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The Economics of the Coronavirus Pandemic

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ABSTRACT

The coronavirus pandemic has become a defining event of our times. There is no "normal" in our lives today. Everything has changed. For nearly a year, we have all been affected by the disease in one way or another. The purpose of this article is to try to enlist the power of economics to help understand some aspects of the coronavirus pandemic. The pandemic has not just been a public health disaster. It has also caused an economic disaster. The disease has caused significant rises in unemployment and drops in Gross Domestic Product around the world. In the longer-term cost is that a large number of people, mostly women who are mothers, appear to have been leaving the labor force altogether. In discussing policy responses to the pandemic, we can distinguish between two different classes of responses: one addressed to the health issues raised by the pandemic; the other addressed to the economic issues. An important point to bear in mind is that the health and economic policies are related.

1. Introduction

The coronavirus pandemic has become a defining event of our times. There is no "normal" in our lives today. Everything has changed. For nearly a year, we have all been affected by the disease in one way or another. Some of our friends, relatives, colleagues, and noted people have had the disease, and, in far too many instances, people we know have died from the disease. We have not been able to see our friends and families, save by video. We have not been able to hug our grandchildren, our fathers, mothers, sisters, and brothers. Our schools have been closed. Our plans to travel have had to be shelved. We are

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still avoiding crowds, wearing masks whenever we leave our homes and apartments, washing our hands frequently, and mastering the art of the Zoom class or meeting. But there is hope for an end. Vaccines against covid-19 are becoming available after heroic efforts of discovery, development, manufacture, and distribution. By the end of the summer of 2021, we will all, we hope, have an opportunity to be vaccinated against covid-19. And then, sometime next year, life can resume.

My focus throughout will be on the United States, but that is only because I am much more familiar with matters in that country. I hope that readers will recognize in their own countries events and issues that are analogous to those I highlight and will be able to derive some lessons for policy. There are risks in writing about an ongoing event like the coronavirus pandemic. Matters change quickly, and we are learning more each week about the virus. When last I wrote about this topic, in the early Summer, 2020, things were very different, both in scope and in the extent of our knowledge of the disease. We thought that a lot of people had contracted the virus in June, but now we are talking about 18 million people having had the disease in the U.S., and more than 320,000 deaths - numbers that were unimaginable six months ago. Moreover, what we thought we knew about the virus on April 15 was contradicted by something credible that was publicized on July 20 and then adjusted again in early December. Because our knowledge is deepening and events are unfolding so quickly, there is always a chance that what I have to say today will be out of date tomorrow. With that caveat, let's begin.

The purpose of this article is to try to enlist the power of economics to help understand some aspects of the coronavirus pandemic. I begin with a brief history of this particular pandemic and a comparison with other recent or historical pandemics. Then I will turn to a brief account of the economic impact that the pandemic has had, followed by a discussion of the public health and economic policy responses to the pandemic. Finally, in Section V I shall use economics to examine a few particular issues of the pandemic.

2. Background on the Pandemic

The beginning of our current health and economic woes dates to the outbreak in Wuhan, China, in December, 2019, of the disease, covid-19, that comes from being infected by the novel coronavirus, SARS-CoV-2.[1] The virus and its disease spread so quickly from its origin that the World Health Organization declared the situation to be a pandemic on March 11, 2020. According to this dating, the world is currently in the 11th or 12th month of the pandemic. Worldwide, there have been – as of mid-December, 2020 – 72 million cases of covid-19 reported, and about 1.7 million deaths.[2] That is a case fatality rate (or CFR, a term of art in epidemiology) of 0.023 or 2.3 percent. That is a much lower CFR than in the early days of the pandemic but is significantly higher than the CFR for seasonal influenza.[3] Those are breathtakingly large numbers.

1. A coronavirus, unlike other viruses, has projections on its surface that provide the virus with a strong means of grasping onto the surface of human cells and then inserting itself into the human cell in order to make use of human cell mechanisms to duplicate the virus. This coronavirus is called "novel" because there are other coronaviruses known to virologists, for example, the virus that causes the common cold; the very name of this current coronavirus — SARS-CoV-2 (pronounced "sars co vee two") — suggests that there was an earlier, similar coronavirus, as, in fact, there was. SARS comes from "Severe Acute Respiratory Syndrome," in recognition of the fact that the disease that it causes tends to focus on the respiratory tract. "CoV" is shorthand for "coronavirus." The numeral 2 distinguishes this new coronavirus from the one (SARS-CoV-1, as it is now called) that gave rise to the SARS epidemic in 2003. The disease that arises from infection with SARS-CoV-2 is called "covid-19," which designates that it is a coronavirus disease that was first identified in 2019.

To further distinguish the 2003 epidemic from today's pandemic, consider this: "According to the World Health Organization, a total of 8,098 people became sick with SARS during the 2003 outbreak. Of these, 774 died. In the United States, only eight people had laboratory evidence of SARS-CoV-1 infection. All of these people had traveled to other parts of the world where SARS was spreading." See https://www.cdc.gov/sars/about/fs-sars.html.

2. See https://coronavirus.jhu.edu/map.html for the latest figures. These figures have doubled since August, 2020.

3. In essence, the CFR measures the percentage of cases that result in death. Measuring the CFR is difficult and subject to controversy. Should, for example, all the fatalities be attributable to this disease or to an underlying condition, which might have been aggravated by the virus? And has the jurisdiction accurately measured the number of cases? See, for example, Jeremy Samuel Faust & Carlos del Rio, "Assessment of Deaths from COVID-19 and From Seasonal Influenza," *JAMA Intern. Med.*, May 14, 2020, available at https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2766121. The authors conclude that a "case fatality rate of 0.5% would still be 5 times the commonly cited case fatality rate of adult seasonal influenza."

An alternative measure of the devastation of any disease is to scale not by the number of cases but by some unit of population, such as one million persons. That "mortality rate" has fewer shortcomings than the CFR. The top ten countries by deaths from covid-19 per 1 million population as of August 4, 2020, are as follows: Belgium – 862.37; United Kingdom – 695.0; Peru – 619.3; Spain – 609.37; Italy – 581.92; Sweden – 564.07; Chile – 518.28; USA – 474.45; Brazil – 451.93; and France – 450.28. A few other countries for the sake of comparison: Iran – 212.77; Germany – 110.39; Russia – 98.17; Israel – 61.46; Norway – 48.17; India – 28.79; and Japan – 8.05. Statistics available at www.statista.com. I give some different but related comparative statistics later.

The country with the most reported cases as of mid-December, 2020, is the United States. The U.S. has more than 18 million cases and more than 320,000 deaths. That is a CFR of 1.8 percent, lower than it was earlier this year in the U.S., lower than in the rest of the world, but still shockingly high. Put slightly differently, the United States, with a total population of 331m people, constituting 4 percent of the world's population, has had about 25 percent of all the world's reported covid-19 cases and 18.9 percent of world deaths from the disease.[1] Another shocking way of putting this is that more people in the U.S. have died of the coronavirus than died in all of World War II.

For the sake of comparison, Iran, with a total population of approximately 84 million people, has had 1.1 million cases, ranking 15th in the world in the total number of cases. With 52,000 deaths, the CFR of Iran is 0.06 percent, among the lowest in the 20 countries with the most reported cases of covid-19.[2]

The pattern of new cases in the United States can be seen in the graph below. The first notable outbreaks in the U.S. occurred in early March and rose to a peak in late May and early June. The 7-Day average of new cases, shown by the heavy line in the figure, either fell very slightly in the early Summer or remained roughly at the late May level until early July. Between July and late August there was another increase in new daily cases, rising to a peak of about 60,000 per day. That increase then tapered off in September and early and mid-October before then beginning a third climb that, as of mid-December, has reached a 7-Day average of new daily cases of 214,270. That means that every five days one million new cases are being added.

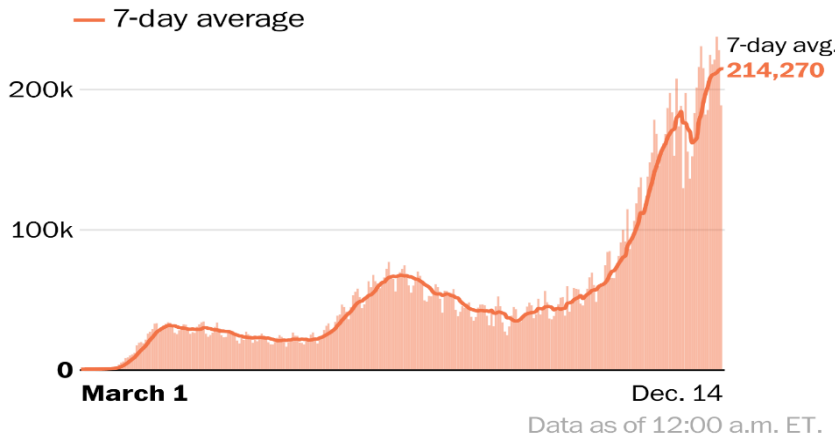
1. The reasons for the decline in the CFR in the U.S. and in the world are several. One is the fact that treatment for the disease has improved significantly over the course of the pandemic. Another is that testing for the presence of the coronavirus has improved so that patients are getting treated earlier in the course of the disease. Yet another is that the coronavirus itself may have mutated to a less virulent strain.
2. See Johns Hopkins covid-19 dashboard, supra n. 3.

Why has this dramatic surge arrived in the late Fall and early Winter? There are several reasons. One is that the weather is turning colder, and, as a result, people are spending more time indoors in close proximity to others. There is also a reasonable conjecture that the coronavirus prefers and thrives in colder weather. A second reason is that people are experiencing "pandemic fatigue": They are being less careful about wearing masks, not mingling with strangers, and in observing social distancing. A third reason is that during the Thanksgiving holiday in late November (one of the largest travel holidays in the U.S. each year), millions of people left home to visit friends and family across the country. Many public health experts, including Dr. Robert Redfield, the head of the Centers for Disease Control and Prevention, one of the most respected public health organizations in the world, urged people not to travel but was widely ignored.

We know that deaths from covid-19 increase within a week or two of an increase in the number of new daily cases. And the recent figures indicate that this has begun to happen. Deaths are now occurring at a rate of 2,500 to 3,000 per day. That means that every week between 17,500 and 21,000 people die of the disease. That is, every five weeks, another 100,000 people die, nearly twice the number who died in the entire Vietnam War.

Public health experts predict that the number of new cases and deaths is going to increase throughout the Winter, unless people's behavior changes dramatically. Credible predictions by the Institute of Health Metrics and Evaluation (IHME) at the University of Washington estimate the number of deaths from covid-19 in the U.S. could reach more than 500,000 by April 1, 2021.[1]

1. See https://covid19.healthdata.org/united-states-of-america?view=total-deaths&tab=trend. IHME estimates that deaths from covid-19 could reach almost 79,000 in the Islamic Republic of Iran by April 1, 2021. See https://covid19.healthdata.org/iran-(islamic-republic-of)?view=total-deaths&tab=trend.



Source: *Washington Post*, Dec. 15, 2020

The magnitude of the current health crisis becomes evident if we compare this pandemic to other recent health pandemics. In the Ebola virus outbreak of 2014-2016 there were about 28,000 cases and 11,300 deaths in West Africa and 36 cases and 15 deaths that occurred elsewhere in the world.[1]

The only comparable modern pandemic to today's was the Spanish influenza outbreak of 1918-1919. Estimates are that about 500 million people, one-third of the world's population then, contracted the disease (which was caused by the H1N1 virus, which is also a coronavirus and is still with us) and that worldwide deaths were 50 million, with approximately 675,000 deaths in the United States.[2]

These statistics illustrate the immense seriousness of the current coronavirus pandemic. This health crisis is orders of magnitude worse than any other recent health scare and unlike anything that the world has seen since the Spanish flu outbreak more than 100 years ago.

1. Note that the CFRs from the 2003 SARS outbreak and the 2014-2016 Ebola virus were much higher than that for covid-19 but that both SARS and Ebola affected a much smaller number of people worldwide and in the U.S.
2. See https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html. The CFR for the "Spanish influenza" was approximately 10 percent, slightly more than double the early CFR of covid-19.

Although we have learned a great deal about covid-19 and the novel coronavirus over the past year, there is still much that we do not know. And our uncertainty has contributed to our chaotic public health responses to the virus.

Let us begin with what we have learned. First, we have learned that the disease has a greater effect on those with underlying health problems, such as obesity, diabetes, and heart and respiratory problems. Because the elderly are more likely than the population at large to have these health problems, 80 percent of covid-19 deaths in the U.S. are among adults 65 years old and older.[1] Although young people get the disease, they seem not to become as sick from the virus as older people do.

Second, we have learned that asymptomatic people may account for between one-third and one-half of all transmissions of the virus. This last point highlights the importance of being able to test widely for the presence of the novel coronavirus and to get those results quickly. In the early days of the pandemic, tests were expensive and, therefore, done only when someone was symptomatic — that is, they had a fever, coughing, shortness of breath, loss of the senses of taste and smell, and the like. The discovery that asymptomatic people were accounting for a significant portion of the transmission changes the importance of testing, in two ways. It indicates, first, that testing needs to be widespread, not just for the symptomatic. And second, it indicates the importance of getting results quickly. The faster that results come back, the faster and easier is "contact tracing," finding and alerting those with whom those testing positive for the disease have been in close and recent contact. I do not believe that the importance of testing in stopping the spread of the virus has been widely appreciated outside of professional public health specialists. President Trump, for example, believes that wider testing simply finds more people with the disease and makes his administration look bad. So, he said, perhaps jokingly, that he asked his people to "slow the testing down, please."[2]

1. See the Kaiser Family Foundation (KFF) website at https://www.kff.org/coronavirus-covid-19/issue-brief/what-share-of-people-who-have-died-of-covid-19-are-65-and-older-and-how-does-it-vary-by-state/#:~:text=Adults%2065%20and%20older%20account,%25)%20over%20the%20same%20period. The Kaiser Family Foundation focuses on health care and health policy in the U.S.

2. See https://thehill.com/homenews/campaign/503758-trump-quips-that-he-told-aides-to-slow-the-testing-down-for-coronavirus.

Shortly, I shall elaborate on a successful and exemplary testing regime at the University of Illinois. As we shall see from that example, there is still not nearly enough testing for covid-19 going on in the U.S.

Third, we have clarified our understanding of how transmission occurs. We used to believe that the coronavirus could be picked up from surfaces, including, perhaps, food. So, we were admonished to wash our hands frequently and for 20 seconds (which, we were also told, we could measure by singing "Happy Birthday to You" twice) each time. Now there is evidence that surfaces are not a likely source of the virus; rather, airborne respiratory droplets are the principal means of transmission and subsequent infection. From this fact has come the strong public health admonition to wear face masks,[1] maintain social distancing, and limit the size of indoor gatherings.

Fourth, as mentioned above, we have also learned that there is something called "pandemic fatigue," a tiredness of complying with all the restrictions and particularly of not being able to meet with friends and family, and that that fatigue has contributed to recent surges in the number of cases and of deaths.

Fifth, we have learned very recently how remarkably powerful person-to-person transmission can be. On February 26 and 27, 2020, just as fears of this pandemic were taking form,[2] Biogen, a biotechnology company that "specializ[es] in the discovery, development, and delivery of therapies for the treatment of neurological diseases,"[3] such as Alzheimer's, held a conference in a hotel in Cambridge, a suburb of Boston. 175 company executives from Italy, Switzerland, Germany, and the U.S. attended the conference. Within days, attendees began falling ill with covid-19. Initially, it was thought that only one person at the conference had had the disease and that all the other 28 cases among attendees stemmed from that one person. Investigators discovered that all 28 had been infected by a particular strain of the

1. As a rough rule of thumb, the probability of contracting the disease is said to be reduced by half from mask-wearing.
2. Remember at the time how new this all was. Only 30 covid-19 infections had been confirmed in the entire U.S., including only one in Boston.
3. See https://en.wikipedia.org/wiki/Biogen.

coronavirus "that had not previously been seen in the United States. The only known instances of the strain that preceded the Biogen conference involved two French patients, ages 87 and 88."[1] That marker and another, closely related one allowed researchers at the Broad Institute of Harvard and MIT to track the coronavirus strain from its transmission at the Cambridge conference throughout the United States and across the world.

By May, [2020,] it was estimated that between 44,000 and 56,000 known coronavirus cases were directly tied to the Biogen conference. About 40 percent were in Boston, but the C2416T strain was carried across the country to Indiana, Florida, North Carolina, and perhaps elsewhere by people who had been at the meeting. Fresh data included in the current analysis raised the estimate [of the total number of people infected by the attendees at the conference] to about 245,000 cases – as low as 205,000 and as high as 300,000 – in 29 states. The researchers estimated that the Boston strain of the virus was responsible for 1.9 percent of all known coronavirus cases in the United States through October.[2]

This is a remarkable indication of how being cavalier about taking precautions against transmission can lead to immense episodes of transmission. That is why these gatherings that result in large numbers of infections are called "superspreader" events.[3]

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1. Michael Wines & Amy Harmon, "What Happens When a Superspreader Event Keeps Spreading," *New York Times*, Dec. 11, 2020, available at https://www.nytimes.com/2020/12/11/us/biogen-conference-covid-spread.html?searchResultPosition=1. The reporters based their newspaper article on a scientific study: Jacob E. Lemieux, Katherine J. Siddle, et al., "Phylogenetic analysis of SARS-CoV-2 in Boston highlights the impact of superspreading events," *Science* 10 Dec. 2020, available at https://science.sciencemag.org/content/early/2020/12/09/science.abe3261.full.

2. Wines and Harmon, supra n. 13.

3. There have been other examples of superspreader events (although not studied with the thoroughness of the Biogen conference example). For instance, the White House has been the site of at least three superspreader outbreaks; many of President Trump's campaign rallies were superspreader events; and the Sturgis, SD, motorcycle rally in August, 2020, was a superspreader event. (See Mark Walker & Jack Healey, "A Motorcycle Rally in a Pandemic?: 'We Kind of Knew What Was Going to Happen,'" *New York Times*, Nov. 6, 2020, available at https://www.nytimes.com/2020/11/06/us/sturgis-coronavirus-cases.html?searchResultPosition=3). That motorcycle rally may have led to 300,000 new cases of covid-19 as the infected attendees returned to their homes across the U.S.

Finally, as I have also indicated, we can see the value of testing for the presence of the coronavirus by looking at a case study of my own institution, the University of Illinois at Urbana-Champaign.[1] One of the criteria that public health experts frequently use in making decisions about what restrictions to impose on a jurisdiction is the positivity rate for the coronavirus among those tested. Often a rate of 10 percent[2] is a threshold in that if the actual rate is above 10 percent, public health officials recommend stricter measures of mask-wearing, social distancing, crowd size, mandated business closings, and the like. When more than 40,000 students returned to the University of Illinois to resume classes in mid-August, 2020, the university administrators were very aware of the dangers that the coronavirus presented for the good health of the students, faculty, and staff. So, using a saliva test that had been developed by the University's Department of Chemistry, the University adopted the requirement that all students, faculty, and staff take two tests per week for the presence of the coronavirus. The University also created a mobile phone app that each member of the University community was required to have; that app showed where to get a saliva test, the results of the member's most recent test, and a badge (colored yellow, orange, or red) to indicate whether the member's latest test was negative (yellow) so that they could be admitted to any University building or that a test was overdue (orange) and admission was denied or that a test showed a positive (red) result and that

1. For general information about the covid-19 plan at the University of Illinois at Urbana-Champaign, see https://covid19.illinois.edu/.

2. A positivity rate of 10 percent means that 10 out of every 100 tested has, according to the test, the coronavirus. I emphasize "according to the test" because every test has false positives (the test reports that the subject *has* the coronavirus when, in fact, he does not) and false negatives (the test reports that the subject does *not* have covid-19 when, in fact, she does have it). There are two principal tests – the nasal swab test and the saliva test. For the nasal swab test the false positive rate is thought to be close to zero; the false negative rate has been between 2 and 29 percent. For the saliva test, the false positive rate is also thought to be close to 0, and the false negative rate is thought to be around 5 percent. The safest thing to do to minimize either a false positive or false negative result is frequent re-testing. Tests for antibodies are not thought to be reliable. Note, too, that the positivity rates gives an accurate picture of covid-19's penetration in a population only if either a large fraction of that population has been sampled (as at the University of Illinois at Urbana-Champaign) or the sample, though small, is representative of the entire population. My guess is that in most U.S. communities neither of those conditions holds.

admission was denied till a quarantine period had passed.[1] Students positioned at the entrance to every University building checked each entrant's app to see if he or she was cleared to enter. Until the weather became more winter-like, there were 17 places across campus at which students, faculty, and staff could have a test done. Results came back within four hours. Now, in the colder weather and given the fact that most students have left campus for home, there are only five test sites. If a test was positive, the University would notify the Public Health Department, who would then contact the positive person with information about isolating and taking contact information.

The program has been spectacularly successful. The positivity rate for the University community is around 0.4 percent. For comparison, the positivity rate for the county (Champaign) in which the University resides is around 8 percent.[2] The number of students on campus who have tested positive for covid-19 is less than 1 percent. There have been no deaths of University personnel from covid-19. Most remarkably, there are so many tests being conducted by the University that on any given day, the University is performing between 2 and 3 percent of all coronavirus tests in the United States.

What we do not know is important, too, in devising sensible public health policies. One important thing that we do not know is whether having had covid-19 and survived generates antibodies that protect the individual from a recurrence of the disease, and if a recurrence is possible, whether that recurrence will be worse, the same, or not as serious as previous episodes. There is now some anecdotal evidence that those antibodies do *not* protect against catching the disease a second or third (and so on) time. As a result,

1. The "Safer Illinois" app also had a voluntary contact-tracing capability that, if activated, would record the presence of every phone that came within six feet of another person's phone. This information could then help contact tracers alert others if a University community member's test was positive.

2. The State of Illinois excludes the University's test results for those of Champaign County for the purposes of determining public health restrictions, if any. There is no question that the percentage of nonuniversity county residents who take tests for covid-19 is much, much smaller and almost certainly nonrepresentative of the larger county population than is the case on both dimensions for the university community.

antibody testing, which was touted early in the pandemic as an important means of determining who had and might have survived covid-19, becomes less important than tests to determine who currently has the disease.

Relatedly, we do not have enough widespread experience with the Pfizer/BioNTech, Moderna, AstraZeneca, and other vaccines to know whether they provide seasonal or longer protection against covid-19.

Finally, we know that, in the U.S., covid-19 strikes minority populations so much harder than other groups and seems to be much more infectious to Native American, black, and Latinx populations than to others. This has been a sad mystery until relatively recently. There is increasing evidence that the higher infection rates among minority populations are due to those groups's pre-infection social inequalities and not to a lack of medical care or of access to quality medical care.[1]

3. The Economic Costs of the Pandemic

The pandemic has not just been a public health disaster. It has also caused an economic disaster. The disease has caused significant rises in unemployment and drops in Gross Domestic Product around the world. In the United States, there were approximately 40 million adults who filed for unemployment benefits in the period between March and July, 2020. That is not quite one-third of the labor force and has led to the highest levels of unemployment – on the order of 15 percent – since the Great Depression of 1929 to 1933.

Since the Summer, there has been a slow but steady recovery in employment so that in early December, the unemployment rate is just below 7 percent. Unfortunately, that seemingly strong recovery is both fragile and is hiding a potentially serious longer-term problem for the U.S. economy. The fragility is coming from two factors. First, the recent surge of a "second wave"

1. Recent studies seem to indicate that while minorities are infected at higher rates than nonminorities, the mortality rates of covid-19 sufferers once they are in the hospital are the same for minorities and nonminorities. See Gina Kolata, "Social Inequities Explain Racial Gaps in Pandemic, Studies Find," *New York Times*, Dec. 9, 2020, available at https://www.nytimes.com/2020/12/09/health/coronavirus-black-hispanic.html?searchResultPosition=1.

of cases – illustrated and discussed in Section II – has caused an uptick in new unemployment claims and in the number of unemployed. In recent weeks (late November and early December) the number of unemployed has been rising from about 5,500,000 to 6m and the weekly number of new unemployment insurance claims is between 850,000 and 1m.[1]

Second, the longer-term cost is that a large number of people, mostly women who are mothers, appear to have been leaving the labor force altogether (and the U.S. counts as "unemployed" only those who are looking for a job but cannot find one). Women are leaving the workforce at four times the rate of men. In September, 2020, approximately 865,000 women decided not to keep working, principally so as to stay home with children who are not in school. During that same month only 216,000 men left the workforce.[2,3]

In late July, the U.S. Commerce Department estimated that in the second quarter of 2020 (the period of April, May, and June), the U.S. GDP fell 9.5 percent, which equates to a 32.9 percent annual rate of decline. This was the largest three-month collapse since modern recordkeeping began in the late 1940s and "wiped away nearly five years of growth."[4] The good news is that in the 3d quarter, the U.S. economy grew at an annualized rate of 33.1 percent, which almost restored the losses of the downturn of the 2d quarter.

1. Eric Morath, "U.S. Unemployment Claims Rise to Highest Level Since September," *Wall Street Journal*, Dec. 10, 2020, available at https://www.wsj.com/articles/weekly-jobless-claims-coronavirus-12-10-2020-11607552060. There are approximately 19m continuing unemployment insurance claims.

2. Avie Schneider, Andrea Hsu, & Scott Horsley, "Multiple Demands Causing Women to Abandon Workforce," *National Public Radio News*, Oct. 2, 2020, available at https://www.npr.org/sections/coronavirus-live-updates/2020/10/02/919517914/enough-already-multiple-demands-causing-women-to-abandon-workforce.

3. More recent data indicate that a total of four million people have left the labor force between February and November, 2020 – most of them women. The labor force participation rate just before the pandemic (in January, 2020) was slightly above 63 percent (which is low by historic standards). In late November that rate was 61.5 percent. See "Measuring the Impact of the Pandemic on the Economy," *New York Times*, Dec. 18, 2020, B5, available as "How the Economy Is Actually Doing, in 9 Charts" at https://www.nytimes.com/interactive/2020/12/17/business/economy/economic-indicator-charts-measures.html?searchResultPosition=1.

4. Ben Casselman, "Virus Wipes Out 5 Years of Economic Growth," *New York Times*, p. 1, July 31, 2020.

The GDP growth record for the 4th quarter of 2020 will not be known till the early part of 2021, but there are some indications that the vigor of the 3d quarter recovery will not be repeated. There is a strong inverse correlation between the vigor of the economy and the new number of new covid-19 cases. The remarkable increase in cases in the past two months may well mean a significant downturn in GDP growth.

For other countries, the impact of the pandemic on economic growth and well-being has been large but mixed. Estimates are that the GDP of the UK will fall 11.5 percent this year. Germany reported, in late July, a drop in GDP for the second quarter of 2020 that was even greater than that in the U.S. China has had a relatively modest decline of 2.6 percent in its GDP (on an annualized basis) and has recently reported a 3.2 percent increase in GDP in the second quarter of this year over the second quarter of 2019. The prospects for growth later in this year in all these countries are, as in the U.S., inversely correlated with the number of new cases of covid-19.

4. The Policy Responses to the Pandemic

In discussing policy responses to the pandemic, we can distinguish between two different classes of responses: one addressed to the health issues raised by the pandemic; the other addressed to the economic issues. An important point to bear in mind is that the health and economic policies are related. To see this, recognize that consumers are not going to return to in-person dining and shopping if they do not feel safe doing so. Nor are employees going to return to work if they perceive the workplace as a place where they are more likely to catch covid-19 than if they stayed at home. So, the safer people feel from infection, the sooner they will return to work and routine commercial activities. That is, the public health and economic responses are not at odds but complementary. As Austan Goolsbee, the head of President Obama's

Council of Economic Advisors and Robert P. Gwinn Professor of Economics at the Booth School of Business, the University of Chicago has said: "The first law of pandemic economics is 'Get control of the virus.'"

Another complication in policy response, at least in the U.S. case, is to ask what level of government was instituting and enforcing a policy response to the pandemic. The American system of governance has three levels of government – federal, state, and local.[1] We might, therefore, consider how each level has responded to the coronavirus pandemic.

A. Public Health Policy

The public health response from the federal government has been thoroughly incompetent: weak, contradictory, and politically motivated. When the first reports of the disease arrived in late January, 2020, the President was preoccupied with his impeachment trial in the U.S. Senate (which began on January 16). He had apparently been briefed in late December and early January by intelligence officers and one of his economic advisors, Peter Navarro, about the possibility of a pandemic. But in the absence of more compelling evidence and given the momentous importance of the impeachment trial, the President did not to pay close attention to these early reports.

President Trump routinely downplayed the severity of covid-19 and suggested that the Democrats were building hysteria about the disease in their campaign to damage his presidency. As he memorably said in early February,

1. We might also recognize an international level of governance and response, as epitomized by the World Health Organization (WHO). And there may also be regional organizations across countries and regional agreements at the sub-national level, as in interstate compacts in the U.S. Recently, seven U.S. states (Virginia, Louisiana, Massachusetts, Michigan, North Carolina, Ohio, and Maryland; three of the states are led by Republican governors; four, by Democrats) have formed a compact to purchase rapid-detection tests for covid-19 together. See Erin Cox, "There's no national testing strategy for coronavirus. These states banded together to make one," *The Washington Post*, August 4, 2020. Some states in the U.S. formed regional interstate compacts to purchase personal protective equipment (PPE) for health care workers. The fact that the states felt compelled to form these compacts and that the federal government did not undertake to use its much greater buying power to acquire the rapid-response tests or PPE is a part of very telling indictment against the Trump Administration's handling of the coronavirus pandemic.

"There are only 15 people with the disease, and soon there will be none." And "It's like a miracle; someday it will just disappear."[1]

We now know – from the tapes that the journalist and author Bob Woodward made of his phone conversations with President Trump between January and June, 2020, for his book *Rage* (2020) – that from late January, 2020, President Trump knew the dangers of the coronavirus pandemic, fully understood its methods of transmission and how widely it could spread, and had been warned by his political advisors that the pandemic could cost him his reelection bid in November. Why he knew of these matters and not only did very little but actively argued against following the advice of his public health advisors is inexplicable.

Trump's unfortunate attitude pervaded the federal government and many state governments and dissuaded many of those governmental entities from acting to address the disease for the remainder of his presidency. This terrible leadership on Trump's part may well have been a significant factor in his loss to President-elect Joseph R. Biden, Jr. Much of the Administration's rhetoric about the pandemic was muddled and contradictory. The President appointed a Coronavirus Task Force, presumably to advise him, but then routinely ignored their advice, attacked the public health experts on the task force, browbeat the heads of the Centers for Disease Control and Prevention and the Food and Drug Administration in an effort to politicize their regulatory roles in the pandemic response, and impeded efforts in the states to institute public health measures to control the spread of the disease.

In only two instances did the Trump Administration do the right thing, and in both of those cases their efforts were half-hearted.[2] In the first instance, the president invoked the Defense Production Act of 1950, legislation introduced

1. See Christian Paz, "All the President's Lies about the Coronavirus," *The Atlantic Monthly*, July 13, 2020, available at https://www.theatlantic.com/politics/archive/2020/07/trumps-lies-about-coronavirus/608647/?utm_source=share&utm_campaign=share.

2. I shall discuss the second instance of the Administration's getting pandemic policy right in a following section in which I discuss vaccines.

at the beginning of the Korean War that allows the president to direct private manufacturers to produce items needed in an emergency.[1] In this instance, the president said that he would use the Act to instruct certain manufacturers to produce personal protective equipment (PPE), items that were and still are running short in hospitals and that doctors and nurses need to treat covid-19 patients safely, and to limit the export of PPE.[2] Some manufacturers independently undertook to cut back on the production of their profit-making goods, such as cars, in order to turn some of their capacity to producing such things as ventilators to help covid-19 patients in intensive care units breathe. Much more could and should have been done under the Defense Production Act.

Yet another failure of the Trump Administration was its failure to maintain the Strategic National Stockpile (SNS).[3] That stockpile was a collection of medical equipment, medicines, and supplies that had been created by Congress in 1998, toward the end of President Clinton's second term. Apparently, President Clinton had read a novel about a pandemic and realized, on the basis of a plot development in that book, that the United States needed to have a stockpile of medical supplies. He urged Congress to begin such an effort; Congress agreed and authorized the creation of the stockpile. Presidents Bush and Obama contributed during their two terms in office so that when President Trump assumed office in early 2017, the SNS was fully stocked. When the coronavirus pandemic began in early 2020, the Trump Administration found the SNS to be depleted, dangerously so. They falsely accused the Obama Administration of having failed to maintain the supplies of medicines, PPE, and other equipment, claiming that they had inherited an

1. See https://www.cfr.org/in-brief/what-defense-production-act.
2. The President suggested that the shortage was due to doctors and nurses taking the equipment from hospitals for their own use. There is not a shred of evidence to support this suggestion.
3. See https://www.phe.gov/about/sns/Pages/default.aspx. That website has been edited since last Summer to remove any history of the SNS that would put President Trump in a bad light. To get the true history and to compare it with the version now posted by the U.S. Department of Health and Human Services, see https://en.wikipedia.org/wiki/Strategic_National_Stockpile.

"empty stockpile." In Congressional hearings in May, 2020, Dr. Rick Bright, an official of the U.S. Department of Health and Human Services, testified that it was the Trump Administration that had not taken care of the Strategic National Stockpile. The President promptly fired him, and Dr. Bright's former employer, HHS, rewrote its website to remove the true history of the stockpile.

On March 13 the president declared a "national emergency" due to covid-19. What that emergency entailed was not entirely clear,[1] for two reasons. First, the federal government did not really follow its declaration with concrete steps and, worse, was inconsistent. The emergency order suggested that the federal government intended to promulgate guidelines drawn up by the Centers for Disease Control and Prevention, but then the president disavowed those guidelines and, worse, began to use Twitter to encourage citizens in the states that enacted public health measures to oppose those measures.[2] In one of those states, Michigan, men armed with assault weapons briefly occupied the state legislature to protest the governor's public health orders.

A second reason for the ineffectiveness of the president's emergency order was that his administration's dithering about what to do – including its repeated contentions that the pandemic was not serious but was, rather, a mild influenza – left such a vacuum in the nation's policy space that many of the nation's fifty governors, some of them working in conjunction with other governors in their region, took over the task of crafting public health policies to address the pandemic. In many states, most of them in the northern and eastern halves of the country, the principal policies were to issue "stay at home" orders, ban gatherings of more than 10 people, close commercial and retail businesses, and the like. Public health officials are the ones who suggested these responses, and many governors tied their policies to those

1. One week before the emergency declaration, the President authorized $8.3 billion in spending on the pandemic, $5.3 billion for ongoing efforts to contain the virus and $3 billion for research on a vaccine against covid-19. On the same day as the President declared the pandemic to be a national emergency, he also suspended all interest payments on student loans until the end of the pandemic.

2. In at least four instances involving states with Democratic governors, President Trump tweeted the message "LIBERATE!" adding four state name in the blank – thereby encouraging his followers to protest lockdowns or stay-at-home orders.

suggestions. And, as indicated in note 35, the President not only did not support the governors; rather, he urged them to rebel, literally, against the public health measures.

But some governors, most of them Republicans and most of them in southern states, such as Florida, Texas, and Arizona, did not follow those suggestions. They allowed commercial entities to remain open, would not endorse or even allow mayors to endorse the public wearing of masks, and followed the President in suggesting that the reaction to covid-19 was overblown. And, as can be shown, those states experienced a significant spike in covid-19 cases and deaths, beginning in June and July.

In brief, although the public health experts across the country spoke with one voice about the dangers of the coronavirus pandemic and all recommended the same public health responses, that advice was at odds with what the Trump Administration and some governors were saying. That allowed vastly different responses among the 50 states and the District of Columbia. The country would have been much better served by a coordinated and consistent public health response emanating from the federal government. Part of the reason for desiring coordination from the central government is that it is not constitutionally possible for the states to restrict travel among themselves – for example, perhaps, to exclude in-bound travel from states where covid-19 infections were rampant.[1] Because it may well have been the case that circumstances were varied among the states, the federal government might have published minimal public health guidelines (as the CDC had tried to do) and then allowed the states to impose additional restrictions if they deemed those to be warranted in their circumstances. Additionally, the federal

1. Incidentally, Australian states and their federal government can prevent travel among the states and did so when the coronavirus appeared there. That restriction and others have led to Australia's having had only 28,000 cases and 908 deaths. Australia's population is 25m. Just for the sake of comparison and recognizing that there are many differences between Australia and the United States, if the U.S. had had the same percentage of its population contract covid-19 as did Australia, by mid-December, 2020, there would have been 370,720 total cases in the U.S. In fact, there have been more than 18m cases in the U.S. If the U.S. had had the same CFR as Australia, then of those 370,720 cases, there would have been 120,219 deaths. In fact, there have been over 320,000.

government might have funded some of these public health measures in the states.

Another way to compare the U.S. response to the pandemic to that of other countries is to compare the covid-19 death rates per 100,000 of population.[1] As of December 17, 2020, the highest rate of covid-19 deaths per 100,000 of population in the world is Belgium with 157.16 per 100,000 people. Italy is first among large, developed countries with a rate of 106.77. The United Kingdom has a rate of 96.66. The U.S. has a rate of 91.44.[2] Others of note are Switzerland, 70.27; Canada, 36.30; Germany, 26.66; Denmark, 16.23; and Australia, 3.63.

Finally, a study by the National Center for Disaster Preparedness at the Earth Institute of Columbia University, published in late October, 2020, estimated that with better policies the United States could have avoided between 130,000 and 210,000 covid-19 deaths.[3]

B. Economic Policy Responses

As I have already noted, an unintended consequence of the public health measures instituted by some of the states from early- and mid-March was astonishingly large economic costs. Unemployment and business closings soared. The so-called hospitality industry – restaurants, hotels, airlines, cruise ships, vacation rentals, and more – was particularly devastated. [4] Unemployment, as I indicated above, rose to its highest levels since the Great Depression, and recent estimates are that the GDP of the U.S. fell significantly.

To their great credit, Congress and the Federal Reserve acted quickly and generously to the economic crisis. For example, the Federal Reserve

1. See https://coronavirus.jhu.edu/data/mortality.
2. Iran has a rate of 63.81 deaths per 100,000 people.
3. See Irwin Redlener, Jeffrey D. Sachs, et al., *130,000 – 210,000 Avoidable Covid-19 Deaths – And Counting – in the U.S.*, National Center for Disaster Preparedness, The Earth Institute, Columbia University, Oct. 21, 2020, available at https://ncdp.columbia.edu/custom-content/uploads/2020/10/Avoidable-COVID-19-Deaths-US-NCDP.pdf.
4. Economists at the University of Chicago estimated that 37 percent of the labor force could continue to work by connecting from home or some other remote location but that 63 percent of the labor force in the U.S. could not work remotely.

announced on March 12 that it would loan $1 trillion to banks to help them maintain their clients' liquidity. Three days later, the Fed reduced interest rates to zero and announced a $700 billion "quantitative easing" program.[1]

For its part, Congress passed four bills between mid-March and early May to ease the economic consequences of the coronavirus pandemic.[2] Taken together, those four bills appropriated almost $3 trillion for various forms of relief.[3] Included in those programs were $1,200 to be distributed to all adults who earned less than $75,000 per year and $500 to every child under the age of 17; the Paycheck Protection Program, which loaned money to businesses and will forgive the repayment of the loan if a large fraction of the loan has gone to pay employees, and the addition of $600 per week to whatever state benefits unemployed workers receive.[4] One of the bills also suspended student loan payments and imposed a moratorium on evictions for failure to pay rent and foreclosures for failing to make timely payments on mortgage payments. Most of these provisions were to lapse in August but were extended to the end of the calendar year, either by Congressional action or executive decrees of the President.

Since that initial laudable action, Congress has not done much, despite a continuing need for help among many American families. More specifically, it has been the Senate that has not done anything. In contrast, the House passed and sent to the Senate relief bills in May and August. But the Senate refused to consider those bills. The stalemate between the Democratic-Party-controlled House and the Republican-controlled Senate has much to do both with philosophical differences between the two political parties and the Fall, 2020, elections. But there is, nonetheless, great urgency in doing something to help the unemployed quickly because all the individual payments, the

1. "Quantitative easing" involves the Fed's purchase of assets as a means of getting liquidity into the hands of assetholders.

2. Con0gress called the lead act the CARES Act for the "Coronavirus Aid, Relief, and Economic Security Act."

3. The U.S. GDP in 2019 was $21.5 trillion. So, the value of these benefits equaled one-seventh of the value of all goods and services produced in 2019.

4. Unemployment benefits are, by and large, a state, not a federal, responsibility, and those benefits vary considerably from state to state. There has been some speculation on whether those receiving the state weekly benefits plus the $600 federal benefit are comfortable enough *not* to seek re-employment. Those who believed that the $600 federal supplement is too generous apparently believed that its continuation would prolong unemployment.

moratoria, the additional unemployment benefit payments, and more will cease as of January 1.

Negotiations between the Republican leaders of the Senate and the Democratic leaders of the House have been on-going since the November 3d election, but with not much progress. Unfortunately, time is running out in that Congress will take a Christmas and New Year's break within days.

Just in the past few days some things have happened that raise the chances that a pandemic relief bill will be passed before Congress adjourns for the holidays. First, the Electoral College[1] voted on Monday, December 14, and affirmed that Joseph R. Biden, Jr., will be the 46th president of the United States and Kamala Harris will be the vice president. This ended — or should have ended — any controversy about who won the presidential election of November 3, 2020. After the Electoral College vote, the Republican leader of the Senate, Sen. Mitch McConnell, acknowledged for the first time that Biden and Harris won and will be inaugurated on January 20, 2021. As a result, Sen. McConnell is now ready to take up a new pandemic relief bill. Matters are changing quickly, but it appears to be the case that McConnell and the Speaker of the House, Rep. Nancy Pelosi, will join the deliberations about the relief bill. McConnell has announced, further, that the Senate will not adjourn for the holidays until the relief bill is passed. I shall have more to say about some of the substantive provisions in the relief bill in the following section.[2]

5. Economic Analysis of Pandemic Issues

The novel coronavirus and the pandemic that it has spawned have raised new public policy issues or exacerbated old and on-going ones. For example, many employers, retail merchants, restaurants, airlines, hotels, and customers and

1. The Electoral College is an arcane institution created by our Founding Fathers in the Constitution. I will not go into the complicated details of the College but will merely note that the popular vote for president and vice-president is not what determines who is elected; it is the vote of the Electoral College that determines our leaders. There is little doubt among thoughtful commentators that the Electoral College is an anachronism that the country needs to abolish. See, for example, Jesse Wegman, *Let the People Pick the President: The Case for Abolishing the Electoral College* (2020).
2. As I write this final draft, Congress has agreed on a $900b relief bill.

employees of those businesses are deeply worried about how the law will deal with liability issues if businesses reopen to their employees and customers. What if a cohort of customers at a restaurant, all of whom dined there on the same evening, come down with covid-19 and learn that the waiter who served them had tested positive for covid-19? Has the employer been negligent in checking on his employees? Did the employee, worried about losing his income, lie to the employer about having tested positive? What problems of proof will the infected customers encounter? What if it is discovered that one of the customers had tested positive for the disease several days before the dinner? Could she and not the waiter be the source of the other diners' infections? Would that relieve the employer and the infected employee of liability? Understandably, customers and employees want to be safe, and businesses want to be assured that if they take adequate precaution, they will not be held liable for their employees' or customers' illnesses. Do existing principles of tort liability provide both sides of this issue with adequate incentives to take care? Will they feel reasonably protected against liability and infection? Or does the federal government need to intervene to make the tort liability system post-covid-19 better?

In this section, I shall use the tools of economics to help understand how to think about this and other pandemic problems.

A. Behavioral Considerations

Before I take up some specific examples of the use of economics to examine pandemic issues, let me address some background assumptions.

I have implicitly been assuming that decisionmakers in these matters are reasonably rational in making their choices about law and safety. That is the traditional assumption in microeconomics, but it is one that an increasing numbers of economists are rejecting in favor of the conclusions emerging from experiments in cognitive and social psychology. Those conclusions typically find that human beings are flawed or imperfect decisionmakers. We

make predictable mistakes, not just random, haphazard errors. And we do not learn very well how to avoid those mistakes. We make them over and over.[1]

Behavioral considerations must be brought to bear on the study of many aspects of the coronavirus pandemic. First and foremost, we can invoke behavioral science to explain one of the most fundamental facts about the virus: People do not seem to assess the risks of the virus accurately. It is not that they miscalculate by a small amount; they miscalculate by orders of magnitude. People are not good at estimating risks. For example, they tend to latch onto what is readily available to them rather than investigating the true, objectively verifiable risks. This is known as the "availability heuristic."[2] As an example, if you were to ask a group of people in the United States which kind of death, homicide or suicide, is more common, most will answer, "Homicide." Why? Because homicides are published in media and are, therefore, readily available. Suicides are typically not publicized, unless the decedent was a famous or notorious person. But, in point of fact, annual suicides are approximately three times the number of annual homicides. In 2018, for example, there were slightly more than 14,000 homicides in the U.S. and slightly more than 48,000 suicides.

How does this apply to the coronavirus? Most public health experts are guided by objective statistics in giving their advice, and, most likely, they expect the people whose decisions they are hoping to affect also to be guided by objective statistics. So, when a public health expert says that your probability of contracting covid-19 will be cut in half by wearing a mask, that resonates with those who pay attention to objective statistics: The cost of wearing a mask is relatively small, and therefore, the benefit of mask-wearing, given that it reduces the risk of getting a potentially life-threatening disease, is much, much greater.

1. For a readable introduction, see SCOTT PLOUS, THE PSYCHOLOGY OF JUDGMENT AND DECISION MAKING (1993). As applied to law and economics, see Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CAL. L. REV. 1051 (2000). As applied to the covid-19 pandemic, see Doron Teichman & Kristen Underhill, "Behavioral Science and the Legal Response to Covid-19," Columbia Law School Working Paper, July, 2020.
2.A "heuristic" is a quick method of discovering something for oneself.

But that may not be the way in which most people make risk-reduction decisions. Rather, with respect to wearing a mask, they may consider such questions as "Who do I know who has had the disease?" Or "When I've been out how many people have sneezed near me?" Or "There really aren't many people in my circle who are getting the disease. So long as I stay around only a few people I trust, why should I wear a mask?" That is, they are using readily available – and subjective – information in making an important public health decision.

Additionally, human beings suffer from "optimism bias": They believe that they are more likely than average to have favorable outcomes, a good life, a successful enterprise, a good grade, a long and happy marriage. (It is, in many ways, a charming fault about humans.) Almost 50 percent of marriages in the U.S. end in divorce.[1] So as a first approximation, when asked what is the probability that any one couple's marriage will end in divorce, the objectively accurate answer (unless one has special knowledge about that couple) would be 50 percent. But if you ask those about to be married or recently married the question about their marriage surviving, they will give you a very low number, usually zero.[2]

As applied to the current pandemic, most people will estimate their likelihood of getting covid-19 to be much less than it actually is because they are optimistic about their life chances. Additionally, they are likely to estimate their conditional likelihood of dying or becoming very ill from the coronavirus, if they get it, to be very low.

Finally, we all suffer from "confirmation bias." We place more weight on evidence that supports our position than we place on evidence that questions our position. Thus, if we dislike President Trump, we give more weight to those who are critical of him and his policies than we do to someone who applauds him and his policies. And, of course, those who applaud President

1. The figure for first marriages is about 41 percent; for second marriages, 60 percent; and for third marriages, 73 percent. As the great Samuel Johnson, who lived in 18th century England and is the subject of James Boswell's immortal *Life of Johnson* (1791), said, "Remarriage is the triumph of hope over experience."

2. And, after all, who would want to marry someone who says, "I think that we have a 50 percent chance of staying married"?

Trump believe him when he says not to worry about covid-19, that it is no worse than the seasonal flu.

That suggests that updates of our prior estimates of becoming infected are reinforced by the evidence that we choose to believe. We selectively look for and believe evidence that confirms our prior estimates. Thus, it is possible for a person who knows no one who has had the disease to pay particular attention to evidence, like that espoused by President Trump, that minimizes the risk of getting covid-19 or of being very badly affected by it if you should get it. By contrast, an older person who knows many people who have had the disease may have a very high prior estimate of contracting covid-19 and, therefore, may pay great attention to the worst and scariest predictions of his vulnerability.[1]

The behavioral perspective teaches us that we are all subject to making errors in dealing with the coronavirus. Unless one has strong evidence readily available to them that this unseen and unseeable virus causes significant harm, they may discount the risk of becoming ill and discount the social benefit of taking steps to contain the viral outbreak. If public officials are saying that the disease is nothing more than a mild flu, that it will disappear quickly, that 99.9 percent of cases are harmless,[2] and the like and if one believes those assertions rather than the objective evidence of the number of cases and deaths, then one will give more weight to the proposition that covid-19 is not worth worrying about; for example, one might believe that fear of covid-19 really is not worth shutting the economy down.

In contrast, if you are a healthcare worker who has seen patients and coworkers die of covid-19, the evidence that this is a very serious disease is readily available. And you will probably be easy to convince that serious public health steps are necessary. You will also pay more attention to the objective, tabulated information on the number of cases and deaths than to "happy talk" by politicians eager to have you believe that the risks are

1. For a specific experimental use of behavioral insights on a covid-19-related subject (effective contact-tracing), I highly recommend Ian Ayres, Alessandro Romano, and Chiara Sotis, "How to Make COVID-19 Contact Tracing Apps Work: Insights from Behavioral Economics," *MedRxIV*, Sept. 11, 2020, available at https://www.medrxiv.org/content/10.1101/2020.09.09.20191320v1.

2. President Trump has said all of those things about the coronavirus, even though we know from his recorded conversations with the journalist Bob Woodward that he knew these statements to be false.

minimal, that we "have rounded the corner on covid-19," as President Trump repeatedly said during his re-election campaign, and that all will be well soon.

B. Risk Perceptions, Contact Tracing, Externalities, and Emergency Powers

I have already alluded to the problems that assessing risk presents to otherwise rational individuals. In this brief section, I would like to give some additional examples of how economic concepts can help to understand and frame policy decisions in a pandemic.

My contention is that a pandemic is such an extraordinary occurrence that it defies the abilities of rational individuals to deal with by themselves or by agreement with other rational individuals. First, there is the ability of individuals to determine if they have been infected. If tests were readily and cheaply available and if their results could be given within a very short time, such as 15 minutes or even 24 hours, then rational people might be able to get tests frequently and the results of tests fast enough to take actions that would diminish the spread of covid-19. They could, for example, immediately isolate themselves so as not to infect others. In addition, if a test on Monday had shown a given individual to be covid-19-free but a test on Wednesday showed her to be infected with the disease, then public health officials could do "contact tracing" at a reasonable cost. That would involve contacting those with whom the now-infected individual had spent time between the (negative) Monday test and the (positive) test on Wednesday and warning them, then contacting those whom those direct contacts had been with and warning them, and so on.[1] These informational matters are beyond the reasonable ability of even the most rational person to deal – information being one of the most difficult items for people to deal with adequately. Moreover, it can be time-consuming and is far better left to trained individuals to do.[2] Thus, practically

1. Recall the earlier examples in Section II of how far and wide these transmission to others can spread.

2. I should note that the complexity of contact tracing can be greatly diminished by more frequent testing and more rapid results. If, for example, it takes two weeks for results of a test to come back, the contact tracer has to try to get a list of everyone the infected person has been near in the past two weeks, who those people have been near, and so on. By contrast, if people are getting tested twice a week (which is the standard that public health officials recommend), the number of people who might have been near an infected person in the few days between tests is far smaller, and, therefore, the contact-tracer's job is far simpler. It is also true and worth noting that technology – as with mobile phone apps as have been used to great effect in South Korea – can make the job of contact tracing much, much simpler and, probably, more accurate. But privacy concerns about these apps are keenly felt in the United States.

speaking, society must undertake the jobs of testing and contact tracing and design policies for disseminating the information thereby gathered, subject to privacy considerations.[1]

Second, the transmission of the coronavirus to others is what economists call a "negative externality," an "external harm," or simple an "externality." It is a harm that the infected person imposes on others without their consent, even without their or the infector's knowledge. Economists recommend *internalization* as the means of dealing with externalities. That would mean bringing to the attention of the externality-generator that he is doing harm unintentionally and restricting the infector's behavior so as to minimize his ability to impose the disease on others by, for example, requiring him or her to isolate themselves for 10 to 14 days.[2]

Third, because up to 50 percent of infections can come from asymptomatic infectors, isolation and face-mask-wearing may not be enough, however important they are. The normal interactions of human beings – commuting to work; shopping; attending sporting events, religious services, and concerts; going to a restaurant for a meal or a bar for a relaxing evening; watching a movie at the cineplex; and so on – often involve large numbers of people being within close proximity. That being the case, there is a public-health argument for restricting the number of people who can be out in public or even going so far as to issue "lockdown" or "stay at home" orders.

Authorities, such as public health administrators, might issue hortatory advice to people within their jurisdiction to follow these practices. Alternatively, governmental authorities might issue orders to those in their jurisdiction to obey these public health guidelines with, perhaps, fines or other

1. The United States federal government has completely mismanaged the testing for covid-19. The first tests they produced were flawed and had to be recalled. The tests now in use are of questionable veracity. To take but one example: Governor Mike DeWine (R-Ohio) had a test for covid-19 early on August 6 before he was to meet President Trump, who was visiting Ohio. The test was positive, indicating that Gov. DeWine had covid-19. So, he did not meet with the President. Later in the day, Gov. DeWine took a second test for covid-19 that indicated he did *not* have covid-19. Either he had a miraculous and spontaneous cure over the course of the day, or, more likely, the test is flawed. The number of tests that are now available is wholly inadequate for the public health task at hand.

2. Public health specialists refer to this conjunction of practices as "test, trace, and isolate."

sanctions for failure to comply. In the United States, those governmental authorities might be federal, state, or local. If the federal authorities issued mandatory guidelines (and other facilitating orders) to deal with the information and externality problems presented, there would be one national policy to govern all 330 million people in the country.

Alternatively, as has been the practice of the Trump administration, regulation has been left almost entirely to the states with confused and contradictory suggestions from the federal government.[1] States then would be free to develop their own regulations and guidelines and their enforcement practices. Some states entered into interstate compacts (agreements among states, subject to Congressional approval[2]) with nearby states to adopt similar practices with the result that there was regional uniformity in regulations. Among all of the fifty states, there was a great deal of variation in the range and seriousness of the guidelines and regulations that they adopted to deal with the problems of covid-19. For example, Iowa and Illinois are neighboring states, but Iowa did not have stringent regulations while Illinois did.[3] The states in the Middle Atlantic and New England areas and Illinois in the Midwest, adopted stringent lockdown practices. Other states, such as Florida, Georgia, Texas, and Arizona, refused to institute stringent behavioral controls

1. The Centers for Disease Control and Prevention tried to issue public health guidelines, but those were often watered down or even contradicted by the White House.

2. See Lisa Hansmann, "Interstate Compacts: A Primer," Edmund J. Safra Ethics Center, Harvard University, April 30, 2020, available at https://ethics.harvard.edu/files/center-for-ethics/files/interstatecompactsprimer.pdf.

3. In Episode 12 of the *Pandemic Economics* series of podcasts from the Becker-Friedman Institute at the University of Chicago (https://bfi.uchicago.edu/podcast/pandemic-economics/), Professors Austan Goolsbee and Chad Syverson describe a study that compared, using cellphone data, the behavior of citizens in Bettendorf, Iowa, with that of citizens in Moline, Illinois. The two cities are situated across the Mississippi River from one another. The investigators were eager to see the extent to which there were differences in traveling, shopping, mask-wearing, and other behaviors between the two cities. They concluded that people in Bettendorf and Moline behaved approximately the same, despite the differences in public policy in the two states; specifically, people in both cities behaved as if they were under stay-at-home orders.

or stay-at-home orders.[1] The consequences of these variations were predictable and predicted: The states with more stringent controls have, by and large, fared better than those that had more lax controls. But, in truth, the contrast is not as sharp as that. Some states that imposed lockdown orders early, like California, have seen a recent spike in cases. Indeed, California has become the state with the greatest number of covid-19 cases.

A central legal issue in all these matters has been the exercise of emergency powers that all state governments have granted their governors and that Congress has granted to the executive branch. There cannot be any question that the benefits of giving government emergency powers in special circumstances exceed the costs and that the emergency of the covid-19 pandemic and the informational and externality issues justify invoking those powers.

That does not mean that there are no legal questions raised by the use of emergency powers to deal with the covid-19 pandemic. For instance, some have contended that contact tracing violates privacy interests and that mandatory face-mask wearing infringes civil liberties. Others have argued that forbidding groups of people greater than a certain, small number to gather violates the First Amendment right of assembly and freedom of religion. Still another set of complaints has arisen about the government's compelling the closure of some businesses, such as bars, restaurants, hotels, sporting venues, and cinemas. Some have claimed that the extraordinary economic costs inflicted on those businesses amount to a compensable taking.[2]

1. There are several reasons for the different attitudes toward public health regulation with respect to covid-19 in the south. First, the weather is warmer there than in much of the rest of the country. As a result, people spend more time outside, where contracting the disease is less likely. Relatedly, the southern part of the United States is a frequent destination for northerners – called "snow birds" – who want to spend at least part of the winter in the south so as to avoid the cold weather in the north. Additionally, southern states are a frequent destination for northern college students during their Spring Break. Both of those northern groups might have been discouraged from coming south if public health measures had closed restaurants, beaches, and bars. Second, many of the governors and legislatures of the southern states are Republicans. They may not have wanted to have imposed restrictive public health measures because their party leader, President Trump, was criticizing northern Democratic governors who *had* imposed restrictive public health measures.
2. Alternatively, one might imagine that "business interruption" insurance might compensate those business owners who had it. However, it appears to be the case that many business interruption insurers had an exclusion for pandemics. See Mary Williams Walsh, "What Is Insurable in a Pandemic?" *New York Times*, Aug. 7, 2020, B1.

I do not find those criticisms compelling, but I recognize that they are important questions that those exercising those emergency powers should be prepared to answer. In all those cases, I think that the answer is that the benefits of the regulations exceed their costs. Nonetheless, I leave for another day the question of whether those who are financially injured by the exercise of these emergency powers have a valid claim for compensation.

Additional questions are these: Should there be fines for failing to wear a mask? Or for failing to obey an order to isolate oneself? Or for a doctor's failing to notify the authorities that a patient has covid-19? Or a business' failing to police social distancing? Would it be lawful to fine people for failing get a covid-19 vaccine?, an issue we shall return to in Section D2 below.

B. Tort Liability and the Pandemic

In the current Congressional negotiations regarding a new relief bill, the Republican negotiators are said to have liability relief as one of their top priorities. They cite concerns that the behavior of employees, customers, and others may be adversely affected by fears of contracting the coronavirus and of liability for harms arising from having contracted covid-19 due to the negligence of a shopowner, an educator, an employer, a healthcare professional, and so on. For example, an employer may be worried that one or more of his employees may bring an action against him alleging that he contracted covid-19 in the workplace. Or a theater owner may fear that his customers may sue him for negligently failing to clean his establishment with the result that some customers were infected with covid-19.

I recognize that these are two-sided transactions – that employees may be reluctant to return to work unless they are confident that their employers have made the workplace safe and that customers will not patronize a restaurant or hotel unless they are assured that the proprietor has followed public health guidelines on masks for employees and customers, maintaining social distancing, ventilation, and so on.

The Republican position is surely premised on both of these concerns – on protecting employers from liability if they have been nonnegligent and on

encouraging employees and customers to feel safe in going to work and going to commercial establishments to shop.

There might be other, unspoken premises at work in this position, and I suspect that they are these: that trial lawyers will perceive suing employers, commercial entities, healthcare providers, educators, and others for negligent care in the pandemic as a potentially lucrative business opportunity[1] and that there is little substance to these allegations, that they are merely a means of shaking down defendants for money.

The Democratic position – because almost everything in the U.S. is politicized today – is probably this: that the tort liability system works reasonably well to provide incentives for everyone to take care; that only those who violate obvious norms of precaution are held liable for injuries; and that the safety regulation system, which provides *ex ante* safety standards for those who might cause harm, fills in the gaps in the tort liability system.[2]

Rather than waste time fighting about whether the tort liability system works well or ill, whether trial lawyers perform a vital function or are mere predators on the business community, let us try to find a middle way forward. William Galston of the New Center and *The Wall Street Journal* has recently suggested such a way: Congress should offer a "safe harbor" act that says if

1. See Andrew Duehren, "Senate GOP Aims to Funnel Covid Liability Cases to Federal Courts," *Wall Street Journal*, July 16, 2020. Under a proposal drafted by Senators McConnell and Cornyn, "defendants in [covid-19-related] cases would only be held liable if they did not make reasonable efforts to comply with public-health guidelines and instead demonstrated gross negligence or intentional misconduct." In addition, defendants could move to have the case tried to a federal court. Finally, the standard of proof for finding defendants liable would be "clear and convincing," rather than the more usual "preponderance of the evidence."

In my view, the provisions for removal to federal court and the heightened liability standard go too far.

Duehren reports that "[a]ccording to a litigation database kept by law firm Hunton Andrews Kurth, more than 3,500 lawsuits involving the coronavirus have been filed across the U.S. since January. Roughly 300 of those cases deal with labor and employment issues, about 240 touch on consumer issues, and nearly 200 relate to education, according to the firm's database."

2.The distinguished economist Justin Wolfers says that it is in society's interest to have businesses frightened by the possibility of liability. Without that fear, businesses might not take adequate safety precautions against covid-19. See Ephrat Livni, "US businesses want immunity from coronavirus lawsuits,' *Quartz*, April 24, 2020.

employers and commercial establishments comply with Centers for Disease Control and Prevention guidelines for safe workplaces, schools, and commercial businesses, the act would "guarantee employers [and businessowners] who can demonstrate that they have met these standards a 'safe harbor' against litigation [related to covid-19]."[1]

There are details that need to be specified. For instance, because this compromise would apply only to the current pandemic, there needs to be a sunset provision. The act might say something general, such as that the act should lapse within six months of the end of the pandemic or by the end of 2022, whichever comes first, or something specific, such as that the act expires when a safe and effective vaccine against covid-19 is widely available and has been taken by a specified percentage of a relevant population.[2]

Another detail that needs addressing is for employers to make certain that their employees get tested frequently and isolate themselves if they have been found to test positive for covid-19. There ought, also, to be incentives for someone, perhaps the federal government, to compensate employees for their lost wages while they isolate or are recovering from covid-19.[3]

D.Vaccinations

In this section I shall explore the economics of two issues having to do with vaccines for protection against contracting covid-19. The first has to do with using governmental power to hasten the development of a safe and effective vaccine. The second has to do with encouraging people to take the vaccine, once it is available.

1. Galston, "Democrats Should Back 'Safe Harbor' Law," *Wall Street Journal*, May 13, 2020, p. A17. These things are precisely what most commercial and manufacturing establishments, schools, clinics and hospitals, and others would do without the safe harbor law. As a result, there is not a significant cost to agreeing to the "safe harbor" provision.

2. This latter provision would have the effect of inducing people in that relevant population to get the vaccine. Having failed to do so might be deemed contributory negligence.

3. Some employees who are not feeling well or who have been exposed to the coronavirus or have tested positive for the disease might not stay away from work if to do so means losing income. We have a friend whose son worked with someone who had tested positive for covid-19 but stayed on the job because she needed the income. Our friend's son was frightened but did not want to go to his employer to tell him about his co-worker's infection. A law that provided for the continuing compensation for an isolated worker would obviate this problem.

6. Government Subsidization of Vaccine Development

The search for a vaccine to protect individuals from covid-19 began in earnest almost as soon as the disease was identified and Chinese researchers published the genome of the SARS-CoV-2 coronavirus in January, 2020.[1] In those early days, there were said to be over 100 pharmaceutical companies, worldwide, engaged in a race to develop a vaccine.

Normally, one might think that the intense competition among over 100 sophisticated companies would be enough to elicit the very best minds and efforts to produce a safe and effective vaccine quickly. But vaccine development is typically a long and arduous task. Heretofore, the fastest that any vaccine had been developed was three years for the mumps vaccine in the late 1940s, and that vaccine was not particularly effective.[2]

So, looking at the history of vaccine development, one would have to have been pessimistic about the ability of even 100 top-notch pharmaceutical companies to complete the task of developing a covid-19 vaccine in less than a year. Moreover, there are, quite rightly, significant regulatory hurdles that any vaccine would have to get over in order to be approved for widespread use by regulatory agencies like the U.S. Food and Drug Administration (FDA). In normal circumstances a new drug or vaccine must pass through three phases of clinical trials, and prudent pharmaceutical companies, knowing that approval is not certain till the results of widespread testing

1. For a very readable account of the development of the covid-19 vaccines, see Carolyn Kormann, "Countdown to Immunity," *The New Yorker*, Dec. 14, 2020, available at https://www.newyorker.com/magazine/2020/12/14/countdown-to-a-coronavirus-vaccine.

2.See the Centers for Disease Control and Prevention (CDC), "The Pink Book: Epidemiology and Prevention of Vaccine-Preventable Diseases," available at https://www.cdc.gov/vaccines/pubs/pinkbook/mumps.html. "The mumps virus was isolated in 1945, and an inactivated vaccine was developed in 1948. This vaccine produced only a short-lasting immunity, and its use was discontinued in the mid-1970s. The currently used Jeryl Lynn strain of live attenuated mumps virus was licensed in December 1967. The vaccine was recommended for routine use in the United States in 1977." Note what a long process of developing a safe and effective vaccine was — almost 20 years — and that another 10 years elapsed before the second vaccine became "recommended for routine use."

(which occurs in Phase 3) are complete,[1] do not undertake manufacturing till the drug receives final FDA approval. Because manufacturing takes time, it can be months or longer till an approved drug is widely available for patient use. Finally, there is the sometimes-daunting task of distributing the drug. Some vaccines may require special handling, such as being kept at very low temperatures, and may require special training for those who are going to administer the vaccine to patients.

All of these are real and vexing problems that, taken together, might have meant that the discovery, testing, manufacture, and distribution of a vaccine for covid-19 could have taken years, during which time infections, deaths, and lingering effects from the disease might have continued.

1. The Food and Drug Administration requires three phases of clinical testing, collectively designed to demonstrate the safety and effectiveness of any new pharmaceutical. See https://www.fda.gov/drugs/information-consumers-and-patients-drugs/fda-drug-approval-process-infographic-horizontal/. In Phase 3, after successfully passing through smaller tests in Phases 1 and 2, thousands of volunteers engage in a randomized controlled trial. The test groups have to be large enough – 30,000 volunteers were common in the Phase 3 trials for the covid-19 vaccines – so that they adequately represent all age, ethnic, health status, gender, and other characteristics of the general population. The group is then randomly divided into two groups, which, because of the randomization, should have roughly equal characteristics. One group receives a placebo, while the other group receives the new vaccine. These tests are "double blind" so that neither the recipients nor the administrators know whether the volunteers receive the placebo or the new vaccine. After a sufficient time to let matters develop – the covid-19 vaccines, likely many other modern vaccines, are administered in two doses, about a month apart – investigators compare the results between the two groups. Here is an example of what happened in the Phase 3 clinical trial of the Moderna covid-19 vaccine: "On November 30th, Moderna announced that it had arrived at the end of its trial, with a hundred and ninety-six COVID-19 cases among more than thirty thousand volunteers. A hundred and eighty-five of the people who got sick had received the placebo, indicating an efficacy rate of ninety-four percent. [Only eleven of those who got the disease had taken the vaccine.] All thirty people who got severely ill, including one person who died, were in the placebo group. The data [were] consistent across age, race, and ethnicity." Kormann, supra n. 67, at 24.

I should note that the FDA also requires Phase 4 testing, often called "Post Marketing Surveillance Testing." This testing occurs after the drug has been approved for consumer sale and involves "(1) [comparing] a drug with other drugs already in the market; (2) [monitoring] a drug's long-term effectiveness and impact on a patient's quality of life; and (3) [determining] the cost-effectiveness of a drug therapy relative to other traditional and new therapies." Findings of this surveillance testing "can result in a drug or device being taken off the market or restrictions of use could be placed on the product." See "Human Clinical Trial Phases," https://www.centerwatch.com/clinical-trials/overview#:~:text=Once%20approved%2C%20human%20testing%20of,continuing%20to%20the%20next%20phase.

To its great credit, the Trump Administration recognized all of these problems and took meaningful — and, ultimately, successful — steps to encourage the development, manufacture, and distribution of covid-19 vaccines. For example, in early June, 2020, the administration selected five companies to receive substantial financial aid with their vaccine development.[1] Among other help, the administration promised to purchase a significant number of doses – typically, 100m – of vaccines for which the Food and Drug Administration granted emergency use authorization (EUA).[2] The result of this promise was that because the federal government was taking on the risk that the vaccines might not pass Phase 3 of the clinical trials, the companies began producing their drugs much earlier — after passing Phase 2 — than they normally would have done. So, when FDA approval finally came in December, 2020, the vaccine-manufacturers were prepared to begin distribution immediately.[3]

As a result of these risk-minimizing subsidization policies, vaccines against covid-19 were developed in record time. In mid-December many

1. Noah Welland & David E. Sanger, "Trump Administration Selects Five Coronavirus Vaccine Candidates as Finalists," *The New York Times*, July 27, 2020, available at https://www.nytimes.com/2020/06/03/us/politics/coronavirus-vaccine-trump-moderna.html.
This selection was itself an innovative act that raised a great deal of concern. How were these five chosen? Did politics figure in the selection or was it done on objective, meritorious criteria? The general economic policy in matters of this sort is to let competition sort out the winners and losers on the theory that competition among suppliers is the most reliable practice for producing socially desirable outcomes. Having government pick the winners in this process is usually fraught with many dangers. I think that the argument that must have prevailed in the administration's thinking was that the nation did not have the time to let this process work through the normally reliable channel of competition. Rather, the need for a clear winner or few winners necessitated the government intervening to select five companies (far better than backing just one company) and giving them subsidies to help them move quickly to develop a safe and effective vaccine.
2. See "U.S. Government Engages Pfizer to Produce Millions of Doses of COVID-19 Vaccine," U.S. Health and Human Services, July 20, 2020, available at https://www.hhs.gov/about/news/2020/07/22/us-government-engages-pfizer-produce-millions-doses-covid-19-vaccine.html.
3. Indeed, the first doses of the Pfizer/BioNTech vaccine were administered on Monday, December 14, the same day on which the Electoral College voted to make Joseph R. Biden, Jr., the next President of the United States and Kamala Harris the next Vice-President. Some commentators saw the conjunction of those two events as very meaningful. See, for example, Peggy Noonan, "The Monday When America Came Back," *Wall Street Journal*, Dec. 17, 2020, available at https://www.wsj.com/articles/the-monday-when-america-came-back-11608247644?st=q6ns5nw4bj87a84&reflink=desktopwebshare_permalink.

countries began receiving doses of a covid-19 vaccination produced by a joint effort of Pfizer, a large American pharmaceutical company, and BioNTech, a German biotechnology company that specializes in immunotherapy development. A second vaccine, this one from Moderna – one of the five companies selected by the Trump Administration for subsidization – received FDA emergency use authorization on December 18, 2020. Its vaccines became available on December 21.

7. How to Encourage Individuals to Take the Vaccine

Even with these efforts to discover a vaccine for covid-19 and to make it available early, there is another hurdle that must be surmounted: In surveys only about 50 percent of the respondents plan to get vaccinated against covid-19 once a vaccine is available.[1] This is distressing. Economists believe that vaccination against a communicable disease is an "external benefit" – that is, an action that confers an unbargained-for benefit on other persons. The greater the percentage of a population that has been vaccinated, the less likely that any unvaccinated person is to contract the disease from another person. And public health experts believe that at least 70 percent of the population must be immunized to covid-19 before they can safely say that the national community has conquered the disease and that we are safe to resume our normal social and commercial interactions.[2]

Governments can take advantage of an external-benefit-generating activity by changing attitudes, mandating the benefit-generating activity, and subsidizing that activity. For example, governments typically mandate that

1. Warren Cornwall, "Just 50% of Americans plan to get a covid-19 vaccine. Here's how to win over the rest," *Science*, June 30, 2020, available at https://www.sciencemag.org/news/2020/06/just-50-americans-plan-get-covid-19-vaccine-here-s-how-win-over-rest#:~:text=Recent%20polls%20have%20found%20as,vaccine%2C%20with%20another%20quarter%20wavering. An additional 31 percent of those surveyed are not sure whether they will get vaccinated. 20 percent say that they will not take the vaccine. The group most likely to get the vaccine are those 60 years old or older, of whom 67 percent say they intend to be vaccinated. The group least likely to be vaccinated are African-Americans, only 20 percent of whom intend to be vaccinated. African-Americans account for 25 percent of all covid-19 fatalities and constitute 13.4 percent of the U.S. population.

2. It helps significantly toward reaching community immunity that the effectiveness of these first two vaccines is close to 95 percent.

young people be educated through a particular age on the theory that a literate and numerate population is a social benefit, not just an individual advantage. Governments typically subsidize getting the annual influenza vaccine. In many communities the shot is free. This policy of free vaccination will also apply to the covid-19 vaccines. What more can the federal and state governments do to increase the number of people who will take the vaccine?

One possible strategy – a Congressional mandate requiring people to get the vaccine – is, apparently, not constitutional.[1] So, the federal and state governments will have to rely on changing attitudes, subsidization, and, as we shall see, paying people to take the vaccine to increase the number of those vaccinated.

Urging people to get the vaccine early may face some significant hurdles. It is possible that the survey finding that only about 50 percent of adult Americans intend to get the vaccine once the FDA has approved it may be due to the public's skepticism about the approval process. Like so much of the federal and some states' public health policies to stop the spread of the coronavirus, vaccine testing – like the wearing of masks, social distancing, and the like – has been politicized; in fact, some or many of the survey respondents may fear that the Trump Administration interfered with the clinical testing process in order to get a political advantage from having produced a vaccine.

One method of encouraging more people to take the vaccine is to have prominent people take the vaccine publicly. Three living presidents — Clinton, Bush, and Obama — have agreed to have their vaccinations televised. President-elect Biden got his vaccine shot on TV on December 21. Members

1. For example, in *United States v. Alfonso Lopez*, 514 U.S. 549 (1995), the Court "struck down the Gun-Free School Zones Act [a federal statute]. That law prohibited carrying a gun within a thousand feet of a school. Congress [justified the federal regulation by pointing] to the impact of gun violence on education and on the economy. In his dissent, Justice Breyer amassed evidence to support Congress's conclusion. The conservative majority on the Supreme Court considered that evidence irrelevant. It announced a general rule that Congress cannot use the commerce clause to regulate noncommercial activities [with three exceptions to that general rule]." See Daniel Farber, "The Coronavirus and the Commerce Clause," *LegalPlanet* blog, May 5, 2020. Farber argues that nothing about vaccination against covid-19 falls within the three exceptions to the general rule against regulating noncommercial activities under the Commerce Clause.

of Congress have publicized their receiving the vaccine on their Facebook pages, on their home-areas' TV, and on local papers. Dr. Anthony Fauci, the head of the National Institute of Allergy and Infection Diseases of the National Institutes of Health and a beloved public health expert, has also agreed to take the vaccine on TV. Doctors publicly vaccinated Vice-President Pence with the Pfizer/BioNTech vaccine. There are also plans to have other prominent people take the vaccine publicly so as to encourage vaccination generally.[1]

Yet another strategy for increasing vaccinations is to pay people to get vaccinated. Some economists have recommended paying people $1,000 to take the vaccine.[2] That taps into the economist's view that "people respond to incentives." It might be effective, but it might be expensive. If, for example, we thought that 300m of the 330m people in the United States needed to be vaccinated in order to achieve community immunity, that might cost $300b.

Further complicating matters, there is some interesting evidence to suggest that this strategy of paying people to get vaccinated may backfire.[3] George Loewenstein and Cynthia Cryder point out that there is behavioral research that suggests that paying people to do things that we think they ought to do causes suspicion and resistance. They write, "Humans don't respond to incentives like rats pressing levers for food; they try to interpret what being offered payment means. In this case, the offer risks implying that the vaccine is not a thing of value."[4] Some studies have suggested that when people are not sure whether something is good or bad, they tend to decide that it is bad when offered payment to do that thing.[5]

1. President Trump has not agreed to take the vaccine at all, publicly or privately.
2. See Robert Litan, "Want Herd Immunity?: Pay People to Take the Vaccine" in *Brookings Review*, Aug. 18, 2020, available at https://www.brookings.edu/opinions/want-herd-immunity-pay-people-to-take-the-vaccine/, and N. Greg Mankiw, "Pay People to Get Vaccinated," *New York Times*, Sept. 9, 2020, available at https://www.nytimes.com/2020/09/09/business/pay-people-vaccine-coronavirus.html?searchResultPosition=2.
3. See George Loewenstein & Cynthia Cryder, "Why It's Not a Great Idea to Pay People to be Vaccinated," *New York Times*, Dec. 15, 2020, at B3, available at https://www.nytimes.com/2020/12/14/upshot/covid-vaccine-payment.html?searchResultPosition=1.
4. Id.
5. Dan Ariely, George Loewenstein & Drazen Prelec, "Tom Sawyer and the Construction of Value," 60 *J. Econ. Beh. & Org*. 1 (2006).

Additional empirical research suggests that "people naturally assume that payments signal risk."[1] For example, in a series of experiments, Cryder, Loewenstein, and others offered subjects different payment amounts to participate in an unfamiliar testing procedure. They found that the higher the payments, the greater the subject's sense of the riskiness of the procedure.[2]

Finally, as Kenneth Arrow long ago noted, altruism is a scarce resource that society should be cautious not to overuse. Getting vaccinated confers a benefit on those vaccinated, but it is also an altruistic act in that it confers a benefit on others. ("You will not get the virus from me.") Moreover, research has shown that paying people to take altruistic actions can backfire. A study of Israeli high school students "who collected for charity on a particular day of the year collected less money when they were paid a small commission."[3] The study also showed that paying the students to engage in altruistic acts might have created unanticipated issues for some of the students: "The amount paid was too little to motivate the students, but enough to raise questions about the motives of students who collected a lot of money, both in the minds of people observing those students, and possibly even on the part of student collectors themselves."[4]

It is possible that private parties may induce people to get vaccinated as the price, for instance, of entering their restaurant, attending a concert, participating in a group religious service, or flying on their airline. Loewenstein and Cryder report that the Australian airline Qantas and some other airlines have raised the possibility of only allowing those to fly who can demonstrated that they have been vaccinated. Indeed, it may be that the best inducement to get vaccinated will be the ability to wear a badge or other indicator of one's having been vaccinated.

1. Loewenstein & Cryder, supra n. 78.
2. Cynthia E. Cruder, Alex John London, Kevin G. Volpp, & George Loewenstein, "Informative inducement: Study payment as a signal of risk," 70 *Soc. Sci. & Med*. 455 (2010).
3. Uri Gneezy & Aldo Rustichini, "Pay Enough or Don't Pay at All," 115 *Q. J. Econ*. 791 (2000).
4. Id.

8. Conclusion

The novel coronavirus, SARS-CoV-2, has generated the greatest health and economic crises of the last 100 years. It has affected nearly 75 million people worldwide and killed more than 1.6 million people. In the United States, covid-19, the disease that this coronavirus causes, has afflicted more than 18 million people and killed more than 320,000. There are credible predictions that more than 500,000 people will die in the U.S. by April, 2021. In addition to the tragedy of so many lives lost and the lasting effects of the illness on so many, the disease has devastated every developed and many developing economies. Unemployment rates have soared around the world, and GDPs have fallen by the greatest levels since governments began keeping systematic records.

I have tried to use the tools of economics to address some of the more salient issues arising from the coronavirus pandemic. The public health measures that may be necessary to stop the spread of covid-19 are small but demanding, and without question they impose significant costs on individual citizens and on commercial enterprises. The personal and emotional consequences of the many lives lost and of many other lives interrupted by and, perhaps, affected for a long time by this disease are immense. And so are the economic costs of unemployment, business and individual bankruptcies, investments gone to waste, plans shelved, education disrupted and changed for the worse, the difficulty of getting to visit and hug loved ones, and more.

I have tried to argue that economics provides tools that can help in thinking about policy responses to the challenges that covid-19 has presented us. In most instances, economics does not necessarily answer the pressing question, but it does help to frame the choices available, highlight the information that is important in making a choice, and suggests how best to gather that information. As a result, economic analysis can often help us to find common ground.

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