

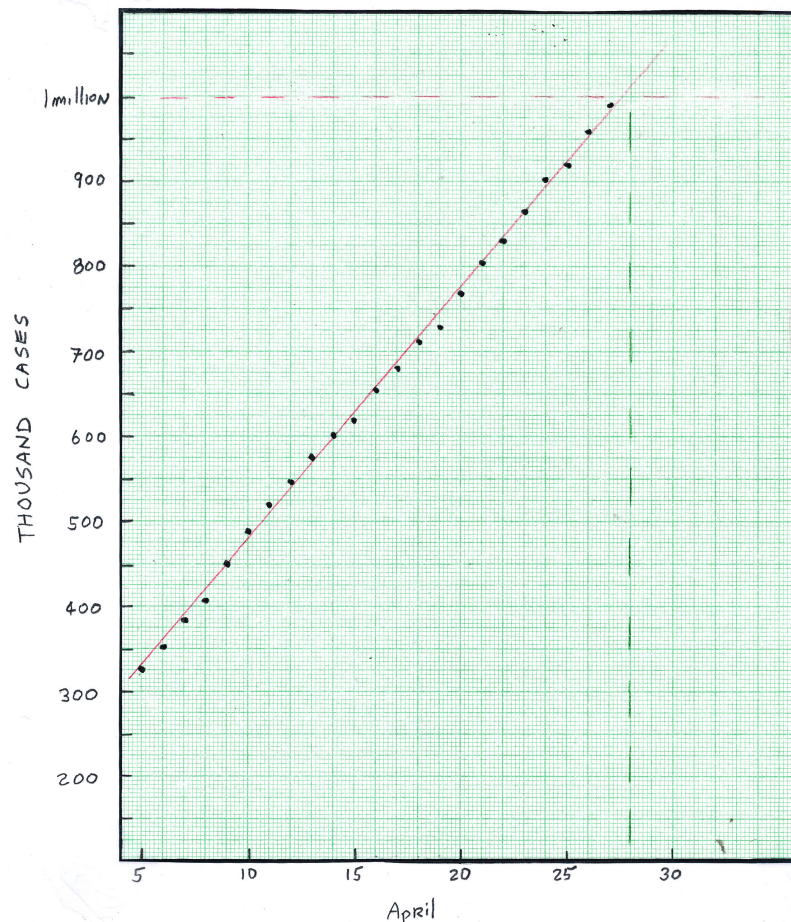
For my daughters:

April 28, 2020

The Coronavirus Pandemic

The Long Goodbye

Today the United States recorded its one millionth case of COVID-19. This did not come as a surprise. Anyone keeping a close watch of the numbers could see this day coming for weeks. I have been tracking the rise in COVID-19 cases for you guys on a semi-log graph since early March, and on this graph you have been able to see daily dots on the initially straight red line begin to gently arch to the right since the beginning of April as social distancing began to take effect. The line has been curving to the right since then - no longer straight - because the increase in case number is no longer exponential. Plotting on a regular graph instead of log paper you can see that since social distancing started, cases have in fact increased on a straight line:

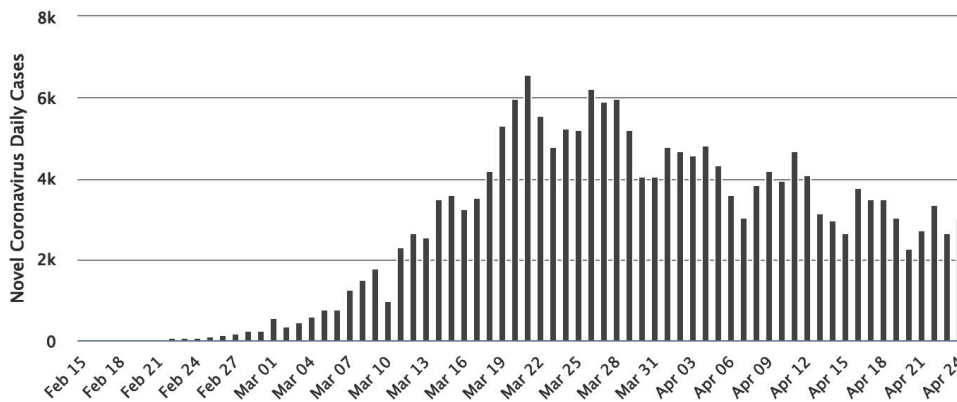


You could have predicted a month ago, without any doubt, that we would arrive at our millionth case on April 28: We have been adding very close to 29,000 new cases each and every day for the last three weeks. That's a steady rate of 9 cases per 100,000 Americans daily.

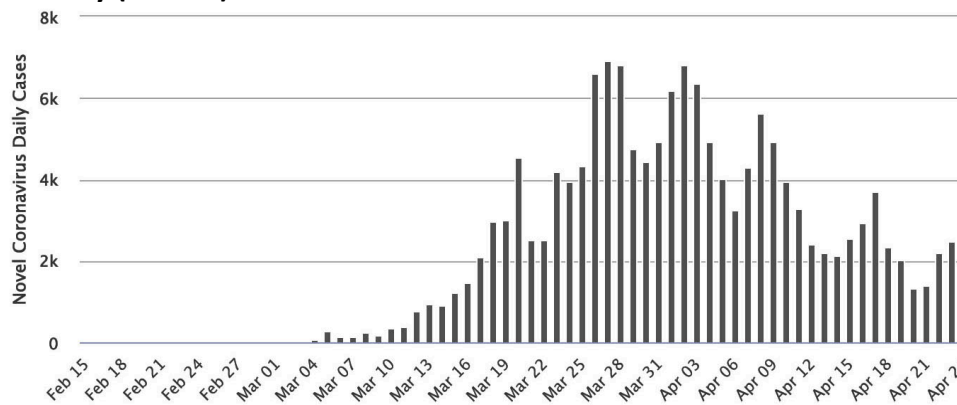
I am showing you this linear graph very large on the page, because what it is saying is very important: COVID-19 is increasing in the United States at a constant rate. Do you see why this is important? The r_0 number is defined as the likelihood of an infected individual passing the infection to another individual. If r_0 is greater than 1.0, the infection will spread in the community, the number of daily new cases increasing; if r_0 is less than 1.0, the infection will diminish within the community, the number of daily new cases decreasing. If r_0 is precisely 1.0, the number of daily new cases will not change. That is what this graph is telling us – shouting to us, actually: in the United States today, the r_0 value is 1.0, not 0.8 or 0.9 as commonly reported.

So what’s so scary about the slight difference between 0.8 or 0.9 and 1.0? We started this mess in February facing an r_0 of between 3.5 and 3.0 in Europe, and between 3.0 and 2.5 in the United States. Knocking it down to 1.0 doesn’t seem so bad. Here’s the rub: Italy knocked it down to 0.8, and Germany to 0.7. Both countries took the same drastic social distancing measures as the United States, but, as it turns out far more importantly, both countries carried out extensive testing using the WHO’s readily available RT-PCR test, with contact tracing and isolation of all infected individuals. You can see the impact on new daily cases:

Italy ($r_0 = 0.8$)



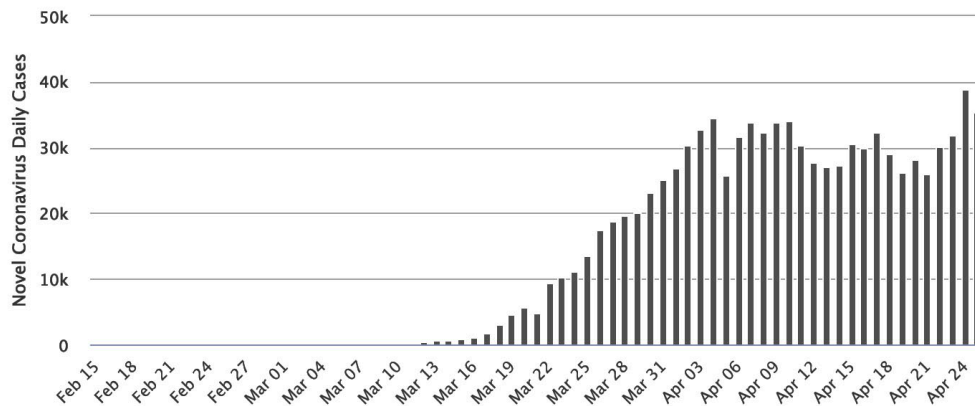
Germany ($r_0 = 0.7$)



With an r_0 well below 1.0, the daily new cases in Italy are decreasing slowly but steadily. With an even lower r_0 value, Germany’s new cases are decreasing even more rapidly.

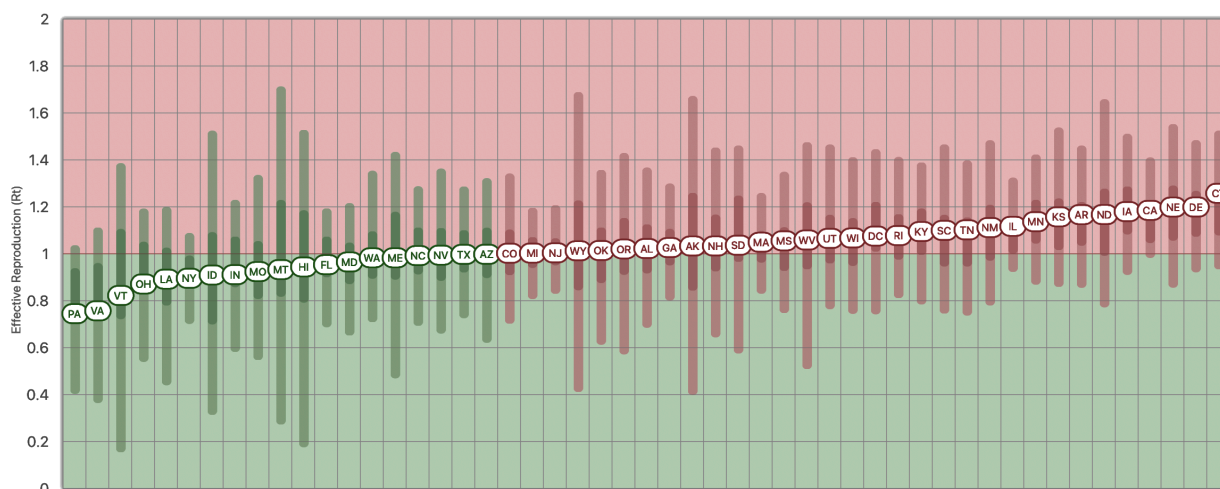
Now look at our country through the same lens:

United States ($r_0 = 1.0$)



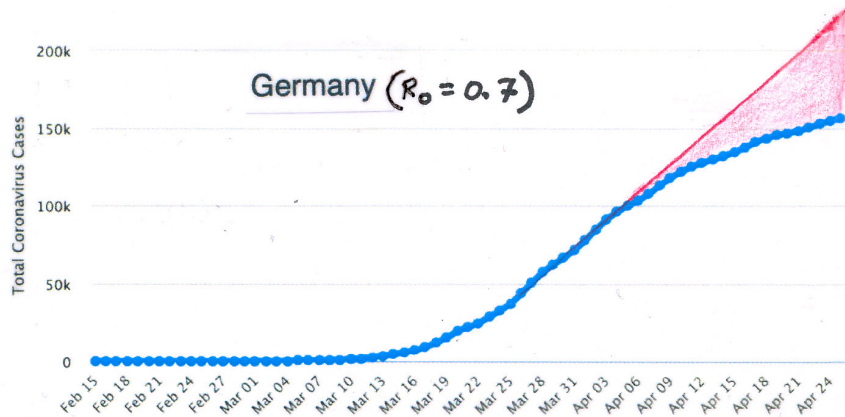
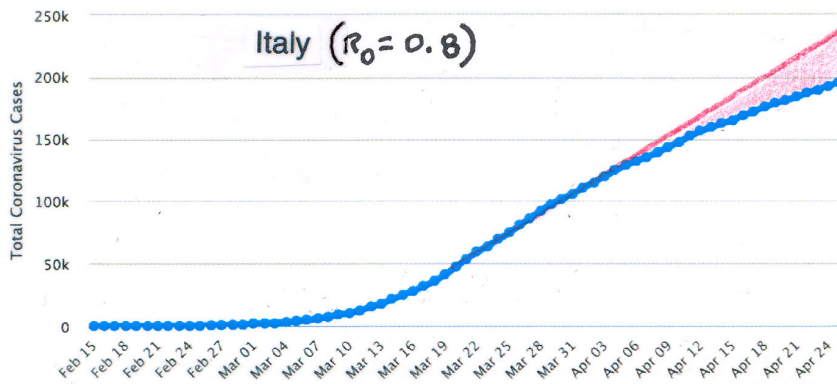
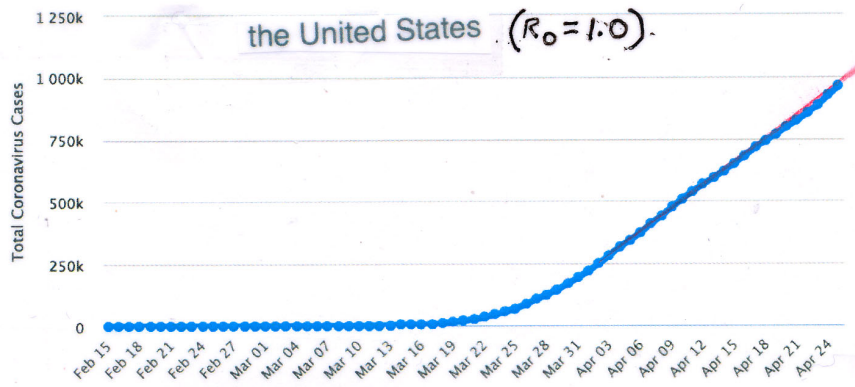
The number of daily new cases in the United States is not going to fall like Italy's did, although I wrongly predicted to you last week that it would. In fact, it's not falling at all. The Murray model, and my forecasting, has relied on the basic assumption that what happened in Italy would, somewhat later, also happen here. But buried deep within that assumption was the idea that both countries would exhibit similar r_0 numbers. Didn't happen.

Making things worse, over half the 50 states have recently begun to "mitigate" -- to loosen restrictions on businesses, hair salons, bars, restaurants -- even bowling alleys. In Florida and California, people are now flocking to public beaches. Many of these states already have r_0 greater than 1.0 (in the red zone of the graph). There is no way "opening up for business"



will not lead to an increase in r_0 above 1.0 in every state that mitigates in this way. I do not see how this can fail to ignite COVID-19 growth in those states in the months to come. Of course, these will be summer months. Perhaps hotter weather may counteract the r_0 increase to some degree. Actually, I think it may. That is the bet the governors of mitigating states are making.

Total Coronavirus Cases



So What Went Wrong?

Why was our outcome so much worse than Germany's? In a word, testing. Why did testing proved to be the critical difference? It turns out that when you randomly test populations within Germany or the United States, these are in both countries an awful lot of people who test positive for COVID-19 with no symptoms. This became obvious with the widespread availability of simple antibody tests, which look for the presence in a person's blood (a pinprick is all that is needed) of antibodies to COVID-19. If they are present, that person has been infected with COVID-19 and recovered. It turns out, many "positives" never had any symptoms!

In Miami-Dade county, Florida, 6% of the 1,800 people tested last week were positive while being asymptomatic. In a Boston homeless shelter, 146 people of 397 tested were positive – all of them asymptomatic. Santa Clara county, California tested 3,330 people selected randomly using Facebook ads targeted by zip code to sample various parts of the community, and found that over 3% of its citizens have been infected with COVID-19 without knowing it. In a study released last week, among 3,000 New Yorkers tested at grocery stores and shops, 13.9% tested positive for COVID-19; in New York City, the figure was 21.2%! So, in a nutshell, we have all of us been living within a large reservoir of undiagnosed virus carriers.

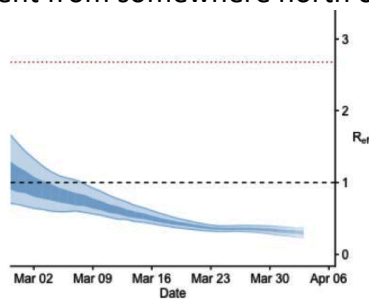
Undiagnosed virus carriers infect other people, and when there are a lot of them free to associate, r_0 cannot get below 1.0. To lower the rate of daily new cases, you've got to find a way to identify and isolate the infected people. And that's what Germany did. Contact tracing identifies anyone the undiagnosed have infected, and contact tracing them lets you isolate anyone THEY have infected. We in the United States are only beginning to initiate the widespread sentinel surveillance called for by Fauci's people. All over the country, he has asked the government to begin testing randomly-selected, asymptomatic individuals for the virus, trace the contacts of anyone who tests positive and test them, and isolate all positives for two weeks (the incubation period of the virus). Not antibody tests, mind you, but RT-PCR tests for active virus – we need to know who has the virus now, not who has had it in the past. Until we do this, our infection will persist, and our family will continue to peer out at an uncertain world.



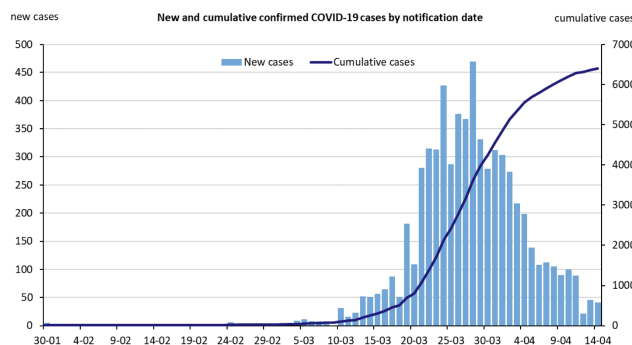
This Is Not a Zero-Sum Game

Listening to the discussion between state governors and public health officials this week, what I hear is one side arguing for the need to restore jobs (open things up) and the other for the need to protect people's health (keep things closed). It's tempting to take sides, feeling that things must go one way or the other – but that whatever happens, somebody loses. In game theory, a situation in which each guy's gain is the other guy's loss is called a zero-sum game, and to me that's what today's public discussion describes.

But it ain't so. Australia got its first COVID-19 case on January 25, only five days after the first reported case in the United States. But, unlike here, the federal government sprung into action, closing the border to China before we did, and in less than a month imposing a total lockdown, country-wide. All non-essential businesses were closed, public events cancelled, schools closed. Employers were required to allow work-from-home where possible, public transport was reserved for essential workers with passes to prove who they were, and discretionary domestic air travel between regions was banned. A reliable test for COVID-19 was developed based on the WHO recommendations, and was rapidly deployed throughout the country, with contact tracing and isolation of all who proved infected. Case numbers plummeted. Within a month r_0 went from somewhere north of 2 to below 0.4:



The number of daily new cases, which had begun to skyrocket in Australia just as they did in the United States, soon peaked and began a rapid decline. As of April 14, the cumulative total of cases had almost stopped rising. Now Australia is (carefully) opening its businesses and schools. The pandemic in Australia is over.



With very similar policies, the same has happened in New Zealand. COVID-19 is a problem that can be solved. Scientists and government can work together. We can reduce r_0 and restore our economy. How? Testing and contact tracing. Federally funded and CDC managed. Now. This does not have to be a zero-sum game.

And the Good News Is....

So, sort of a bleak report, my daughters. June in the United States isn't looking so safe anymore. We are in a war who's duration is not going to be brief, whatever the prognostications coming out of Washington. The good news is that things will likely get better come summer. Meanwhile, we are all of us still healthy, and if we keep up our social distancing our only enemy will be loneliness. Our weapon against that: ZOOMING!!! I cannot hug you, but I can certainly rub virtual noses over the computer. I can even sing *Rudolf the Red Nosed Reindeer* to my granddaughter Jed. Luckily, on the computer she will not be able to see your mother and I do our afternoon balancing exercises! Very straightforward, taught to me by Suzy Madden my exercise maven: just stand on one foot with your hands at your sides, bending your other foot backwards at the knee, and slowly turn your gaze to the right 90 degrees, then back to center and over to the left 90 degrees and back to center -- all the time keeping your foot up, hands at your sides. Repeat three times, then do the other foot. Simple, you say? Just try it.



I love each of you very much. Hopefully next week's news will be more cheerful.

Dad