

# UPDATED THOUGHTS ON SARS-COV-2 AND COVID-19

## SUMMARY

The global COVID pandemic has been a shock to the global economy, resulting in increased volatility in all markets.

Investors should be aware of both biology and psychology when thinking about COVID.

Biologically, more than 200 million individuals in the United States need to develop some type of immunity to COVID for the pandemic to run its course.

A successful vaccine could offer a strong, near-term psychological positive for investors.

Market volatility is unlikely to leave in the near term, but we suggest staying the course. Focus on higher quality investments and continue to invest for the long term.

## INTRODUCTION – COVID TOOK THE WORLD BY SURPRISE

Sometime in late 2019, the world was introduced to a new virus called SARS-CoV-2. While the majority of people that are exposed or infected with the virus show only mild symptoms or are able to recover after a brief illness, a small percentage develop COVID-19, short for COroNaVirus Disease 2019. Like most other mRNA viruses, COVID is primarily an airborne virus (i.e. spread by suspended particles in shared airspace), which, in many ways, makes it similar to other respiratory coronaviruses, and thus somewhat predictable.

From our perspective as managers of Investments, the COVID outbreak and subsequent life-altering events have made 2020 a very challenging environment. Most of the economic impact from COVID has been self-inflicted to date, as public spaces have been closed due to sheltering in place that has significantly reduced

consumer spending, increased unemployment, and raised the national deficit. This brief note is a small opportunity for Crawford Investment Counsel to relay to our clients our understanding of the various issues surrounding the virus and its potential course.

## BACKGROUND ON EPIDEMIC INFECTION

We believe it is not wrong that we categorized COVID as a typical respiratory coronavirus, but it is also unique in several ways. First, COVID has a significantly longer incubation period (the time when a patient is infected until showing symptoms), and thus infected individuals can spread the virus for days without knowing it. Second, one of the proteins COVID uses as a route into humans is found in multiple organ systems, and thus varying symptoms and complications arise from infection. Third, humans have little to no innate immunity to COVID, as it is new.

The primary initial goal is to get everyone to think like a virus and not a human. Viruses only have one thought: reproduction, and COVID is quite good at infecting people. In more exacting terms, the virus has a basic reproduction number of 2.7, which means that each infected person will infect almost three additional people. For the COVID epidemic to end, we need to reach a point where the basic reproduction number is less than 1.0.

We can temporarily reduce COVID's basic reproduction rate through quarantines, sheltering in place, social distancing, and wearing masks. However, we believe the most likely long-term solution is for a large number of individuals in the United States to acquire some type of immune response to the virus. In leaving out a lot of complicated math, approximately 220 million individuals, or about two thirds of the population, will need to develop an immune response. For perspective, the United States has officially reported 7.1 million COVID cases, with 206,005 associated deaths. These

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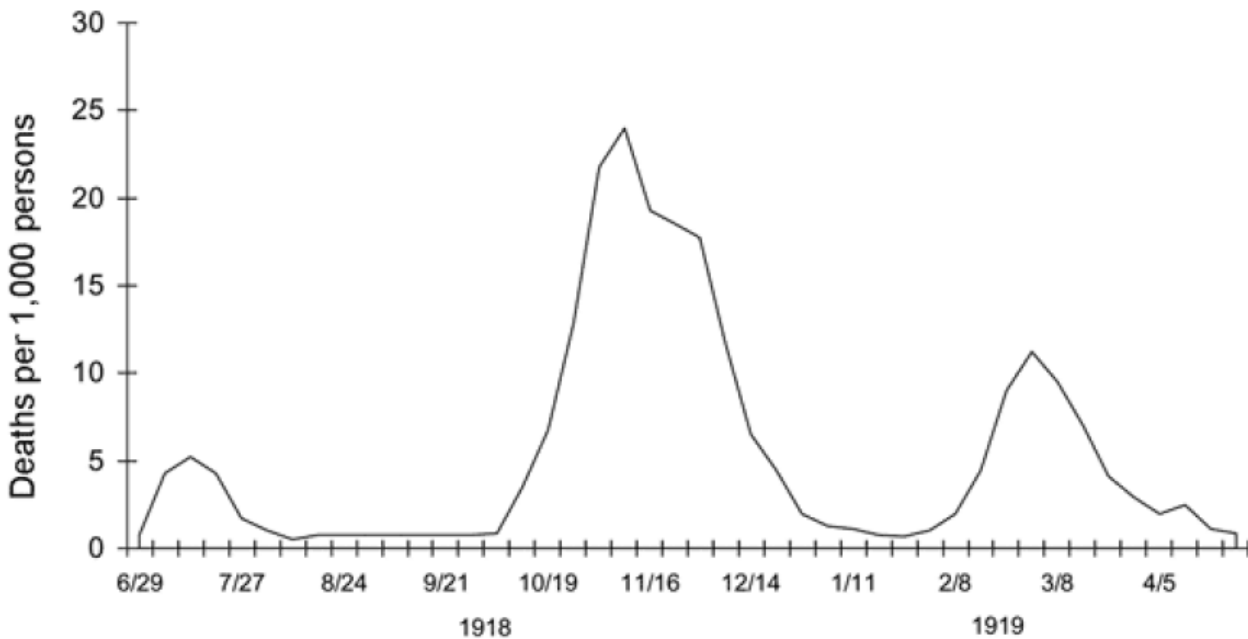
are the most important numbers to watch.

First, we will address the number of infections. The United States has more reported cases than any country in the world, but these cases only represent a small percentage of the population. Needless to say, we have a long way to go. However, there is some hope, as it is likely that some portion of the population has been exposed to COVID and is either asymptomatic or was able to develop an immune response quickly such that medical attention was not required. This is an intersection of art and science, but our best guess from reading several papers from both scientists and mathematicians is that for every official case reported there are about three additional people that have been exposed to the virus and developed an immune response. So, we believe we are closer to the 220 million goal.

Second, it is tragic that COVID has already claimed over 206,005 lives in the United States. This number is important to watch, but it may not act the same as the number of infections.

Given our ability to test and diagnose earlier, to better understand the pathology of COVID, and growing experience on which treatments offer the best outcomes, the mortality rate for COVID is likely to decline. In the past, mortality rate (increases in death) was the method for measuring the severity of a new disease when introduced into a population, primarily because accurate diagnosis was difficult and unreliable. While some political decisions may be made using mortality rate, we view the infection rate as the more important metric to track for the economy.

As an illustration, the chart below shows the epidemic peaks from the Spanish Flu in the United Kingdom during 1918/19. COVID will NOT be identical to the Spanish Flu, but we think it is important to look at past infections and determine if the science can still hold for the current situation. It is clear that in the past, viruses do what they do best – infect people – and this typically occurs in waves as seen in the chart below. Also, most respiratory viruses tend to be seasonal, as is displayed below. Our goal with modern technology is to rapidly develop a vaccine so that immunity can be built in the population.



Three pandemic waves: weekly combined influenza and pneumonia mortality, United Kingdom, 1918-1919

Source: Centers for Disease Control and Prevention

### VACCINES – POTENTIALLY A GREAT HELP IN STEMMING THE EPIDEMIC

Vaccines are a type of prophylactic treatment that work to stimulate the body's immune system to recognize and combat foreign pathogens (i.e. viruses). All vaccines work according to the same basic principle – they trick the body into thinking it is infected (in this case with COVID), which triggers the immune system to produce antibodies against the foreign pathogen.

As it relates to COVID, there are about two dozen different vaccine candidates in the United States and Europe being actively pursued. There are at least that many being researched in other countries, mainly China and India. It is very good that we have multiple shots on goal, considering:

1. **COVID's Unique Structure.** COVID is spherical with spikes protruding from the surface, giving the particles a crown-like appearance. These spikes bind to human cells, allowing the virus to gain entry. Most of the vaccines against COVID are being targeted to this spike protein, the first time a vaccine has targeted this protein.
2. **Difficulty Making a Vaccine.** COVID has two similar coronavirus "cousins" that have appeared in the last twenty years – SARS and MERS. Despite attempts to manufacture a vaccine for SARS and MERS, we have yet to be successful. These are just two of the several viruses that have received a tremendous amount of investment and effort with no vaccine success.
3. **Unproven Technology.** Several of the vaccine candidates fall into novel technology areas. These areas (i.e. mRNA platforms) hold great promise in labs and have substantial manufacturing benefits. However, proving a platform at the same time as proving effectiveness could lower the probability for success.
4. **Obvious Versus Efficacious.** Most vaccines are targeting the spike protein, which is very similar to other proteins that are found in the human body. This class of proteins (capsular proteins) have

proven difficult to vaccinate against.

5. **Do No Harm.** This is always a concern for any vaccine/drug/biologic in development.

Despite all the negative comments above, we believe it is likely there will be at least one candidate that meets the FDA's threshold for effectiveness. This threshold is for 50% of the people vaccinated to show a sustainable immune response. Again, after some complicated math, we are focusing on the large, well-funded programs to run clinical trials with approximately 30,000 patients that will last about four months (from first enrollee through to last patient). Following a trial, it will take about a month to collect, sort, and present the data. We then expect the FDA to turn around an approval on an ASAP timeline, which is likely two months. We believe this puts our best case scenario for an approved vaccine around February of 2021, with initial dosing to begin weeks after.

### THE WORLD AFTER A VACCINE IS FOUND

Once a vaccine is approved and dosing begins, we would expect for a slow maneuvering back to a pre-2020 world. However, vaccines are NOT miracles. If one of the larger programs is first to market, we would expect approximately 100 million doses to be available in the United States. These doses would most likely be given to front line caregivers and other essential personnel, with the remainder going to individuals that are at significant risk. The good news is that in a very short period of time, the United States could increase those exposed to COVID by about 50 million. More importantly, with an approved vaccine, the manufacturing would step up such that widespread vaccination could begin by late summer or early fall of 2021, our best case scenario for when COVID would no longer be an epidemic. If a second, equally effective vaccine is approved, then more individuals could be dosed earlier.

We view a vaccine approval as the biggest psychological boost for U.S. economy. However, even after a vaccine is released, we are worried about some of the potential, long-term implications from COVID.

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1. Not a Full Panacea. Even after we reach the magic number of 220 million individuals exposed to SARS-CoV-2, and virtual complete compliance with the vaccine, there will still be COVID infections and deaths. Remember, the virus will not stop, and thus expect hospitalizations, deaths, and news stories to continue for years.
2. Behavior Changes for High-Risk Individuals. High-risk individuals that receive a vaccine would not be immune to COVID. Technically, the vaccine would offer some percentage of protection. While this may increase certain activities (i.e. increased traffic at local restaurants), other things in society may take longer to return to normal (e.g. indoor concerts). International travel is likely to be considered a risk for quite some time.
3. Viral Mutation. Your author has spent 25 years in healthcare, and this crisis has shown the amazing leaps we are making as a society. The combination of gene sequencing and cloud computing has changed the way virologists can share information. It is too early to know if COVID will mutate significantly enough that it will be like the flu. If so, it may be a common occurrence to get an annual flu + COVID vaccine in the future.
4. Immune Durability. There are some early cases of either reinfection (i.e. patients catching a different strain of COVID) or reactivation (i.e. the immune system does not totally clear the virus). It is still too early to determine how the immune system reacts to COVID long term. Reinfections would be handled long term with a shift in vaccines, and reactivations may need to be handled with aggressive anti-viral therapies.

### CONCLUSION – STAY THE COURSE

All of the above commentary is simply our best guess at this time. We hope that you find it interesting and helpful. At Crawford Investment Counsel we readily admit we do not have a crystal ball that dispenses answers. We know we cannot predict the number of infections this fall before a vaccine is likely to be available. We know we cannot predict the impact

the coming election will have on additional stimulus packages from the Federal Government. We know we cannot predict how the economy will rebound from the depressed levels.

Even in the face of these uncertainties, we do expect the world to eventually return to normal. Between now and then, we will continue to monitor your investments and look for companies that we believe have good fundamentals, proprietary moats around their businesses, the strongest balance sheets, and safe dividends to boost your income. Crawford Investment Counsel has an investing model built on 40 years of success. We will fine tune for this current uncertainty but will continue to stay the course.

### CRAWFORD INVESTMENT COUNSEL, INC.

600 Galleria Parkway | Suite 1650 | Atlanta, GA 30339

main 770.859.0045 | fax 770.859.0049

[www.crawfordinvestment.com](http://www.crawfordinvestment.com)

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