

25 MARCH 2020

ASSESSING THE MEDICAL AND ECONOMICAL SITUATION

We firmly believe that the world will win the fight against CoronaVirus. However, we also think that having a world that is on a standstill for too long represents an even higher risk than not CoronaVirus itself and is not worth the price for any one of us.

In our previous publications, we focused on the significant changes the global COVID-19 crisis is likely to bring about and the possible unintended consequences of this health crisis, both in general and for our investment themes.

In this document, our attention turns to the economy and the possible therapeutic answers. We are living an unprecedented situation and have to navigate through uncharted territory. Still, we believe that logic and good sense are maybe the only and best tools in the current context. Furthermore, as already stated in our previous research reports, we reiterate our belief that once the spread of the disease is under control, the markets will start looking towards how quickly countries will decide to relax their social distancing rules.

How will the economy respond once the restrictions start to decrease? The combination of pent up demand (even if it takes a bit longer than initially thought), interest rates at zero, and large fiscal stimulus programs will likely lead to an economic boom. The economic measures took by central banks and governments have no historical comparison (not even during the 2008-2009 financial crisis), with all the regions of the world deciding to run both a loose fiscal and monetary policy.

Such measures act as short-term social shock absorbers but should also be expected to last longer than anybody might currently envision. It would indeed be tough to "put back into the box" such extraordinary measures as policymakers will want to have confirmation from macro data that the economy is stable again before cutting them. With this in mind, we believe that policymakers would prefer to let things "overheat" as the risks are clearly to the downside (double-dip recession, 2nd wave of a pandemic) and reiterate our view that inflation is likely to come back in the not too distant future.

The financial market is all about future expectations. With half of the world's population confined home and manufacturers running at their lowest levels in decades, it won't be a surprise to anyone to see Macro numbers in the next few days and weeks printing off-charts.

Most of the world was unprepared for such a pandemic. We believe that just about everyone will adjust its "health crisis responses" in the weeks and months to come, as people won't accept another such loss of freedom. Countries with systematic testing in place and with identifications of infected people, e.g., Singapore or Taiwan, have been able to limit the propagation of the virus, and the direct economic impact is also much smaller.

THE MEDICAL RESPONSE – ANY POSSIBLE "WHITE SWAN"?

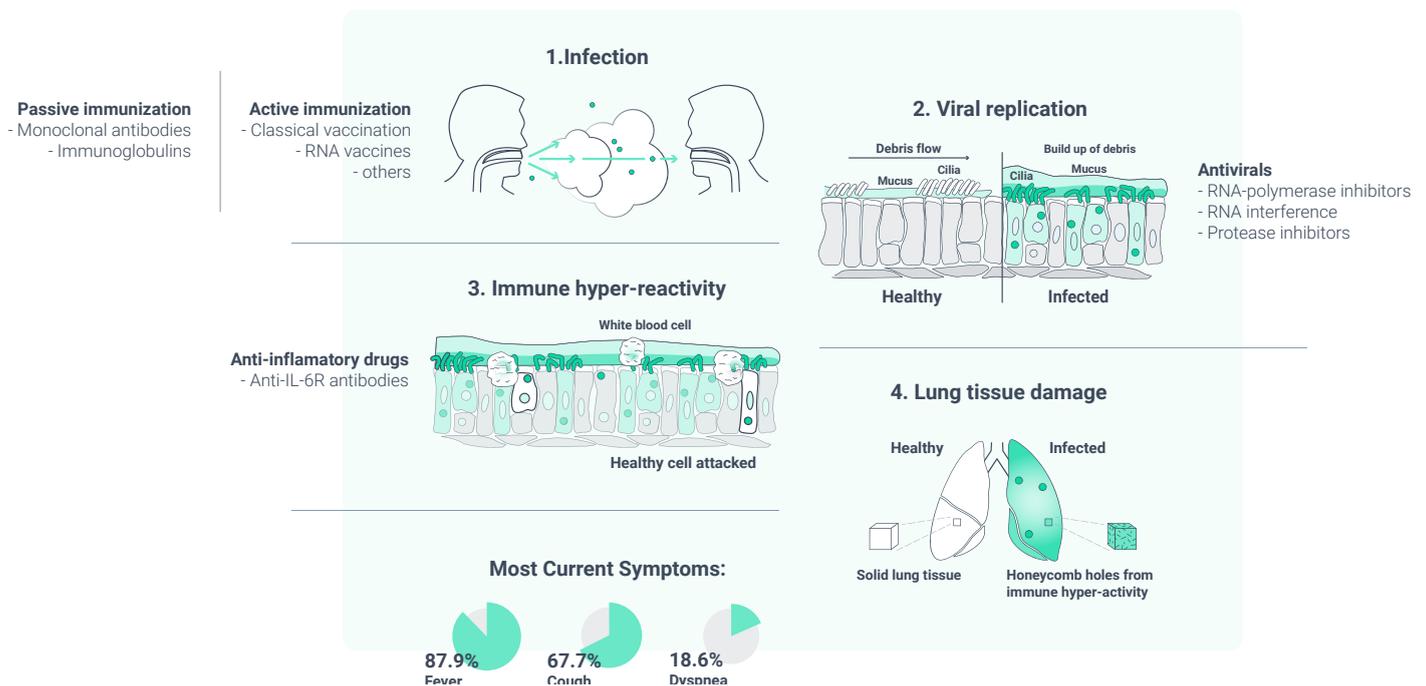
All over the world, drug manufacturers and researchers rush to develop a medical answer to the COVID-19 outbreak. Several antivirals and anti-inflammatory drugs, and vaccines are under investigation to cut mortality rates and reduce the length of hospital stay.

The mechanism of COVID19:

The COVID-19 virus sticks to the lung cells. It triggers an immune (and therefore inflammatory) reaction, causing the accumulation of inflammatory fluid (water, bacteria, or viruses, etc.) in areas called alveoli (tiny bags where oxygen passes from the air to the blood).

The inflammatory fluid fills the alveoli and prevents oxygenation of the blood. Lungs stop working, leading to pneumonia. Furthermore, the inflammatory fluid might fill with toxic proteins, damaging the alveoli, and causing irreversible lung damage.

Antivirals work by fighting off the virus and halting its activity. Anti-inflammatory drugs prevent the inflammatory response of our body to the virus. Vaccines are biological formulations that reduce the risk of infection.



Four approaches to treat and prevent the COVID-19

The search for a COVID-19 response has become global, and a few companies are leading the race and showing promising results. There are currently almost 100 treatments/ vaccines in development (from preclinical to Phase 3 stages).

Companies are presently exploring four approaches to fight against COVID-19: antivirals, anti-inflammatory drugs, passive immunization, and active immunization (vaccines).

A. Antivirals:

An antiviral is a molecule that disrupts the replication cycle of a virus, slowing a viral infection.

Antivirals work by chemically disrupting the replication cycle of the virus and slow down the contamination by limiting the multiplication of viral particles. Some treatments stimulate the immune system's response to improve antiviral action. Antivirals are an effective method of virus control, but don't stop the contagion. As a result, coronavirus continues to spread with the risk of overwhelming hospitals and increasing mortality rates.

Bottom line:

Favilavir (Hisun Pharmaceutical) was the first drug allowed for investigational treatment against COVID-19 in China. Since then, many companies are following this path and are now in clinical trials all around the world.

We see antiviral options available and fast-tracked in the next few months as most of them proved their efficacy in other diseases (Ebola, H1N1, influenza). Gilead's drug, Remdesivir (five clinical trials undergoing in Phase 2 and 3), is one of the most promising antivirals.

Chloroquine (already approved for malaria and arthritis) has seen encouraging results in small cohorts (small study in France) but needs to be the subject of a truly randomized study on a larger patient population. Indeed, the investigations were incomplete and unreliable and showed significant side effects.

While Chloroquine is just about to enter clinical trials for COVID-19 in Europe (conducted by Inserm), U.S. and Chinese doctors are already using it off label.

HIV drugs (AbbVie/ J&J) are currently tested but had so far limited responses to COVID-19.

B. Anti-inflammatory drugs:

When COVID-19 infects the upper and lower respiratory tract, it can cause a mild or highly acute respiratory syndrome with consequent release of pro-inflammatory cytokines. Anti-inflammatory drugs aim is to block cytokines avoiding an immune hyper reaction.

Bottom line:

Anti-inflammatory drugs could receive emergency approval by the FDA and some other drug agencies around the world in the following months. As the two leaders in this field (Sanofi/ Regeneron and Roche/Chugai) are in Phase 2/3, we expect more data in the next few weeks.

These drugs could be useful for patients in critical conditions to treat the underlying consequence of COVID-19, pneumonia.

Regeneron/Sanofi Kevzara and Roche's Actemra are approved for Rheumatoid Arthritis. China approved Roche's Actemra for the treatment of severe complications related to COVID-19.

C. Passive immunization:

Passive immunization provides persons with exogenous, preformed antibodies that can prevent or treat infectious diseases. In passive immunization, a person receives antibodies or lymphocytes that have been generated by another individual's immune system.

Bottom line:

The passive immunization approach has the potential to enhance our immune system to fight against the virus. Most treatments are still in preclinical trials.

Regeneron is the most advanced company in this field and is planning to begin humans trials in June 2020. Regeneron has already proven the capacity of its antibody platform and has a real competitive advantage over some other players (such as Takeda or Vir Biotechnology) because it does not require blood from healed patients to manufacture the drug.

D. Active immunization (vaccines):

There are several approaches: classical ones and RNA / DNA based vaccines.

Bottom line:

According to the latest estimates, it could take up to 18 months to have a vaccine.

Moderna is leading the race of vaccine development and is already in Phase 1. The company uses a novel approach, mRNA-based vaccines, which exploits our own cell's system to generate coronavirus-like proteins. The main benefits compared to conventional vaccines are lower cost and faster production, allowing a rapid response to epidemics. It may also have fewer side effects.

As of now, there is no approved mRNA vaccine. Therefore, the feasibility of this approach remains to be proven, and companies may find hurdles along their way. However, if any mRNA vaccine gets approved for COVID-19, it validates for the first time an innovative technology that could potentially apply to every type of infection and even diseases.

The real breakthrough would be the development of a universal vaccine, working against any of the coronavirus family, even if the vaccine mutates. Such a vaccine would also prevent new waves of coronavirus.

According to **Icosovax** (a synthetic biology start-up), this is possible, and the company is close to starting clinical trials.

Even if new vaccine technologies fail or take longer to get discovered, we will be able to rely on conventional vaccines and their major manufacturers (Sanofi Pasteur, GSK). They have already proven their success in other infections in the past. While it will take time to develop and produce them on a larger scale, we hope to have a vaccine in place before another possible coronavirus epidemic appears.

WHAT ARE THE MARKETS PRICING?

As we have highlighted in the 1st page of this document, the financial market is all about future expectations. We also stated that the different economic figures to be released in the next few days and weeks would set new records.

The tricky part comes in understanding how much has already been priced or not. Timing the markets, something we never do, is also very challenging as the liquidity squeeze is still ongoing, and one of the main reasons behind the overshooting. We believe that the market is likely to adjust to the correct COVID-19 impact and will start pricing the huge fiscal and monetary stimulus once it realizes that the current extraordinary situation is not a permanent one.

To better understand which variables are likely to impact the most, we have been proceeding in three steps:

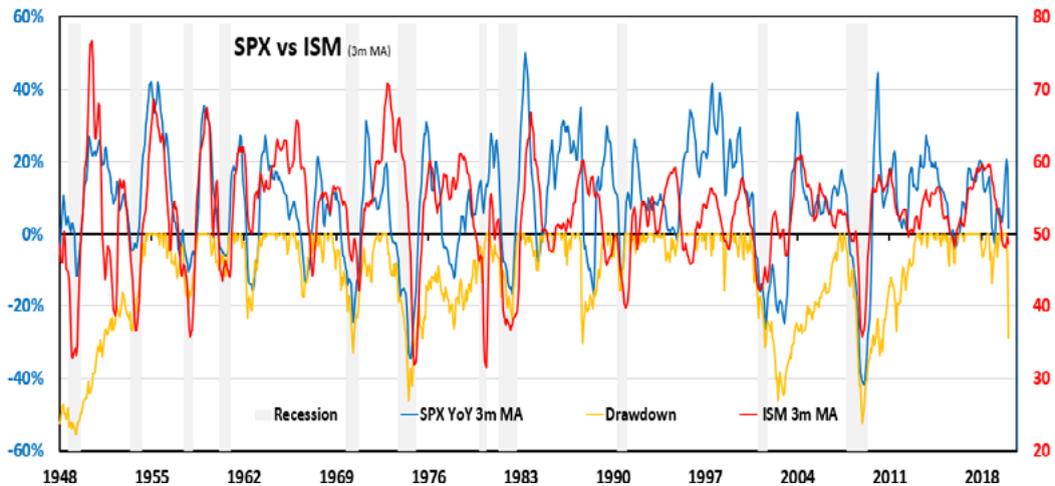
1. Identify what the markets are implying in terms of how long this economic crisis is expected to last. This information is critical as it will allow determining the possible economic impact.
2. Estimate how long the health crisis is going to last. Based on available data from different sources, we have been trying to identify where this turning point might be.
3. We are closely monitoring all the developments in the medical field.

What is the market currently pricing?

The impact of the COVID-19 crisis is at the GDP level – global activity stoppage is impacting GDPs all over the world, albeit at different levels. Reasoning at the extreme, a complete stop, or 0% activity for a month (4 weeks) would mean the loss of 1/12 of annual GDP or 8.3%.

We looked for an indicator that relates to both the GDP and the stock market. In the U.S., the one indicator that better correlates (taking the S&P 500 as a proxy for the general market) to both is the ISM PMI.

The market fall (about 30% since the recent peak mid-February) suggests a print for the ISM manufacturing PMI at around 35 (most likely next month), which would correspond to a 12% annualized hit to U.S. GDP. In other terms, approximately six weeks of 0% economic activity in the U.S.



The flash PMI eurozone figure for March was released this Tuesday and, at a level of 39.5, and Markit PMI eurozone estimates for early April currently stand at 31.4, making a U.S. reading in the 35 areas plausible.

Of course, economic activity is not going to 0%. So we tried to determine a possible range of economic activity levels.

We first looked at China

Chinese economic activity, across a broad range of measures, appears to have slowed by around 30% once the full scope of actions to slow the spread of COVID-19 were implemented.

Coal consumption at power plants in China

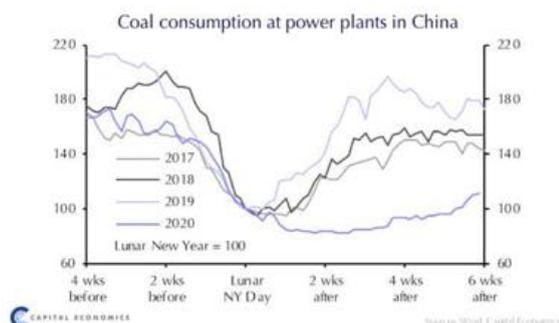
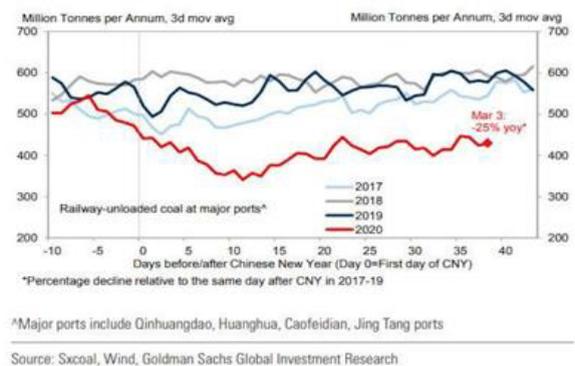


Exhibit 3: Railway-loaded coal volume over the past week remains below normal level

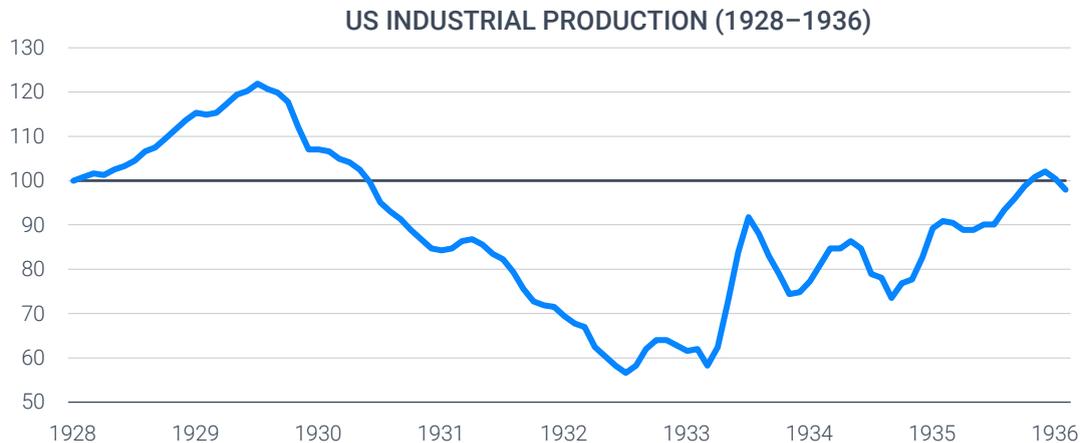


In this scenario (66% of capacity running), the market is currently pricing an 18 weeks (4,5 months) partial stoppage of the U.S. economic activity due to the COVID-19 crisis.

For the lower end of the range, we turned to history

A 30%+ drawdown in the S&P500 has occurred only five times since WWII. In four of these occasions was during a recession, while the other one was over the 1987 crash.

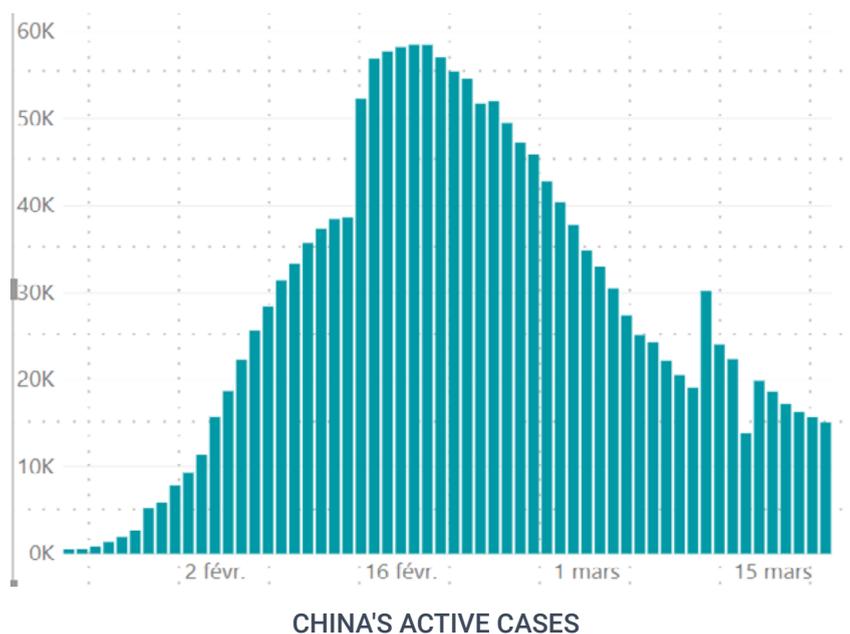
The market is pricing a severe recession, so we went for the mother of them all, the Great Depression in the U.S. (1929 to 1932). Over this period, industrial production fell an astounding 50%.



In this scenario (50% of capacity running), the market is pricing a 12 weeks (3 months) stoppage due to the COVID-19 crisis.

CoronaVirus – looking for a peak

The underlying idea is that the spread of the virus will eventually be contained and that after a phase of exponential growth, the number of active cases (total cases minus deaths and recovered) will come down to a trickle, as it has been the case for China.



Based on publicly available data from different sources, we have been trying to identify a peak date for the current crisis on a country by country basis.

We have been looking at the pattern shown by those countries who have already passed the peak (China and South Korea) and counted the days it took from peak to either the first confinement measures (China) or the first death (Korea & China). We have +26 days for the first and +60 days for the latter (a weighted average). We also look at the speed at which the curve is slowing down to project a tipping point.

By combining the two approaches, we obtain a range of potential peak dates, shown in the table below:

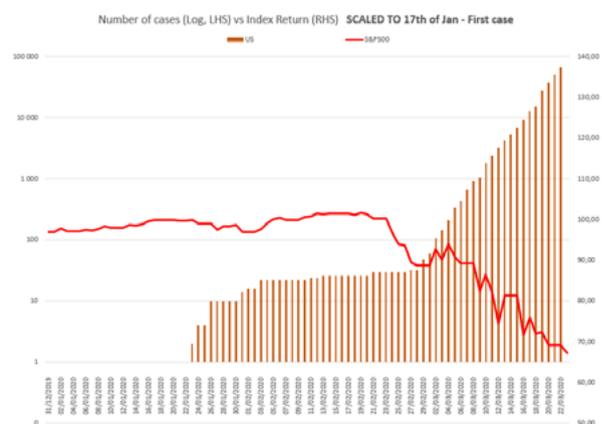
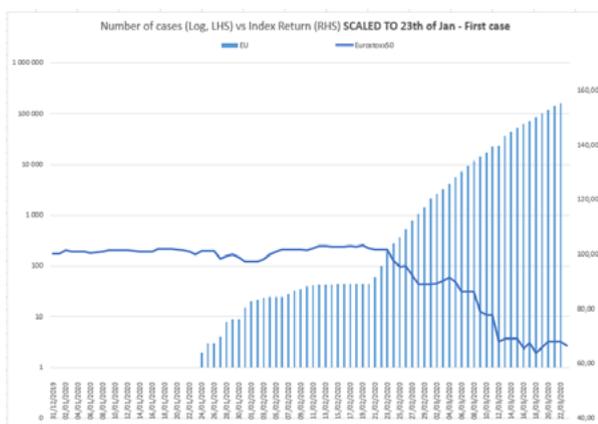
Country	Early Peak Date	Late Peak Date	Confidence level
Italy	28 March	3 April	High
France	3 April	12 April	Medium
Germany	3 April	8 April	Medium
U.K.	9 April	19 April	Low
Switzerland	29 March	8 April	Medium

Once the active case peak is confirmed, we need to estimate how long it will take before regular economic activity can be resumed. Again, China provides a template – and we are assuming ~4 weeks to end confinement + 1-2 weeks ramp-up (return to normal) time.

The above numbers are just indicative as they depend on so many variables that no one (including us) can fully comprehend at the moment.

CONCLUSION

We believe that at current levels, the market has over-reacted to the CoronaVirus threat and that policymakers' responses will provide a cherry on the cake (or better, the cake) once the health scare abates. There is no mistaking the way local COVID-19 numbers have impacted the markets.



We are aware that, at the moment, there is more than just the health crisis, and significant risk is due to the exceptional strains the COVID-19 crisis is imposing on liquidity mechanisms. As long as these are not taken care of, market gyrations will remain wild and unpredictable. Timing remains a near-impossible effort. Nevertheless, the efforts of policymakers, through either fiscal or monetary stimuli, are of exceptional scale and nature. In essence, there is no other choice, as nobody can afford the consequences of an imploding economic system.

In this respect, we continue to believe that the COVID-19 crisis is temporary, but the measures taken by policymakers across the world will provide a considerable boost for the longer term.

It will take some time for those measures to filter into the real economy, but it will also be challenging and long to scale them back.

And as the COVID-19 crisis reaches its peak in one country after another, the patterns will start to appear in a more definite way, and provide the visibility the market is so desperately in need of.

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