How Do You Forecast in a Pandemic?

Our sympathy goes out to those caring for family and neighbors through this pandemic; to companies and their workers struggling to keep operations open; and for anyone experiencing anxiety as we all hope for a swift and safe global public health response.

The cartoon evokes a time many may have felt before the pandemic struck the globe. And yet, at this writing at the end of March 2020, here we are in the Age of SARS-CoV-2 virus. We are in a Black Swan, a singularity, an unexpected event which makes previous forecasts invalid. Market forecasts are most valuable when markets are neither too predictable nor too chaotic. Is a forecast even possible right now?

The view will clear with time, but any scenario planning is better than none. One can prepare for one or more scenarios, and then adjust as events unfold. Here are some heuristics that may be helpful as this crisis proceeds.
• **Capital spending will be delayed.** Most optical products go into capital equipment, such as machine tools, networking systems, military equipment and so forth. Facing uncertainty, companies preserve cash by delaying spending on new capital equipment. Capital spending in some segments can drop as much as 50% for the year in a "normal" recession. This one isn't normal; factories are not just running below capacity, but shut down altogether. Buying new capital equipment is a low priority for many right now.

• **Downturns can accelerate outcomes.** Crises force companies and their investors to make choices. Many companies that were barely surviving before the crisis will be forced to consolidate or exit markets. Sketchy business ideas may not survive, while solid ones will take root and thrive. Market shares may shift as companies struggle to react. But there may be positive outcomes as well, such as pressure to upgrade communications infrastructure to meet accelerated demand for online services, or to commercialize and deploy ultraviolet LED sanitation technology to mitigate the spread of pathogens.

• **Performance will vary by sector.** The disruption of supply chains and productivity impacts everyone, but some sectors were in better positions entering 2020. For example, the military sector was doing well going into Q1 and may get back online more quickly, while the machine tool industry was soft and already cutting spending in 2019.

• **Supply is affected first, then demand.** A business concern early in this crisis was that it would disrupt supply chains for optics and photonics products, upsetting near term business results. Now the crisis and intervention is so widespread that the fear is that the demand for optics and photonics goods and services will decline for the longer term. Much will depend on the speed and scale of government measures to mitigate the damage in this intervention period.

• **Extremes are possible but statistically unlikely.** The point of a singularity is that anything is possible, and extremely bad outcomes are very possible. But there are statistically more outcomes that lie between the extremes. Consequently, outcomes rarely turn out as well as one hopes, but neither do they usually turn out as bad as one fears. This is also because we adapt as we go, and there is a belated but massive mobilization to avoid the worst case. The situation today is already as bad, or worse, than many expected just weeks ago. We have already lowered our expectations for this year.

• **We tend to overestimate the near term, and underestimate the long term.** The near future is most uncertain, but if history is our guide, we will underestimate the recovery in the coming 6 to 9 months. A full recovery may be unrealistic; it took nearly a decade to rebuild after the 2008 recession. But the worst damage happened at the beginning. A new study from the U.S. Federal Reserve Bank and MIT suggests that, while pandemics depress the economy, public health interventions like social distancing do not, based on data from the 1918 Influenza Pandemic. The situation today is very different from that of 1918, but the study offers some hope for the mitigating effects of early and strict interventions.

• **Western society will learn from Asia.** For the most part, Western societies overlooked or forgot the impact of SARS, H1N1 virus and swine flu, but Asia remembered. Now China's workers have been returning to factories, and some flights between Shanghai and San Francisco have resumed. We are likely to toggle between periods of tight and relaxed restrictions for months. Western societies may have been poorly prepared for the pandemic, but they will adapt.
• **Asian manufacturers are returning to normal production.** The contract manufacturing giant **Foxconn** recently announced it expected to be back to normal production in its Chinese factories by now, and that first half 2020 revenues might end up flat with H1 2019. The chart shows Foxconn’s revenues so far this year, with the usual seasonal declines in the late fall and continuing to February. The decline through February was dramatic, but Foxconn was not completely offline through the period.

![Revenues Normalized to Previous October](source: Foxconn financial statements)

The Taiwanese lens manufacturer **Largan Precision** showed satisfactory results so far this year, thanks to Taiwan's rapid response to the pandemic threat. The company had nearly US$ 2 billion in revenues in 2019, selling lenses mostly to mobile phone handset manufacturers. The company normally has a seasonal decline through February by as much as 65% of the previous October, but so far in 2020 it suffered only a mild decline.

![Revenues Normalized to Previous October](source: Largan Precision financial statements)
• **There are still nine months left in 2020.** Even if the first half of 2020 shows a steep decline, a recovery in the second half can bring Q4 2020 at least to the 2019 average. The illustration below provides an example. The chart shows OIDA's estimate of the trajectory of the optics and photonics market in 2019, followed by a fall in the first two quarters of 2020. A seasonal decline in Q1 is normal, but we expect a much steeper drop this year from the coronavirus crisis, falling by 1/3 from Q4 2019 to Q2 2020. The chart shows the usual second half seasonal growth, as well as some additional recovery. The example continues in 2021 with a more typical trajectory: the seasonal drop in Q1, followed by the seasonal pattern of growth through the rest of the year.

![chart](chart.png)

**Example Scenario (%)**

- 2019
- 2020
- 2021

Source: OIDA (2020).

• This example assumes that our sector will respond to this crisis at about 4X the rate of the (real, adjusted) growth rate of the U.S. economy, using estimates from the major Wall Street banks as of this writing. The optics and photonics industry fluctuates more widely than the overall economy because of our role in the capital equipment sector. In this example, the optics and photonics market would decline about 16% from 2019 to 2020, and 2021 would still end up about 9% short of the 2019 value. There are many other possible scenarios, of course, and this one may be optimistic. But the value of the forecast isn’t only the predicted values. It’s also the logic that led to the values. The readers can then make adjustments and judge for themselves.

• **In-person events will endure.** There is a lot of talk that the coronavirus crisis will force a permanent migration to more virtual conferences and telework, as many have long expected and advocated. Perhaps. But there is a deep human urge to live our lives in person: we live in cities, attend live sports events and do business deals in person. Even tech-intensive companies like Apple and Facebook have relied strongly on in-person meetings. Pandemic, political violence, rising fuel prices or other travel restrictions may reduce the size, number and frequency of live events, but in-person conferences and trade shows will endure. They are like the souks in North Africa: every village needs a weekly gathering to exchange goods and gossip.
• **ZM and ZOOM are doing just fine.** You may be wondering how Zoom is doing as a company—the one that operates videoconferencing software. The company is officially named Zoom Video Communications, Inc., and goes by the stock symbol ZM. It is doing very well, doubling its price per share since the beginning of 2020 and boasting a whopping US$ 35 billion market capitalization, as of this writing. However, the company that goes by the stock symbol ZOOM is actually Zoom Technologies Inc., a company based in China. This other Zoom used to supply modems, but hasn’t reported revenue since 2011 and has a market cap about 1/1,000th of big Zoom. Yet little Zoom has enjoyed a greater surge in stock price than big Zoom, thanks to confusion in the names. Stock trades for little Zoom were suspended on 26 March through 8 April for that reason. It’s an example of how irrational the investment market can be in times like this.

![Graph showing stock price comparison between ZM and ZOOM](chart.png)

Source: OIDA (March 2020) from daily adjusted closing prices.

**Our industry is helping to get through this pandemic.**

It will take a lot of leadership and teamwork to get through this pandemic, and now is the time to put others first and demonstrate how we can help. It’s worth noting that the optics and photonics industry plays a positive role in many ways in this crisis. Genome sequencing instrumentation is used to identify and understand the SARS-CoV-2 virus. Ultraviolet LED equipment may be helpful to eradicate the virus from surfaces. Videoconferencing and telecommunications technology today makes it far easier to send workers and students home than even a few years ago, for those who are in a position to do so. And there is much more. All of this helps, and it will take all of us to stem this crisis.

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