



STRATIGRAPHIC ASSET MANAGEMENT, INC.

---

JAYUSIA P. BERNSTEIN  
ALAN S. BERNSTEIN

**The Coronavirus: Medical Developments, Ending the Economic Lockdown,  
and the Investment Implications**

**Alan S. Bernstein**

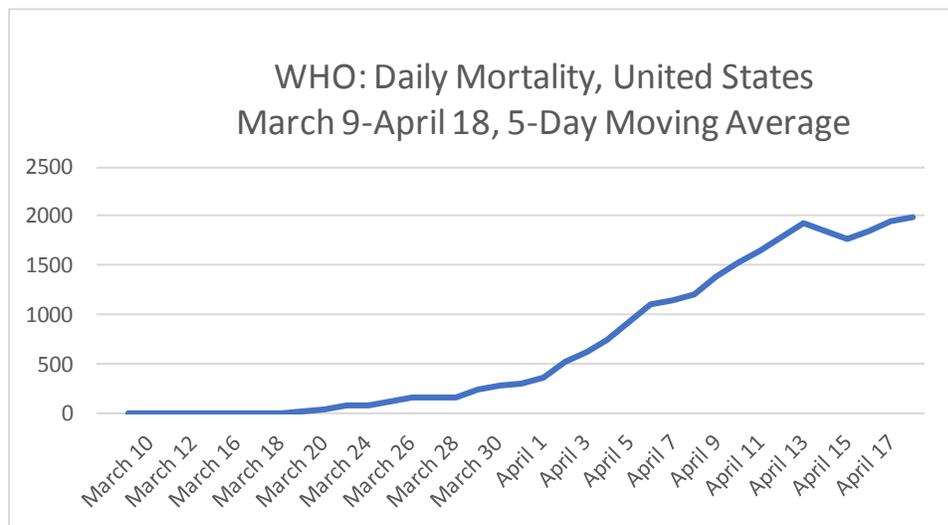
**April 20, 2020**

## Summary and Conclusions

The purpose of this paper is to characterize current developments on the medical front to combat the coronavirus, which in turn will determine when and how our country returns to work, the economic outlook, and investment returns.

### *Medical Developments*

- It is encouraging that there is a large number of antibody treatments, antiviral treatments, cell-based therapies, and RNA-based therapies under development that have the potential: (a) to reduce the severity of coronavirus symptoms; (b) to lower the utilization of limited ICU facilities, ventilators, and other scarce equipment; and (c) to drive down mortality rates. Their development timeline is much shorter than for vaccines. Treatments that prove effective should bend the mortality curve. As the chart below indicates, mortality rates in the United States may be stabilizing, but they are not yet trending down.<sup>1</sup>



- One antiviral treatment that has received widespread attention is remdesivir of Gilead Sciences. However, results of a randomized clinical trial to date are mixed, and the pharmaceutical efficacy of remdesivir is still not known.
- In the end, a vaccine is required to return to normal levels of social interaction and work with zero risk. There are 86 active vaccine candidates of which six are in clinical trials. Johnson & Johnson has asserted its target vaccine could be available on a limited basis as early as Q1 2021. Even if successful, having adequate manufacturing capacity will be a problem as billions of doses of any new vaccine will be required. One wonders whether there will be divisive political disputes over vaccine distribution priorities.

<sup>1</sup> WHO data do indicate that the daily rate of confirmed new infections is now trending down. The problem is that the data are not considered reliable because most infections are asymptomatic and not reported. World Health Organization, Coronavirus disease situation reports. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>

## The Coronavirus: Medical Developments, Ending the Economic Lockdown, Investment Implications

- In the absence of a vaccine, the United States requires massive testing capability to ascertain if an individual has or has had the coronavirus, and tracing to determine with whom an infected person was in contact. It is virtually impossible to obtain reliable forecasts on when the United States will have adequate supplies of test kits and tracing capabilities. The dissembling at the federal level is deeply disturbing.
- Individuals who have been infected with the coronavirus and recovered possess antibodies that should provide immunity and enable such individuals to return safely to work. However, distinguished scientists caution that there are no confirmation data on immunity at this stage, meaning how much protection is conferred and for how long are not known. There are reports that existing tests on the market to determine the presence of coronavirus antibodies are woefully unreliable.
- The NIH is conducting serosurveys to determine the presence of coronavirus antibodies in individuals. The data will enable the NIH to estimate the unreported number of infected in the United States. By our calculations, only an estimated 1% of the total population has contracted the coronavirus to date. However, even if 10% were assumed to have had the virus, that leaves 90% of the population still vulnerable to infection, which underscores the risk of returning to work and socializing prematurely.
- Ending the economic lockdown and social distancing practices is likely be a long drawn out process that will extend into 2021. What this means is that the economic recovery and rebound in corporate profits may take longer than many investors currently believe. The risk is to the downside.
- The reopening process will be managed at the state and local levels. If it is to be effective, decisions should be based on data-driven rules related to trends in infection and mortality. The only group I have found that has addressed this public policy issue is a non-profit, Resolve to Save Lives (RSL), directed by Dr. Tom Frieden, a former head of the CDC. Attached as an appendix is RSL's framework, which is worthy of consideration.
- In the face of economic lockdown and the substantial decline in corporate earnings in 2020, the S&P 500 Index has fallen year-to-date through April 17 by only around 11%. The strength of the market seems to rest on the willingness of investors to look past the immediate economic consequences of the coronavirus to an economic and market recovery in 2021. Investors who expect a relatively robust recovery in the second half of 2020 are likely to be disappointed. Just as the process of ending the lockdown will be uneven — characterized by openings followed by new infections, shutdowns and reopenings over a several month period — we expect a good deal of volatility in the market as investors vacillate between optimistic and pessimistic views of the progress being made. Clearly, we have entered an extended period of limited visibility and low predictability, factors that tend to lower equity valuations.
- The coronavirus experience probably will have some lasting impact on our society, business practices, and the economy. Attempts at divining the future in the post-coronavirus period have barely begun. Nevertheless, some preliminary thoughts lead us to believe that coming changes could have an extended negative impact on corporate profits and investment returns.

## Treatments<sup>2, 3</sup>

The Milken Institute is tracking treatments and vaccines that are under development. Table 1 summarizes the various initiatives. Apart from natural immunity possibly conferred by recovery from COVID-19, only a vaccine is likely to provide immunity to coronavirus infection. There are currently 73 treatments (antibodies, antivirals, cell-based therapies, and RNA-based therapies) under development. Although they do not offer immunity, these treatments have the potential to alleviate the severity of the symptoms of infection, reduce the resources required to attend the infected, and lower the mortality rate of the virus. Among the antibodies and antiviral medicines being explored are FDA-approved drugs for treating other medical problems that hopefully can be repurposed to fight COVID-19.

<b>Table 1</b>			
<b>Covid-19 Treatment and Vaccine Tracker</b>			
<b>As of April 15, 2020</b>			
<b>Class</b>	<b>Number in Development</b>	<b>Comments</b>	<b>Company</b>
<b>TREATMENTS</b>			
Antibodies	42	Avastin, Approved to Treat Cancer Kevzara, Approved to Treat Rheumatoid Arthritis Actemra, Approved to Treat Arthritis Soliris, Approved to Paroxysmal Nocturnal Hemoglobinuria	BioCentury Sanofi/Regeneron Roche Alexion
Antivirals	19	Favilavir/Favipiravir Kaletra/Aluvia, Approved to Treat HIV-1 Infection <b>Remdesivir</b> Prezcobix, Approved to Treat HIV-1 Infection Truvada, Approved to Treat HIV-1 Infection Xofluza, Approved to Treat Influenza Tamiflu, Approved to Treat Influenza Virazole, Approved to Treat Respiratory Tract Infections	Fujifilm Toyama Chemical/Zhejiang Hisun Pharmaceuticals AbbieVie, WHO <b>Gilead</b> Janssen Gilead & Chinese Sponsors Roche Roche Bausch Health
Cell-Based Therapies	7		
RNA-Based Treatments	5		
Scanning Compounds to Repurpose	11	Janssen, Johnson & Johnson, BARDA Novartis, Gates Foundation	
Others	44	Methylprednisolone, Approved Anti-inflammatory, Some Cancers Chloroquine/ Hydroxychloroquine, Approved Antimalarial Jakafi, Approved to Treat Myelofibrosis, Polycythemia Vera, and Acute Graft-versus-host disease  PegIntron, Sylatron, IntronA, Approved to Treat Hepatitis C	UK govt, Oxford, WHO Numerous trials  Novartis Wuhan Jinyintan Hospital, Schering
Devices	3		
Total Treatments & Devices	131		
<b>VACCINES</b>	86		
Source: Milken Institute <a href="https://milkeninstitute.org/sites/default/files/2020-04/Covid19%20Tracker%20NEW4-15-20.pdf">https://milkeninstitute.org/sites/default/files/2020-04/Covid19%20Tracker%20NEW4-15-20.pdf</a>			

Remdesivir, an antiviral drug under development by Gilead Sciences, has received the most publicity. The U.S. Food and Drug Administration has approved remdesivir for treating COVID-19 patients under the compassionate-use protocol (a designation that gives patients with life-threatening illnesses access to an experimental drug). Remdesivir was discussed in a recent article in the New England Journal of

<sup>2</sup> Goldman Sachs, Latest Developments on COVID-19 Therapies and Vaccines, April 14, 2020.

<sup>3</sup> Milken Institute, COVID-19 Treatment and Vaccine Tracker. The document aggregates publicly available information on all treatments and vaccines currently in development.

Medicine.<sup>4</sup> Sixty-one coronavirus patients were given at least one dose of the drug. Fifty-three had data that could be analyzed. In a follow-up after 18 days, 36 patients (68%) showed improved in oxygen-support, including 17 of 30 patients on ventilators. Twenty-five patients (47%) were discharged while 7 patients (13% died). Of the 7 who died, six were on ventilators. The shortcoming of the study is the inability to attribute the improvement of the infected patients to remdesivir. To know for sure, randomized, placebo-controlled trials will be required.

STAT, an American health-oriented news website ([www.statnews.com](http://www.statnews.com)), reported on the recent results of a University of Chicago Medicine trial of remdesivir that is part of a significantly larger Gilead Phase 3 trial. The University of Chicago recruited 125 people suffering from the coronavirus, of which 113 had severe disease. All patients were treated with daily infusions of remdesivir. Most of the patients have been discharged. Two patients died. The results were encouraging, but not definitive.<sup>5</sup>

Other promising treatment candidates were brought to my attention by a physician friend. These include Pluristem's placenta-based cell-therapy,<sup>6</sup> Leronlimab,<sup>7</sup> which is in a phase IIb/III clinical trial; and Ivermectin, an antimicrobial therapy, which has had promising results in trials.<sup>8</sup> The point is that treatments and therapies under development offer significant potential to treat the coronavirus.

## Vaccines

In the end, the defeat of the COVID-19 virus depends on the development of a vaccine that provides immunity to the coronavirus. The Milken Institute is tracking 86 active vaccine candidates. While most are in the early stage of development, six are in clinical trials, which is encouraging.

The Coalition for Epidemic Preparedness Innovations (CEPI) is a global non-profit alliance formed to develop vaccines against infectious diseases such as COVID-19. CEPI is collaborating with GlaxoSmithKline to use their vaccine adjuvant<sup>9</sup> technology to enhance the development of an effective COVID-19 vaccine. The target vaccine is expected to cost \$2 billion to develop over the next 12 to 18 months.<sup>10</sup> There is no assurance the CEPI and GSK will be successful.

Johnson & Johnson recently announced it had a lead vaccine candidate and would seek to develop it through a partnership with the Biomedical Advanced Research and Development Authority (BARDA), which is part of the U.S. Department of Health and Human Services. J&J stated that it "expects to initiate human clinical studies of its vaccine at the latest by September 2020 and anticipates that the first

---

<sup>4</sup> "Compassionate Use of Remdesivir for Patients with Severe COVID-19," *New England Journal of Medicine*, April 10, 2020.

<sup>5</sup> Feuerstein and Herper, "Early peek at data on Gilead coronavirus drug suggests patients are responding to treatment," *STAT*, April 16, 2020. Bret Stephens also underscored the risks still associated with the preliminary data on remdesivir. "The Story of Remdesivir," *Stephens*, *New York Times*, April 17, 2020.

<sup>6</sup> <https://www.jpost.com/health-science/israeli-covid-19-treatment-shows-100-percent-survival-rate-preliminary-data-624058>

<sup>7</sup> <https://www.targetedonc.com/view/first-patient-treated-in-phase-iiibiii-trial-of-leronlimab-for-covid19>

<sup>8</sup> "Usefulness of Ivermectin in COVID-19 Illness," Patel et al, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3580524](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3580524)

<sup>9</sup> Adjuvants are ingredients in certain vaccines that stimulate a stronger immune response in people receiving the vaccine.

<sup>10</sup> <https://cepi.net/covid-19/>

batches of a COVID-19 vaccine could be available for emergency use authorization in early 2021, a substantially accelerated timeframe in comparison to the typical vaccine development process.”<sup>11</sup> Trials will still be necessary to prove the drug’s efficacy and safety. There is no assurance that J&J will be successful either.

On April 17, Moderna, a publicly held clinical stage biotechnology pharmaceutical company, stated that it received federal funding of \$483 million to accelerate the development of its candidate for a coronavirus vaccine.<sup>12</sup>

### **Antibodies and Immunity**

Individuals who have recovered from the coronavirus have antibodies in their blood that are believed to confer immunity. How long such immunity lasts is not known. Marc Lipsitch, an epidemiologist on the staff at the Harvard School of Public Health, cautiously stated that individuals who recover from the coronavirus at the very least should have immunity for one year.<sup>13</sup> If one can determine with certainty that a person has had the virus and possesses antibodies, that person should be free to return to work without fear. Antibody testing is crucial to reopening the economy.

Biotech companies and research laboratories are rushing to produce an antibody blood test. Unfortunately, many testing kits that have been sold are not giving reliable results, including 3.5 million tests ordered by the UK Government that had to be scrapped.<sup>14</sup> In the United States, the FDA has allowed more than 90 companies to enter the market to offer antibody tests. Unfortunately, most of the tests are not generating reliable results.<sup>15</sup> It is reasonable to expect that over the next couple of months the FDA will correct this chaotic and unacceptable situation.

Wuhan authorities recently announced commencement of testing 11,000 residents for coronavirus antibodies. Similar antibody testing will be done in nine other Chinese provinces and large cities. The thrust of the Chinese testing is to determine who can safely go back to work. Adding to the confusion, Lin Xihong, a professor at biostatistics at the Harvard T.H. Chan School of Public Health noted, “It is not safe to assume if one has a positive antibody test, one is immune and can go back to work.”<sup>16</sup> We do not have the requisite data, but the data should become available in the coming months.

On April 10, NIH announced that it will conduct a survey to determine how many adults in the United States who do not have a confirmed history of infection with COVID-19 nevertheless have antibodies to the virus. Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases (part of NIH), stated, “This study will give us a clearer picture of the true magnitude of the COVID-19 pandemic in the United States by telling us how many people in different communities have been infected without knowing it, because they had a very mild, undocumented illness or did not access testing while they

---

<sup>11</sup> <https://johnsonandjohnson.gcs-web.com/news-releases/news-release-details/johnson-johnson-announces-lead-vaccine-candidate-covid-19>

<sup>12</sup> “Vaccine in trial gets federal funding,” Loftus, Wall Street Journal, April 17, 2020.

<sup>13</sup> “Who Is Immune to Coronavirus?,” Marc Lipsitch, New York Times, April 13, 2020.

<sup>14</sup> “Will antibody tests for the coronavirus really change everything?” Mallapaty, Nature, April 18, 2020,

<https://www.nature.com/articles/d41586-020-01115-z>

<sup>15</sup> “Antibody test, seen as key to reopening country, does not yet deliver,” Eder, Twohey, Mandavilli, New York times, April 19, 2020.

<sup>16</sup> “Wuhan starts testing people for immunity,” Page, Wall Street Journal, April 17, 2020.

were sick. These crucial data will help us measure the impact of our public health efforts now and guide our COVID-19 response moving forward.”<sup>17</sup>

I calculate the number of people in the United States who have contracted the coronavirus is only around 3 million people or about 1% of the population. The total number of confirmed U.S. cases is 604,070 through April 16.<sup>18</sup> Assume that these cases are ones that show obvious symptoms of COVID-19 and that 80% of infected are asymptomatic, meaning they do not show such symptoms.<sup>19</sup> Then the total infected would amount to around 3 million (604,000 / .2) or 1% of the population. If 99% of our citizens have not been exposed, prematurely ending social distancing and self-quarantining would result in a resurgence of infections. However, even if 10% were assumed to have contracted the virus, that leaves 90% of the population still vulnerable to infection. We conclude that the risks of a broad-based near-term return to work and socialization remain high.

### Testing and Tracing

The obvious reason for coronavirus testing is to determine who should be isolated and who should be treated. In this regard, the United States lacks enough test kits at medical installations to meet the demand for tests. According to the New York Times,<sup>20</sup> as of April 14, around 145,000 people were being tested each day during the week of April 6. Daily new infections reported in the United States are running around 25,000 per day. However, if asymptomatic infections at 80% of total infections are included, then the rate of testing is barely ahead of the daily new infection rate. Substantially greater testing capability is required if the country is to reopen safely. A report by the Safra Center for Ethics at Harvard University stated that the United States needs 5 million tests per day by early June and should increase to 20 million a day by late July to fully remobilize the economy.<sup>21</sup>

The current mess in testing suggests that the Safra objectives will not be met. There is no understanding concerning which companies are producing tests, how their capacity is being increased, the capital investment required, or the cost per kit of the test that will be manufactured. Many existing tests take too long to generate results. Abbott Laboratories has developed a test that can deliver results in as little as five minutes, but the test equipment is expensive.<sup>22</sup> There have been reports by STAT and in The Atlantic that the supply of key chemical ingredients used in testing is low, which could restrain the ramp up of testing.

---

<sup>17</sup> NIH Press Release, NIH begins study to quantify undetected cases of coronavirus infection, April 10, 2020. <https://www.nih.gov/news-events/news-releases/nih-begins-study-quantify-undetected-cases-coronavirus-infection>

<sup>18</sup> Coronavirus disease 2019, Situation Report 87, World Health Organization, April 16, 2020. <https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200416-sitrep-87-covid-19.pdf>

<sup>19</sup> WHO, Q&A: Similarities and Differences-COVID-19 and Influenza, March 17, 2020. “For COVID-19, data to date suggest that 80% of infections are mild or asymptomatic...” The 80% figure, however, is not a hard number. Reference is made to “COVID-19: What Proportion Are Asymptomatic?”, Heneghan, Brassey, Jefferson, Center for Evidenced Based Medicine, April 6, 2020, which found that between 5% and 80% of people testing positive for COVID-19 may be asymptomatic. <https://www.cebm.net/covid-19/covid-19-what-proportion-are-asymptomatic/>

<sup>20</sup> “Testing falls woefully short as Trump seeks an end to stay-at-home orders,” Goodnough, Thomas and Kaplan, New York Times, April 15, 2020.

<sup>21</sup> “Roadmap to Pandemic Resilience,” Safra Center for Ethics at Harvard University, April 20, 2020, Appendix E: Summary of Recommendations.

<sup>22</sup> <https://www.alere.com/en/home/product-details/id-now-covid-19.html>

It takes an estimated four to 14 days for an infected person to show symptoms of the virus. During that period, the victim can infect more people. Increasingly officials are trying to trace the social interaction of infected individuals in order to quarantine the exposed people. The manual process based on extensive interviewing is awkward, time consuming, and expensive. It is understood that Apple and Google are trying to develop an app that would allow automatic tracing of individuals, but to be effective, everyone would need to download and consent to the app.

### Ending the Economic and Socialization Lockdown

*Criteria for Reopening.* President Trump has stated that decisions to reopen cities and states will rest with local, not federal, authorities. While the White House has published guidelines for phasing out lockdown and social distancing, they say little about how our governors and mayors should make such decisions.<sup>23</sup> In that sense they are not helpful. What is required is a rules-based framework.

Date	Country	Policy Measure
Mid-Feb	China	Lockdowns start to ease. Central government urges employers and workers to resume normal activity. Response lackluster
Early-Mar	China	Many factories, shops and restaurants have reopened in regions where the outbreak was less severe. Office workers have continued to work from home where possible. Early
Early-Apr	China	Wuhan ends lockdown with individuals able to leave the city. Schools remain closed. Schools in less affected regions start to reopen.
Mid-Apr	Spain	Manufactures, construction and some services allowed to return to work.
	Italy	Bookshops, stationers and Children's clothes shops to reopen. Forestry & gardening to resume. Worst affected regions maintained quarantine rules.
	Italy	Possible reopening of schools in September with reduced classes and online lessons.
	Austria	Hardware and home improvement stores reopen.
	Czech	Sports centers & some shops reopen.
	Denmark	Kindergartens and schools (up to 5th grade) return.
Late-April	Norway	Schools reopen starting with kindergartens and primary schools.
Early-May	France	Aim for manufacturers and retail sectors to reopen.
Source: Capital Economics, "How Will Lockdown Be Lifted?", April 15, 2020		

<sup>23</sup> <https://www.whitehouse.gov/openingamerica/>

China adopted a rule that stated no city could reopen until intensive surveillance found zero new cases for 14 straight days, the assumed virus incubation period.<sup>24</sup> On this basis, Wuhan and Nanjing, among other cities, were allowed to reopen. Resolve to Save Lives, a public health advocacy group headed by Dr. Tom Frieden, a former director of the CDC, has issued a series of criteria for determining when physical distancing measures can be loosened. The criteria, which are rules-based and data-driven, are attached as an appendix to this memorandum.<sup>25</sup> The principal measures are decreasing cases of new infections for 14 days; decreasing numbers of deaths for 14 days; and decreasing health care worker infections; among other measurements.

I suspect that reopening in the United States will be piecemeal and staggered, phased and gradual: by neighborhoods; by districts; by counties; by business types; and by industries. Bear in mind that since most people have not been infected by the coronavirus and do not have immunity, new infections remain a risk. This suggests that until massive testing is available to determine whether one is infected or possesses coronavirus antibodies, reopening will be a maddeningly slow process. *But it is also possible that if powerful treatments and therapies can be introduced such that, for most infected, the coronavirus is not worse than the flu, becoming infected will be an acceptable risk and reopening could be accelerated.*

Until that point is reached, we expect that areas will reopen only to be locked down again because of a rise of new infections. In short, reopening will not be across the board, but rather, uneven with periodic shutdowns. This seems to be consistent with Fauci's view that relaxing social distancing rules will likely occur on a rolling basis and not all at once.<sup>26</sup> How much time will be required to permit the restoration of normal economic conditions is unknown at this stage, but the likelihood is that this process could easily extend into 2021.

## The Future

One of the consequences of the coronavirus is to stimulate a good deal of introspection about our society. McKinsey & Company recently published a brochure discussing its speculations on long-term consequences of the coronavirus for the U.S. economy. Its principal observations:

- Economic distancing. Less enthusiasm for the international.
- Resilience and efficiency. Just-in-time supply chains may have to be restructured because of the risk of interruption.
- The rise of the contact-free economy. Internet shopping, telemedicine (Teladoc, TDOC). Automation will increase.
- More government intervention in the economy. Safety net. Involvement in crisis management, climate change, public health.
- More scrutiny of business — read more regulation. Backlash against maximizing profits, share buybacks, and high dividends. Even before the coronavirus, there was a growing sense that shareholder value should not be the only corporate value. In August 2019, more than 181 U.S. CEOs signed a statement committing themselves to other priorities — investing in employees, supporting communities, and dealing ethically with suppliers — in addition to shareholder value.

---

<sup>24</sup> "The Coronavirus in America: The Year Ahead," McNeil, New York Times, April 18, 2020.

<sup>25</sup> [https://preventepidemics.org/wp-content/uploads/2020/04/COV020\\_WhenHowLoosenFaucet\\_v4.pdf](https://preventepidemics.org/wp-content/uploads/2020/04/COV020_WhenHowLoosenFaucet_v4.pdf)

<sup>26</sup> "Fauci: 'We're not there yet' on key steps to reopen economy," Neergaard and Pace, AP, April 14, 2020, <https://apnews.com/46ee40035d500c4190489aea0adb126b>

## The Coronavirus: Medical Developments, Ending the Economic Lockdown, Investment Implications

- Changing industry structures, consumer behavior, market positions, and sector attractiveness. Some industries will be under pressure: automobile; retail; energy; etc.

McKinsey concluded by noting that decisions could follow two opposing models. In the first, decisions lead to less prosperity, slower growth, widening inequality, bloated government bureaucracies, and rigid borders. In the second, the decisions made during this crisis could result in a burst of innovation and productivity, more resilient industries, smarter government at all levels, and the emergence of a reconnected world. While it is possible to end up with a mixture of both, I believe the United States will end up closer to the first model rather than the second.<sup>27</sup>

### *Implications for Investors*

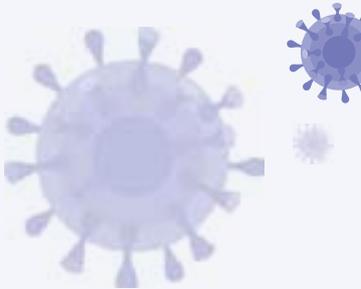
We concluded our investment outlook letter in early January by noting that the economic outlook was more subdued, expected investment returns would be lower than in past years, and investment risks were higher. The consequences of the coronavirus have been to greatly accelerate and magnify the trends we feared.

It is astonishing that given the economic destruction that already has taken place, the U.S. equity market as measured by the S&P 500 Index through April 17 was down around only 11%. Clearly investors are looking beyond 2020 to the recovery next year and the likelihood that a vaccine will be developed.

As postulated by McKinsey and others, it is quite likely that the coronavirus will have a lasting impact on our society and an adverse affect on the investment outlook. This does not mean equities are not the most attractive asset among the asset classes available to investors, but rather that investment returns short term may be less predictable and more subdued, while longer-term returns will be below the trend of 8% to 10% per annum.

---

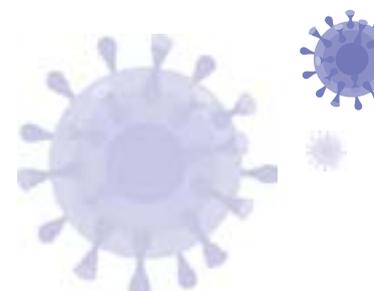
<sup>27</sup> "The future is not what it used to be: Thoughts on the shape of the next normal," Sneader and Singhal, McKinsey & Company, April 2020.



# When and How to Reopen After COVID-19

**COVID-19 PHYSICAL DISTANCING MEASURES CAN BE LOOSENED WHEN ALL OF THE FOLLOWING CRITERIA ARE MET:**

Epidemiology	Health Care	Public Health
<ul style="list-style-type: none"> <li>✓ Decreasing cases in the context of increasing testing (or stable testing with decreasing positivity) for at least 14 days</li> <li>✓ Decreasing numbers and proportions of cases not linked to a source case (goal less than 3 unlinked cases per 2-week period)</li> <li>✓ Steady decrease in ILI in syndromic surveillance for at least 14 days</li> <li>✓ Decline in deaths for at least 14 days</li> <li>✓ Decreasing health care worker infections such that infections are now rare</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ability – including staffing – to double number of patients treated in intensive care units from current census</li> <li>✓ Ability – including staffing – to screen large numbers of symptomatic patients safely (e.g., outdoor tents, drive through)</li> <li>✓ Sufficient PPE for all health care workers even if cases double</li> <li>✓ Sufficient face masks to provide to all patients seeking care even if cases double</li> <li>✓ More discharges than admissions for COVID-19</li> <li>✓ Ensure at least baseline capacity in general health services, including through expansion of telemedicine for Covid-19 and usual care</li> <li>✓ Health care facilities enforce policies and redesign to minimize possibility of exposure at triage and all other locations</li> </ul>	<ul style="list-style-type: none"> <li>✓ All cases interviewed for contact elicitation</li> <li>✓ Contacts elicited for at least 90% of cases</li> <li>✓ 100% of symptomatic contacts and others with symptoms undergo testing within 12 hours of identification of symptoms</li> <li>✓ Enough hand sanitizer to place at entry and strategically placed in buildings including workplaces</li> <li>✓ Designated facilities for non-hospitalized covid-infected people who can't be safely cared for at home (e.g., because of space constraints, homelessness, medically vulnerable household members, or otherwise)</li> <li>✓ Demonstrated ability to convey physical distancing recommendations that change behavior in most residents</li> </ul>



**ONCE THE LOOSEN CRITERIA ARE MET, THE FOLLOWING ACTIONS CAN HAPPEN OVER TIME TO REOPEN:**

Action	Initial re-opening only if all criteria above met	4-8 weeks later if no significant increase in cases and criteria remain met	8-16 weeks later if no significant increase in cases and criteria remain met
Wash hands often	Continue	Continue	Continue
Cover coughs	Continue	Continue	Continue
Don't go out if ill	Continue	Continue	Continue
Face mask if ill persons go out	Continue	Continue	Continue
Surface and object cleaning	Continue	Continue	Continue
Enhanced ventilation	Continue	Continue	Continue
Isolation of cases	Continue	Continue	Continue
Quarantine of contacts of cases	Continue	Continue	Continue
Physical distancing to 6 feet when possible – avoid crowding	Continue	Pause physical distancing	Pause physical distancing
Stop visits to nursing homes, hospitals, congregate facilities	Continue	Continue	Continue
Ban all gatherings including religious (above 10, 50 people)	Continue - 10	50	Allow all gatherings
Restaurant closures	Reopen with physical distancing*	Reopen	Reopen
Bar closures	Continue	Reopen with physical distancing*	Reopen
General business closures	Partial reopening*	Additional phased reopening	Reopen
Special situation business closures**	Partial reopening*	Reopen	Reopen
Post-secondary ed closures	Continue	Consider reopening	Reopen
K-12 in-person closures	Reopen*	Reopen*	Reopen
Day care closures	Reopen*	Reopen*	Reopen
Quarantine of travelers from high-prevalence areas	Continue, informed by data on spread	Continue, informed by data on spread	Continue, informed by data on spread

\*People over age 60, including employees and those who are medically vulnerable continue to shelter in place, including employees. Online education/work encouraged wherever possible.

\*\*Special business situations include strategically important entities (e.g., infrastructure); entities which can reopen while ensuring safe commute, physical distancing, exclusion of anyone ill, and mandatory handwashing/sanitizing at entry and periodically during day.

**Note:** Decisions on both when and what to open must be made based on evolving knowledge (e.g., infectivity of children), availability of treatment, community acceptance and adherence, and other evolving knowledge and experience. Other restrictions, such as limitations on crowding in public transport, also necessary with graduated reopening.