The Market in Review

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This week's articles and insights

1. *Buggywhips to Self-Driving Chips*
2. *Trouble with the Curve*
3. *Approaching the Seasonal Best Months*

"Have you ever noticed that anybody driving slower than you is an idiot, and anyone going faster than you is a maniac?"

– George Carlin

Your Index Report

	Current	Last Week	Year-to-Date
Dow Jones Ind. Avg.	35,603	+1.98%	+ 16.33%
S&P 500	4,550	+2.51%	+ 21.13%
TSX	21,212	+1.88%	+ 21.68%

Buggywhips to Self-Driving Chips

Remember the Kindle e-reader? I say "remember" because sales have fallen over the years. 32% of U.S. adults owned an e-reader device in 2014 versus only 19% today (source: Pew Research). The Kindle from Amazon was once the hottest new device around. Bookstores disappeared as e-readers became more available a decade ago and then really vanished as e-book sales exceeded paper book sales.

This is a classic example of a S-Curve, where a new technology starts small, grows rapidly until it controls most of a market, then attenuates. Think of the automobile replacing the horse and buggywhip, as one example. Or word processors replacing typewriters.

Not all S-curves result in the obliteration of one technology for another. Sometimes the new technology gets halted, for some reason, or is hit with unexpected failure rates. Transitions can stop partway and stay flat for years until technology catches up.

The nuclear industry is one such example. After a surge in oil prices in 1973, thanks to OPEC, reactors were built all over the world. It made sense – a few pounds of uranium displaced millions of barrels of oil. As we know, however, they were expensive to build and far more dangerous than oil if they failed. Three Mile Island and Chernobyl come to mind. Now that small modular reactors are on the horizon, the industry may finally start growing rapidly once again.

The Kindle revolution is another example of an S-curve that stalled. *E-books* are still a growing business (versus *e-readers*, which are not), with people now preferring to read electronic versions of their novels on phones or tablets. Reading this way during travel is an undeniable benefit over lugging multiple books in your handbag.

The Kindle stalled, however, because many people still prefer paper books. In the U.S. and Canada, only 7% of readers use an e-reader exclusively. This compares to 37% of U.S. readers who only read paper books, and 56% of Canadian readers (source: tonerbuzz.com). Is it old people stuck in the past? No - even young and millennial readers prefer print over digital. Why is this? Print books offer a tactile experience that is more easily remembered.

"You feel it, you smell it, and you remember it."

- Quote from survey on print books

Categories hardest to displace are nature books, children's books, and cookbooks.

While electronic book sales continue to grow, so do print book sales. A new category – audiobooks – is growing even faster. What this means is that the S-curve transition from print books to electronic books may take decades to happen, if it ever completely happens. Sometimes old technology is just as good as new technology.

Trouble with the Curve

Which brings us to the newest S-curve: Autonomous Vehicles (AV), which are cars that drive themselves. We have been told they are coming and that children today will never drive their own cars. But are we really that close?

Source: Unsplash

The benefits would be enormous. The National Highway and Transportation Safety Agency found that human error was the probable cause in over 92% of U.S. accidents. And even in recent crashes involving self-driving cars, forensic data showed that the main problem was the people behind the wheel relied too much on systems that weren't yet fully capable (i.e. the drivers took a nap).

An electric car is not an autonomous car, although it is likely that most autonomous cars will be electric cars. This is because electric cars, like Tesla's (**NASDAQ TSLA**), are basically computers on wheels, which is the perfect platform for a 'smart car.' To be truly autonomous, a car will have to be artificially intelligent, or very close. The problem is, we've had several hype cycles since the 1950s that "artificial intelligence is close!" only to see it fizzle away in failed expectations. Many of the methods used in AI (artificial intelligence) just don't lend themselves to cars. Winning at chess, for example, is as simple as programming a massive computer (or massive chip) to examine nearly every possible move before making the best one. This allowed the Deep Blue chess computer to beat humans at chess in 1997 and never look back.

But Deep Blue would be a terrible driver. Imagine it approaching an object in the middle of the road at 100 kilometers per hour. Deep Blue would have to cycle through every known object of that size, from a paper bag ("keep driving!") to a large rat ("keep driving, but plan on a car wash!") to a child ("stop or swerve!"). And thousands of other similar objects of similar size. By the time it made up its mind, it would be too late.

"The difference between AI and human intelligence is that you show an AI 100,000 cats before it will recognize one cat, and you show a human child one cat and it can recognize all other cats."

- Allen Zhang, creator of WeChat

There are five levels of Automated Driving capability:

Level 0: No automation

These include abilities that control the car momentarily, such as antilock brakes, but don't control the car.

Level 1: Driver assistance

These include automated cruise control and park assist. Many new cars have these features today.

Level 2: Partial automation

The driver does not have to steer, brake, or accelerate under some driving conditions. They do have to monitor the car, however. Tesla's offer this level today.

Level 3: Conditional automation

The car can mostly drive itself, but the driver must always be alert to take over.

Level 4: High automation

The vehicle can operate fully autonomously but is restricted to specific roads or conditions. Alphabet's (Google **NASDAQ GOOG**) Waymo division operates Level 4 cars in a tightly-controlled sections of Phoenix and San Francisco today.

Level 5: Full automation

The vehicle can operate fully autonomously without any human driver interaction.

Bear in mind, all human drivers have essentially Level 5 capabilities. We can drive in just about all weather conditions, in the day and the night, and make the safest choices 99% of the time. The human brain is exceptionally good at pattern recognition, which is vital when assessing oncoming cars and poor road conditions. Cars still rely on centralized data, meaning they have to check conditions or maps on computers hundreds of miles away, which may not always work. Stuffing every car with computers capable of what humans can do remains an elusive goal.

Tesla hoped to be at Level 5 by the end of 2021, and yet many of its features are still stuck back at Level 2. "Auto-steer" capabilities were hyped as Level 5 features, yet are really just Level 2.

"The AV industry has promised too much for too long, and has delivered too little."

- Raj Rajkumar, robotics professor at Carnegie Mellon University

Some reports show the valuation of Waymo, the autonomous leader, has shrunk sharply over the last five years due to its inability to deliver a true AV car.

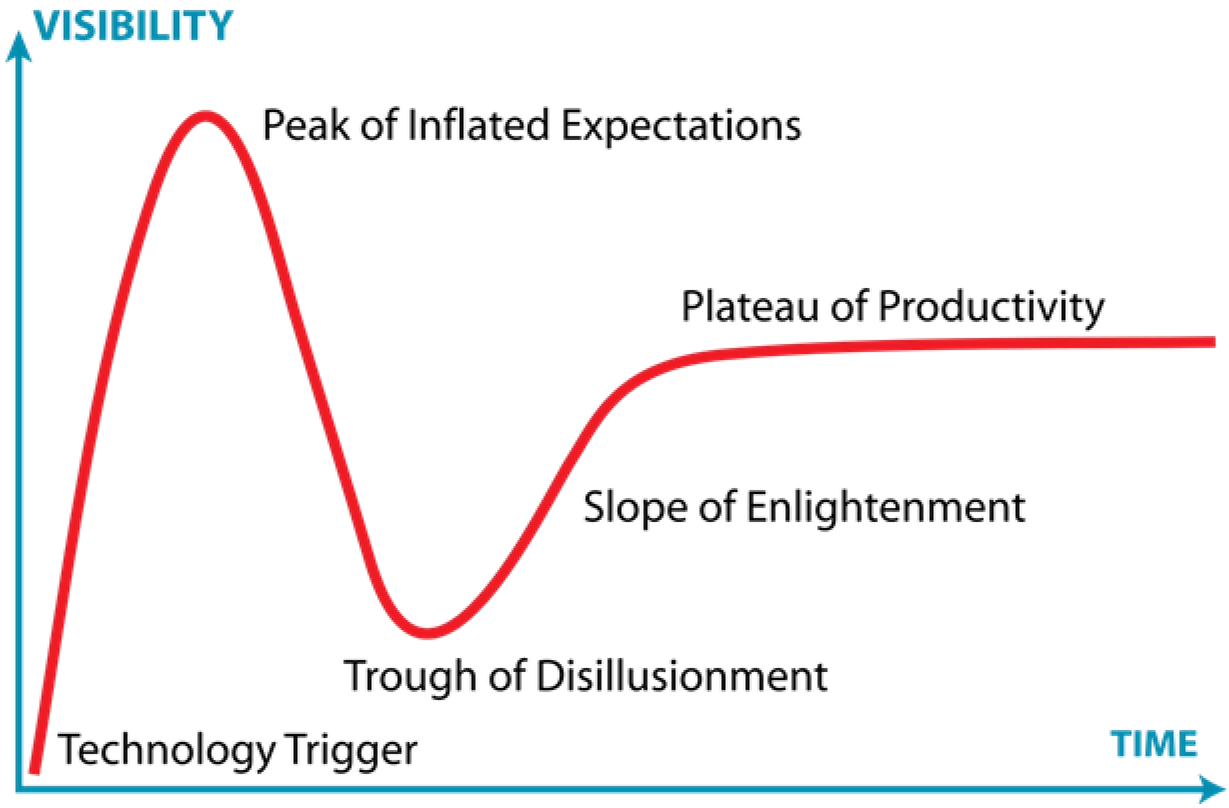
Predictions that we would see highways full of driverless cars by 2020 have shifted to 2030 and beyond. And it may not be cars that get automated first, but highway trucks, ships, and mining vehicles that never see a city street. It will also take hundreds of billions to fully realize the dream. This means the race to self-driving has narrowed to Waymo (Alphabet), Intel (**NASDAQ INTC** with its Mobileye division), GM (**NYSE GM** with its Cruise division), Tesla, and possibly Ford (**NYSE F**) and Apple (**NASDAQ AAPL**). As with the Kindle, this S-curve may look more like a W-curve that takes far longer to realize.

Meanwhile, we own both Apple and Alphabet in our portfolios. These are companies that can afford to pour money into an unprofitable venture for much longer than others, and are most likely to see success in the next decade. They also don't need to rely on success in AV cars if the reality is further away than anticipated.

Closer Than We Think?

Our research analyst, Lincoln Jiang, offers this counterpoint to my somewhat skeptical argument. He has been studying General Motors closely and sees their Cruise division as a very serious competitor in this new field.

"My counterpoint for this would be akin to "*We always overestimate the change that will occur in the short term and underestimate the change that will occur in the long term*". This is a quote attributed to Bill Gates but versions of it have been around for decades. In any case, I think that precision on the actual timeline of autonomous driving is less important compared to the likelihood of it occurring. I would bet a considerable sum that eventually, the problem is solved. The path could certainly be convoluted. However, it isn't science fiction and we may be moving between the peak of inflated expectations and the trough of disillusionment currently.



The regulatory hurdles will certainly be tougher than the technological ones. Data from Waymo and Cruise shows that their latest disengagement rate (when a safety driver needs to intervene in an autonomous vehicle) was 0.033 per mile for Waymo and 0.035 for Cruise, or roughly 1 disengagement per 30,000 miles (48,500 km). I would consider that strong proof that we are very close.

From an investor's point of view, I can appreciate the skepticism. Even 2030 could be generous to see mass adoption, but I believe that once we start to approach the S-curve, the exponential growth will be incredible. That said, I have learned to temper expectations. I first rode in an Uber in Toronto back in 2014, and I thought that within two years it would be ubiquitous across the country. Here we are more than 7 years later and the "coming soon" sign is still on display. The idea of investing in any pure-play autonomous technology feels like a crowded space with sky-high valuations.

I like Alphabet and GM as the best and safest ways to invest in this theme."

Approaching the Seasonal Best Months

September lived up to its reputation for being the worst month of the year to be invested. The Dow Jones Industrial Average fell by about -4.4% while Canada's S&P/TSX fell by a smaller -2.3%. China's index of large companies was one of the worst at -6.1%.

Why is September always the worst month? It's hard to say. Is it back-to-school blues? Are more bills due, or do reporters come back from vacation in bad moods?

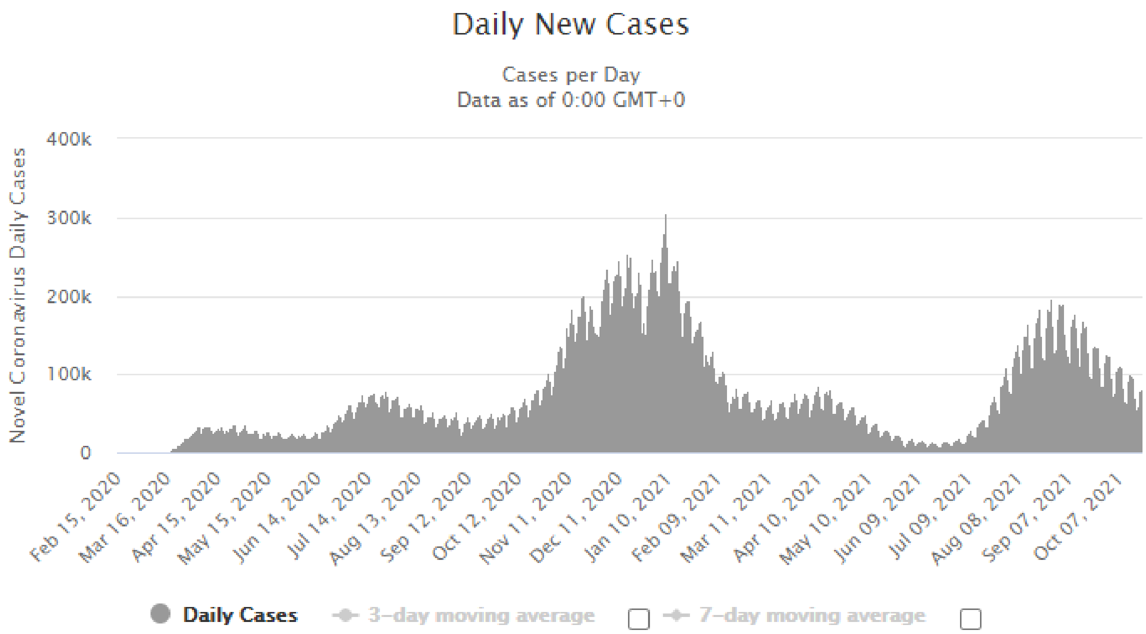
This year, there was no shortage of bad news:

- The Delta variant of Covid-19 was raging across the U.S., Canada, and elsewhere.
- Energy supplies – oil, coal, natural gas – were low in China and India, leading to spiking prices.
- China's largest property developer was in financial distress.

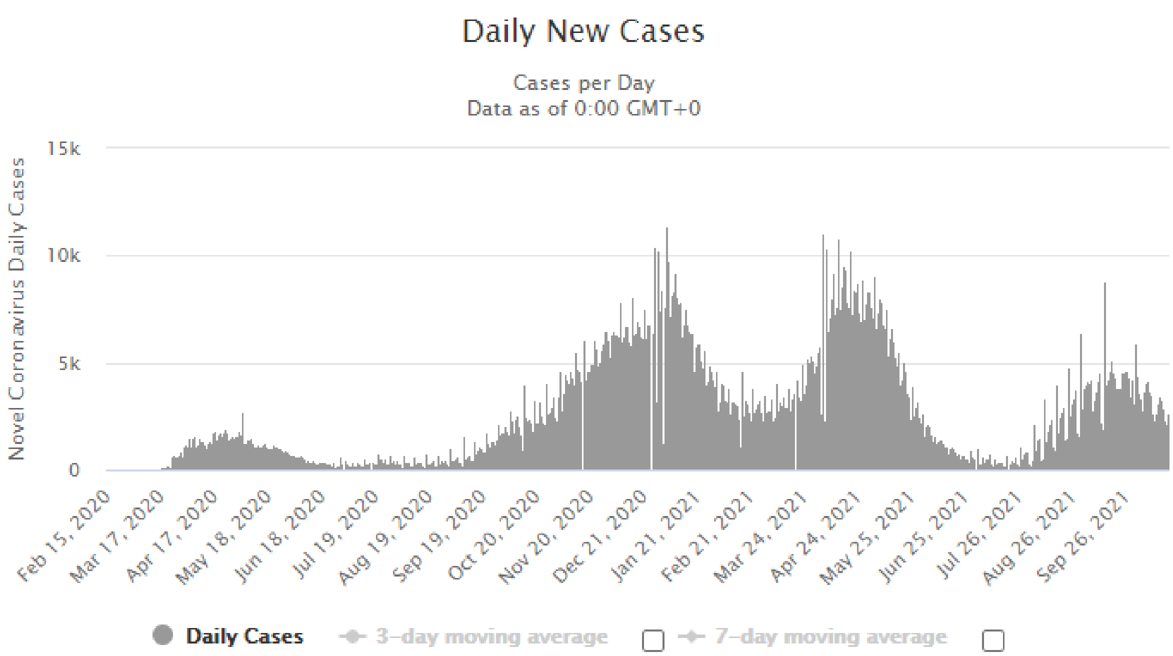
October has been a different story, with Canada's markets up +5% and U.S. markets up a similar amount. Both have – so far – erased September's losses.

- Delta has peaked in both countries:

Daily New Cases in the United States



Daily New Cases in Canada

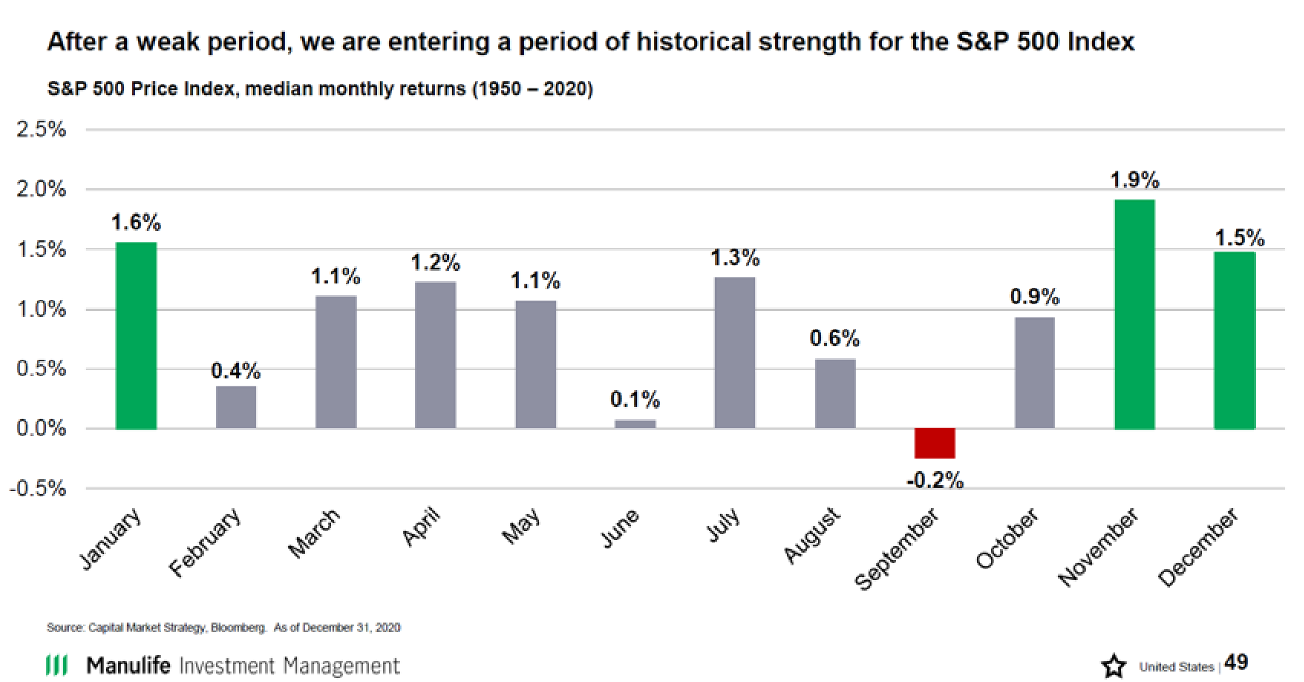


Source: Worldometers

- The energy price spike has worsened, but the market seems to have accepted (or ignored) it. Oil inventories in the U.S. are at their lowest seasonal level since 2014, so we remain on watch for higher oil prices.
- While three Chinese property developers have missed bond interest payments, markets see these problems as internal to China that won't spread.

We are approaching the "seasonal best six months" of the market, which is the period from November 1st to April 30th. Note how November has traditionally been the best month to be an investor in the calendar year.

October isn't over yet, and may still deliver some Hallowe'en chills, but markets are normally smoother after November starts.



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