacity, while also buying time to increase that capacity and develop potential treatments and vaccines. But flattening the curve involves trade-offs that are both highly complicated and consequential; and indeed, some policymakers and citizens are becoming increasingly concerned that the costs of “social distancing” mandates and recommendations have started to outweigh the benefits.

Modeling a Virus

Economists have attempted to provide insights into the nature of the trade-offs by building and analyzing macroeconomic models of epidemics. Some of these macroeconomic models expand on the epidemiological models of William Ogilvy Kermack and A. G. McKendrick, which were first published in the 1920s and 1930s but remain relevant today.¹ In Kermack and McKendrick’s basic model, the number of new infections hinges on the number of contacts between those who are infected and those who are susceptible.

The rate of new infections increases in the earliest stage of an epidemic as the number of infected people grows relative to the number of susceptible people. Barring a seasonal break or the introduction of a successful vaccine, the rate of new cases eventually peaks and then declines as the susceptible, yet-to-be infected population becomes smaller. (The basic model assumes that those who are infected cannot rejoin the ranks of the susceptible). According to the theory, the time plot of new infections takes the shape of a bell curve — a pattern that has fit many historical epidemics.

Macroeconomists have extended such epidemiological models by allowing for the interaction between economic decisions and rates of infection. Marin Eichenbaum, Sergio Rebelo, and Mathias Trabandt, for instance, developed a model in which infection rates depend not only on the populations of infected and susceptible people, but also on levels of consumption and production.² In their model, consumption activities (think of shopping and dining) and production activities (think of working in an office or in a restaurant) increase human interaction and thereby increase the rate of new infections. When faced with an epidemic, economic agents

in their model voluntarily cut back on consumption and work. These decisions reduce the severity of the epidemic as measured by total deaths, but they also deepen the recession caused by the epidemic.

One of their key findings is that the outcomes predicted by the model are not optimal from a social point of view. The reason is that, while individuals tend to adjust their behavior to lower their own risk of infection, they do not fully account for the effect of their consumption and work decisions on the overall spread of the virus. As the authors emphasize, “This market failure does not reflect a lack of good intentions or irrationality ... It simply reflects the fact that each person takes economy-wide infection rates as given.” They conclude that this market failure provides a rationale for government containment measures that reduce consumption and production but raise overall welfare by reducing mortality.

Their model also addresses the possible discovery of a successful vaccine. In the absence of a possible vaccine, the epidemic would need to eventually run its course until the population achieved “herd immunity.” In this case, containment policies would mostly ensure that the health care system does not become overwhelmed. But with the anticipation of a successful vaccine, there is much more value in continuing to flatten the curve. Thus, they find that optimal containment policies become more stringent as the prospect of a successful vaccine becomes more likely.

Economic Costs

Voluntary and government-mandated measures to contain the virus have already exacted a significant toll on American households, workers, and businesses. Unemployment claims skyrocketed to an unprecedented 3.3 million in the week ending March 21; the following week, an additional 6.9 million Americans filed for unemployment. By May 16, almost 40 million claims had been filed in the nation. The unemployment rate in April climbed to 14.7 percent. GDP fell at a 4.8 percent annualized rate in the first quarter. While uncertain, the corresponding rate for second

quarter GDP is generally expected to be more than -30 percent, which is easily the lowest on record. All sectors of the economy have been affected; the 20.5 million net job losses from March to April spanned industries. But, not surprisingly, the greatest losses have been in the industries most affected by social distancing measures. Employment in leisure and hospitality, for example, was halved in April.

[Surveys](#) conducted by the Richmond Fed indicate that both manufacturers and service providers saw a decline in activity. The composite index of manufacturing for the District fell to -53 in April and remained well below zero — at -27 in May — indicating that conditions worsened for most manufacturers from April to May. Meanwhile, the headline revenues index for the service sector plummeted to -87 in April and remained low, at -48 in May. For both of these measures, the April reading was the lowest in a 25-year history. Preliminary results from a special survey on COVID-related declines indicate that just over a quarter of respondents were in danger of insolvency if conditions did not improve and most expected it to take at least six months before they would be back to pre-COVID levels of activity. In a survey conducted in late March by economists from the University of Illinois, Harvard University, and the University of Chicago, nearly 40 percent of small businesses thought it was unlikely or only somewhat likely they would still be open at the end of 2020.³ The future viability of small businesses is a top concern for the public and policymakers.

No Simple Trade-off

While macroeconomic models of epidemics are useful for understanding the nature of some of the trade-offs, their conclusions can be difficult to translate into operational policy. It is difficult to measure a particular policy’s effect on either economic activity or the loss of life. And there is even more uncertainty and disagreement about the appropriate trade-off between the two.

Economists — practitioners of the dismal science — have conducted numerous studies of labor market data to estimate the trade-offs that workers make between fatality risk and wages. Based on these analyses, economists have developed a measure called the value of a statistical life, or VSL, which policymakers use to weigh the benefits and costs of various risk reduction policies. The concept has been widely applied to assess product and workplace safety standards, and it also plays an important role in healthcare cost-benefit analyses. In the United States, estimates of the VSL vary widely, but the average is about \$10 million. If this number were to be used to inform the trade-off between the loss of life and the loss of economic value, it would imply that it is worth sacrificing 1 percent of U.S. GDP (or \$200 billion) to save 20,000 lives. It has been widely noted, however, that those most vulnerable to COVID-19 are often older and/or in poor health. Whether and how such considerations should affect their estimated VSLs are difficult questions to answer.⁴

More realistically, however, we do not face a simple trade-off between forgone GDP and COVID-19 fatalities. Indeed, there is reason to believe that the current economic downturn may contribute to fatalities in and of itself. Numerous studies in the United States and abroad have found a relationship between unemployment and poor mental and physical health outcomes.⁵ Researchers have also found a link between stress and social isolation and higher rates of domestic violence,⁶ and police departments across the country have reported an increase in domestic violence calls. The Charlotte-Mecklenburg police department received 517 more calls in March of 2020 compared to March of 2019, an 18 percent increase. Suicide rates also tend to increase during economic downturns, which could be exacerbated by social isolation and decreased access to community support and mental health care.⁷

Social distancing measures may also have long-lasting costs for children. More than 54 million K-12 students were out of school at the end of March.

Research suggests home schooling is an imperfect substitute for in-person instruction, and families vary widely in the time and resources they have to devote to instruction. In 2017, more than 14 percent of children between 3 and 18 years old did not have internet access at home, according to the National Center for Education Statistics, and many school districts have reported that large numbers of students are not attending school online.⁸ In addition, state and local governments will likely have to sharply reduce their future expenditures, which could affect education spending once schools reopen. A large body of research has demonstrated the importance of education for long-term outcomes and the potentially [long-lasting effects](#) of educational disruptions.⁹

While these considerations suggest that mitigation efforts may impose costs above and beyond the loss of current GDP, a recent study of the 1918 Spanish Flu puts mitigation efforts in a much more favorable light. Examining the economic performances of various U.S. cities between 1914 and 1919, Sergio Correia, Stephen Luck, and Emil Verner presented two key findings. First, the pandemic had negative effects on manufacturing activity. And second, cities that intervened earlier and more aggressively did not perform worse and, if anything, grew faster during the period studied.

A number of recent papers using high frequency data such as electronic transactions records also suggest that government-mandated mitigation efforts may have relatively modest effects on economic activity. For example, Denmark and Sweden faced similar exposure to COVID-19, but it was only in Denmark that the government significantly restricted social and economic activities. In a recent paper, researchers at the University of Copenhagen and the Center for Economic Behavior and Inequality estimated that aggregate spending dropped around 25 percent in Sweden but only an additional 4 percentage points in Denmark. These results suggest that the economic contractions were largely caused by the virus and the societies' voluntary responses to it and that government policy may have played a secondary role.¹⁰

What Are the “Right” Policies?

Are current U.S. social distancing efforts “worth it”? Economic theory provides a rationale for government-mandated mitigation measures that tend to reduce mortality at the cost of reduced GDP. And evidence based on the 1918 Spanish Flu pandemic seems to suggest that mitigation efforts do not necessarily entail a trade-off between fatalities and the economy, although the service-intensive economy of today is much different from the more agricultural- and manufacturing-intensive economy of the World War I era.

Clearly, the costs of social distancing are high, and people are hurting. Against this backdrop, the debate over the merits of government-mandated social distancing has become more highly charged and politicized in recent weeks. But it appears that there is still a broad consensus about two things: First, a certain level of social distancing is wise. And second, we would all like to see the economy opened up as quickly as is safely possible.

In order to maintain this (clearly non-unanimous) consensus, it may be important to recognize that the impact of social distancing measures varies greatly among different demographic groups and job categories. Many of the people who are bearing the greatest income losses associated with containment measures are small business owners and relatively young service-sector workers whose fatality risk is relatively low. And many people with the highest fatality risk are elderly and retired and are therefore losing relatively little income. Arguably, the unequal distribution of costs and benefits associated with containment measures creates a rationale for government transfer payments to at least partially compensate for the discrepancy.¹¹

It also will be important to have well-articulated and transparent standards for reopening. Perceptions of favoritism or that regulations do not apply equally to everyone could undermine the legitimacy of the social distancing mandates still deemed necessary by public officials.

Finally, it is difficult to know the extent to which easing social distancing restrictions will boost economic activity, as consumers may be cautious about returning to their previous levels of shopping, dining, and other interactions.¹² New health protocols and widespread COVID-19 testing and contact tracing will likely support consumer confidence and encourage a more robust economic recovery.¹³ ■

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Endnotes

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