Pandemic Series
Pandemic Paths

- The current lives lost will exceed 600 thousand by the election at the current virus reproduction rate.

- Removing any of the mitigation measures will result in increased deaths as the reproduction rate rises.

- A complete or near-complete reversal of the mitigation measures would permit the virus reproduction rate to grow, resulting in 2 million lives lost by August.

- Even a modest reduction in mitigation methods could see the lives lost double by the time of the election in November.

- Realistically, public gatherings are non-existent until robust testing/tracing is in place or a vaccine/anti-viral arrive.

The way forward is measured by the degree to which we will listen to scientists and consideration for our neighbors. As mitigation measures are reduced in stages, weighing the effect will occur. Benign data would suggest relaxing further rules. Unfavorable data will result in a return to the previous step. In essence, we will live a social experiment in real-time with thousands of lives in the balance.

For the United States, the outcome will emanate from the battle between strident individualism and collective conscience that is unresolved over centuries. History suggests that in a time of turmoil, Americans answer the call for the greater good. We are individuals in peace and a triumphant team when tested. Since the fate of millions hangs in the balance, we hope that this time is *not* different. E Pluribus Unum.

Racing Down. As States begin to restart their economies, the question arises whether it is too early? One way to answer the question is with the reproduction rate ("RO" or "R-Naught"), which measures how fast the virus reproduces. While not explicitly a time measure, framing it as the rate at which the virus doubles simplifies the exposition. The current rate is about 1.22, which translates into an approximate doubling time of 50 days (exhibit 1). This rate will still deliver over 15,000 new cases a day. The size of this number implies *105 deaths per day* and should give people pause in their eagerness to open up the economy. This outcome, however, is not the only measure.
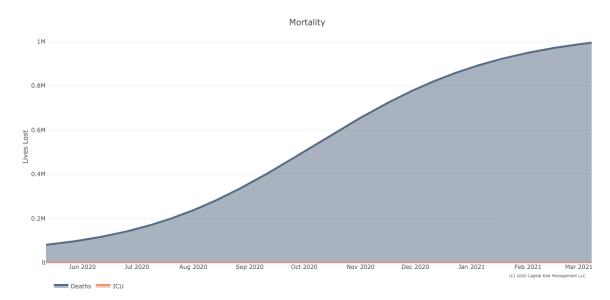
Exhibit 1. United States COVID19 Reproduction Rate

Source: Capital Risk calculations. Reproduction rate is a 7-day moving average.

This reproduction rate was the result of unrivaled action by the government to slow the virus. Whole sections of the economy closed after enacting social distancing measures. Unparalleled unemployment is virulently spreading through the economy. In economic terms, the devastation is extraordinary in its scope. This outcome, however, is not a material measure.

The critical question policymakers must ask is, how much more can we reduce the reproduction rate? Short of a vaccine or a complete shuttering the economy, not much. This conclusion is essential to understand. Absent completely closing the economy through home quarantine, this level of reproduction is an exceptional outcome. Thus, we've achieved a level that is probably as good as it gets until a vaccine arrives.

The implication for mortality is not as reassuring. If the disease were to continue at the current rate, then estimated lives lost by the election would exceed *660,000* (exhibit 2).[1] That number is higher than the total of both world wars for the US and is an unquestionably tragic outcome. Unfortunately, the result may be unavoidable absent the miracle arrival *and production* of a vaccine. This outcome is our base-case going forward as the current social distancing measures are maintained in some form.

Exhibit 2. United States COVID19 Lives Lost Forecast

Source: Capital Risk calculations. Based on virus reproduction rate from first week of May.

Past as prelude. The spread of the COVID19 in March spurred policy makers into action. A modest regression gave cause for hope in early March, but the pause was only temporary (exhibit 1). The continually growing virus gave policy makers no choice but to act in mid-March. How necessary was the action? The reproduction rate was estimated at about four. This number implies a doubling of the virus in just over 3 days. It would take only 50 days to reach 245 million people (and herd-level immunity), with an estimated 1.7 million people dead. This scenario does not account for deaths that could occur because of insufficient ICU resources. These numbers highlight that the social distancing action was *necessary*.

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[1] *This estimate is based on the current reproduction rate. It uses a standard Susceptible-Infected-Recovered (SIR) model for virus spread. As with all models, it is only as good as the underlying assumptions. The model used here compares outcomes on a relative basis and is not an absolute forecast.*

This experience helps to frame the effect of the mitigation measures. The current action helped reduce the reproduction rate from north of four to 1.2 in six weeks. This outcome was probably better than expected because the majority of the economy was designated as an essential service and continued to work, commute, and interact (with restrictions). This result suggests that an easing of restrictions is possible in controlled circumstances where social distancing occurs and measures to prevent disease spread are in place. The question is which mitigation measures to maintain and which to relax? Lives lost are the measure for the outcome.
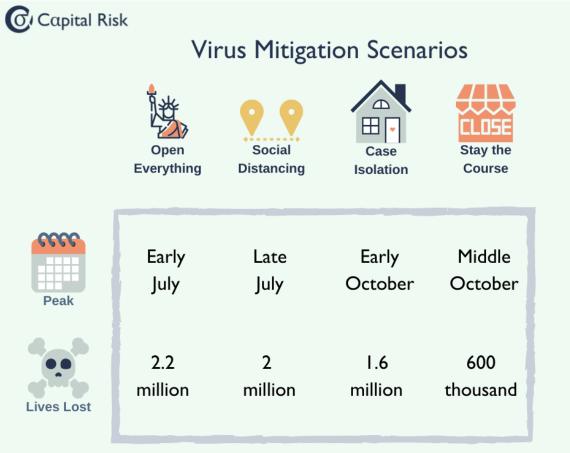
Many Paths. To understand the path forward, we need to frame out the plausible mitigation scenarios. The options to reduce the effect of the virus are not numerous because the disease is already in the community. Typically, isolation of the infected to help slow the disease is viable. The problem is that we do not know everyone who is contagious, so it is impossible to isolate them. There are effectively only four scenarios going forward.

- **Keep All -** Stay the course with current measures.
- **Remove All -** Let the virus run its course.
- **Social Distancing (Home Quarantine)** - Ensuring people keep at least six feet apart and limit gathering in groups.
- **Case Isolation** - The infected are isolated and home quarantine of their household members.

The strategies vary in their containment ability. The first two scenarios are straightforward. Keep all would stay the current course of all measures. Do nothing suggests letting the virus run its course. Social distancing limits contagion at the cost of stopping significant parts of the economy. Case isolation is less effective as case tracking takes time to achieve; however, more of the economy can operate. These scenarios provide border cases where most other actions should fall within. While these estimates lack the precision of the antediluvian economy, they provide a means to frame the analysis.

An important distinction is required when forecasting the virus spread. While there are many means to model the rate in the future, two are most frequent. The forecast can use the current rate as a projection going forward. In doing so, the forecaster assumes that there are no further incremental benefits to the mitigation methods, which is a weakness of the method.

In contrast, a declining rate projects the prior rate of change forward. The assumption is that the mitigation methods will continue to have incremental benefits beyond those already realized. This method aligns with the internal dynamics of the model. When new cases remain constant in magnitude, they still become proportionally less of growing number of total cases. The weakness is that as more people are infected, the possibility to spread the disease *increases*.

Forecasting is a difficult task because some assumptions *must* be made. The choice delivers two types of errors. *False positives* indicate the presence of disease when it is not truly present. Alternately, *false negatives* indicate the absence of a disease when it is present. When lives are the measure for success, prudence dictates false positives as the bias in the model. Thus, this forecasting uses a constant current rate.

Exhibit 3. United States COVID19 Scenario Forecast

Capital Risk

Virus Mitigation Scenarios

	Open Everything	Social Distancing	Case Isolation	Stay the Course
Peak	Early July	Late July	Early October	Middle October
Lives Lost	2.2 million	2 million	1.6 million	600 thousand

Note: These numbers are estimates only and are not definitive.
The serve only to frame the discussion.

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The numbers are sobering for loosening the mitigation strategies (exhibit 3). Releasing everyone would result in upwards of 2.2 million lives lost with peak contagion in early July. Partial removal of the social distancing measures would achieve a similar result. In this scenario, the result would be nearly two million lives lost and a peak contagion at the end of July. Everyone returning to normal with just case isolation would deliver 1.6 million lives lost while delaying the peak until early October. For all intents and purposes, these scenarios are off the table.

This analysis highlights the risk of early opening. The question, however, is how we go forward from here. Closing the economy until a vaccine arrives would result in an economic catastrophe of unimaginable depth. The answer lies with the people. Policymakers know these numbers. The question is whether people will conduct themselves in a manner that prevents the reproduction rate from rapidly increasing.

The way forward is a reduction of the mitigation measures in stages and evaluation of the outcome after each step. As evidence emerges that people are acting responsibly, then proceed to reduce the restrictions further. If the data is poor, then return to the prior stage. In essence, we are living a social experiment in real-time with thousands of lives in the balance.

E Pluribus Unum. The way forward is measured by the degree to which we listen to scientists and our thoughts for our neighbors. In the United States, the battle between strident individualism and collective conscience has waged for centuries. A resolution remains elusive. History suggests that in a time of turmoil. Americans answer the call for the greater good. We are individuals in peace and a triumphant team when tested. Since the fate of millions hangs in the balance, we hope that this time is *not* different.

> **"The right to swing my fist ends where the other man's nose begins."**
>
> Oliver Wendell Holmes, Chief Justice of the United States

This article is part three in a series on the economic impact of the COVID-19 virus.

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