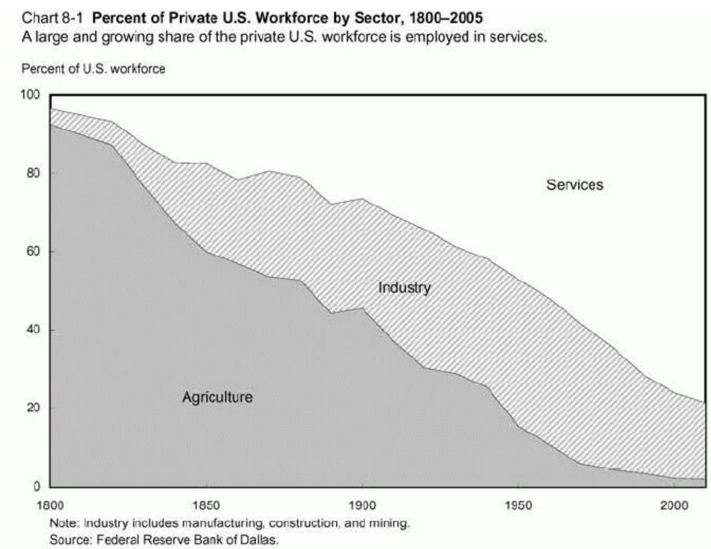
Jobs: Us vs the Machine

On December 7th, 2017 Google's AlphaZero[i] became the de facto world champion in Chess by beating Stockfish[ii], the reigning Chess champion. Both Stockfish and AlphaZero are computers. Computers have taken over the title of best Chess players in the world a while back. How did AlphaZero become so good? Well, someone fed it the technical rules of the game and then AlphaZero spent about 9 hours playing itself. AlphaZero has no need to sleep or eat so it has quite a bit of time to excel in other areas after basically dominating the ultra-competitive Chess world in less than a day.

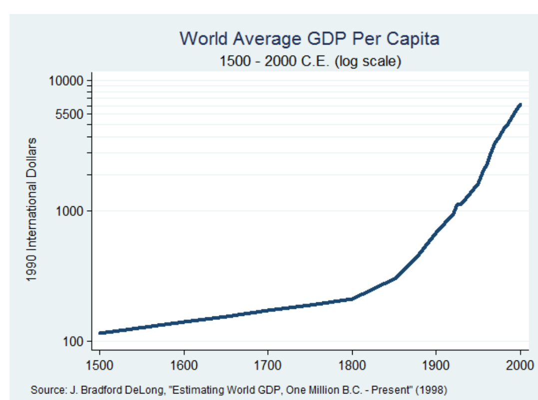
Kai-Fu Lee[iii] is a thought leader in artificial intelligence (AI). He believes roughly 40% of current jobs will disappear in the next few decades due to the fact that AI has allowed, or will allow, machines to be able to do routine tasks more accurately and efficiently than humans.



If it takes AlphaZero less than a day to dominate in Chess, what other tasks may AlphaZero excel at? How many jobs may it and it's clones be able to replace? How can humans expect to compete? Beyond simply who (or what) does the job is how does this affect the wider world? How does it affect financial markets?

Society has dealt with job displacement before. During the industrial revolution, farmers left their land in droves for industrial opportunities such as building the machines to help leverage tilling the land and transporting food from the farms. Humanity slowly ceded brawn to the machines yet we still dominated with brain. The machines were dumb with the ability to fulfill a simple function that we designed it to do. Note how quickly agriculture jobs dropped as a percentage of all jobs in the graphic above.

Increases in industry and technology ultimately allowed for the world's human population to balloon. At the same time, and despite many visionaries' fear of global hunger, food supply increased as fast, if not faster, than population growth necessitated. Jobs obviously increased as well. This all led to fabulous and dramatic growth in global wealth.



However, political systems and society went through severe disruption as well. For example, Feudalism and Monarchism (for the most part) were not efficient models to manage the new realities of the industrial age - enter Democracy and Communism and all the disruption that came with those transitions.

The point is, job disruption does not occur in a vacuum. It affects the very nature of how us humans live and interact with our surroundings. When farmers left their lands, they generally went to factories which had a specific geographic location. This resulted in the need for many people to live in close proximity to their new workplace and then for those people to have the ability to source what is necessary for daily life (e.g., food, water, etc.).

Humans ceded brawn to the machine during the industrial revolution. Despite immense disruption to many millions of people, conceptually this was better for humankind. This time around it seems to be brain, or at least a significant portion of brain, that will be ceded to the machine. What other attributes do us humans have? What existing jobs will continue to be dominated by humans and what new jobs may crop up?

There are 3.5 million truck drivers according to the American Trucking Association[iv], representing 2.25% of the workforce[v]. There are already several examples of self-driving trucks making it very likely human truck drivers will dwindle materially over the next decade or so[vi].

Some of the positives from automation include:
- Anticipated drop of roughly 90% in annual fatalities (currently 4,000 in the US alone) and injuries (currently 110,000)
- Material efficiencies through savings in fuel, labor costs, and productivity which will translate into cheaper products for consumers and/or increased profit for the companies involved

Negatives:
- 2.25% of the workforce are out of jobs with an assumed difficult transition given a lack of similar roles


Tesla Automated truck[1]

Examples of this sort of disruption abound and are easy to see in our daily lives. When I drive to the office, I automatically pay the toll using EZ Pass as opposed to stopping at a toll attendant, which number fewer by the day. When I call my bank I typically first speak (and am frustrated by) a computer voice prior to being passed on (and frustrated by) a human, typically located in a call center thousands of miles away. Eventually EZ Pass will disappear, replaced by the next upgrade in technology and AI will take over the call center. A computer does not need to do shifts and will have the ability to understand every language. When someone asks for a supervisor, they do not even need to pass the call over to their cubby neighbor, they can simply adjust their voice. In fact, based on personal consumer preference they can change their gender, voice, accent, nuance, and so on.

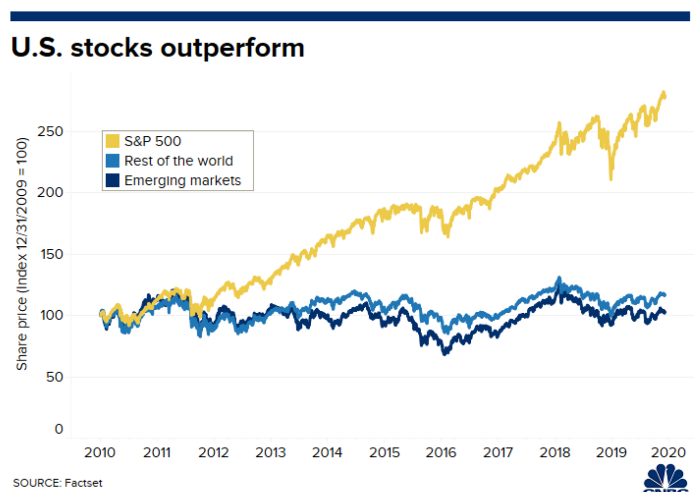
This disruption is not limited to the blue-collar world. For example, studies have shown AI to be better at making bail decisions as compared to judges[vii] and better at reading certain medical reports[viii]. These innovations will provide more potential for all but perhaps we will not need as many doctors, lawyers or judges in the future.

As was discussed in our last explorations, after a period of increased globalization, we seem to be going through a trend toward regionalization. With increases in technology, it is no longer necessary to travel the world for the cheapest human labor. Raw materials are all that is needed for a 3D printer to create items. A computer is all that will be needed to host a call center.

Disruption in traditional jobs (or at least jobs that have been traditional for the last 100 years or so) combined with increased regionalization may result in real tensions in parts of the world as it may be harder for emerging economies to tap into the wealthiest nations of the world the way China (manufacturing) and India (outsourced services like call centers) did. Disruption may result in new forms or at least new ideas from government to cope with retraining and economic needs of those negatively affected.
In summary, job disruption and further regionalization due advances in technology may result in material shifts in governments approach domestically and internationally. It may also further heighten disparities between the haves and have nots, both globally and locally. We continue to watch these trends in managing portfolio risk and seeking out investment opportunities.

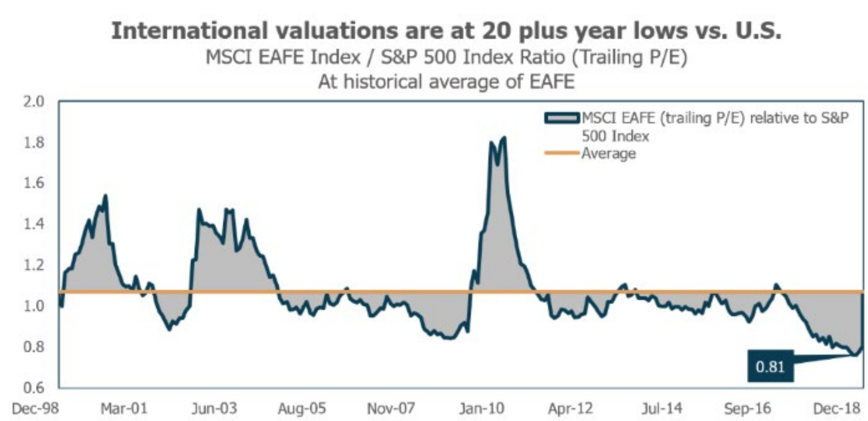
Biases in favor of the US and Short Duration in Review

Our general approach to investing on your behalf is to take a top-down approach in creating diversification of risks and returns in one's portfolio. Let's unpack that. A top-down approach means we start by viewing the high-level investing opportunities. Equities vs. Fixed Income exposure first. Then within equities, US, Developed Markets (e.g., Europe & Japan), and Emerging Markets (e.g., less- developed markets like China & India) and so forth. We continue on this path to actual strategy and manager selection. Diversification of risks and returns means we invest in multiple exposures on your behalf in order to increase the likelihood we'll have varied return streams as well as risk streams. Since we do not know with certainty (nor does anyone else to our knowledge) what investment will do best, we attempt to smooth out the experience. We do have biases though.



We have maintained a US bias for the last couple of years. Each of the Exploration pieces we have published this past year illustrated the positive attributes and strong positioning of the US relative to the rest of the world. However, we are now reviewing our exposure as strong and persistent US market performance, illustrated in the first chart to the right, has resulted in quite a premium. It is worth noting the periods of material underperformance by the US prior as well as the fact that we have quite the favorable rating as noted in the second chart below.

We are also reviewing our stance on short duration as the yield curve further steepens and 10-year interest rates have increased from historic lows of 1.5% to 2%. Our original bias here was due to a relatively flat and low yield environment which begged the question of the reward offered for the risk of holding fixed income for longer.



Concerns: A Quick Changing Global Political Landscape – New Rules of Engagement

Note that given our longer term focus, these concerns will not change dramatically from quarter to quarter. As such, when content does adjust we will make sure to point it out. In our last Exploration we highlighted the addition of global strife between citizens and their governments as a growing concern. This exploration as well as our Demographics exploration point to the potential of global strife increasing as jobs go through further transformations and the world become older and trade becomes more regional. Language on the first and third headline concerns have been updated to reflect our increasing concern.

Geopolitical climate: Iran and the middle east, Daily protests in China, impeachment proceedings in the US, newer protests in Egypt and Russia. 2020 elections. Need we scare you more?

Artificial market support by governments: Is it possible that the government is purchasing negative yielding bonds from the government? Yes it is. We are not sure of the implications or how this potentially even ends (negatively or not) if it does but we are actively analyzing.

Shorter-term volatility and risks: Between Iran and the upcoming elections, we expect volatility and headline risks to be heightened relative to the last couple of years.

To be clear, there are and always will be concerns in the market and in the world. We explore them to obviously give us the best chance to navigate them effectively. It is worth noting though that the reason we diversify both risks and returns is that the future is simply unknown.

General Market Review: Year-long Themes Primarily Play-out Positively (a tongue twister)

There are three main themes that have assisted the markets increasing throughout the year: Trade, Fed Policy & the Economy. Let's discuss one at a time:

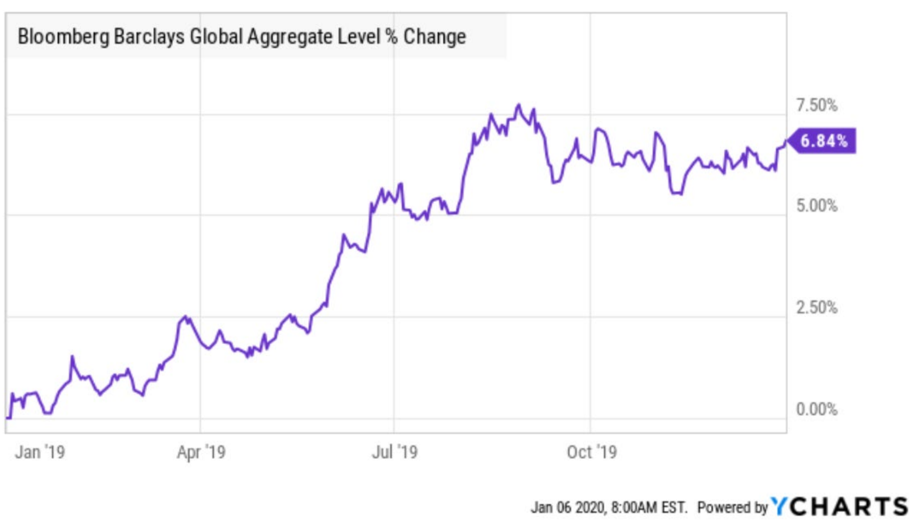
Compared to a year ago, the trade front is generally tame. Trade deals with Canada and Mexico, two very important trading partners, are complete. The trade war that caught headlines though, the one with China, however, is not. It increasingly feels like China will take the place of Russia on the biggest adversary list. Perhaps a longer topic for another time. In regard to trade wars though, the markets reacted positively this quarter as US held off on increasing tariffs while China extended an olive branch by purchasing soybeans among other agriculture products. While it does not feel like a full scale US – China agreement is even close, after a year of generally negative news, the small positive momentum was appreciated by Wall Street. We would not be surprised to see negative headlines in the near future.

The Fed capped a reversal in stance relative to Q4 2018 by effectively stating that they would be hard pressed to raise rates unless inflation increased dramatically from current levels. After hitting historic lows in the summer, longer term yields have increased, though still remain materially lower than they were a year ago, resulting in most fixed income investments generating healthy returns.

One of the fears that came with a tightening fed and trade wars was a softening economy. Thankfully, that did not play out. With the Fed easing through the year and trade tempering, some of these fears naturally subsided. While portions of the economy, like manufacturing, have been slumping as of late, employment, inflation, and other indicators, especially consumer-related ones, continue to remain mostly stable.

After a relatively sideways six month period, the market further broke out in Q4 on the back of the aforementioned positive trade news and Fed stance. For the year, global markets, as represented by the MSCI All World Index was up 27.3%. For the quarter, it increased roughly 10%.

After hitting an aforementioned high in yields in late summer, fixed income has generally remained in a range. Though, as can be seen from the second chart on the right, which uses the Bloomberg Barclays Global Aggregate to represent general fixed income exposure, the yield curve has become slightly steeper which is seen as "healthy" by the markets relative to a flat or inverted yield curve.



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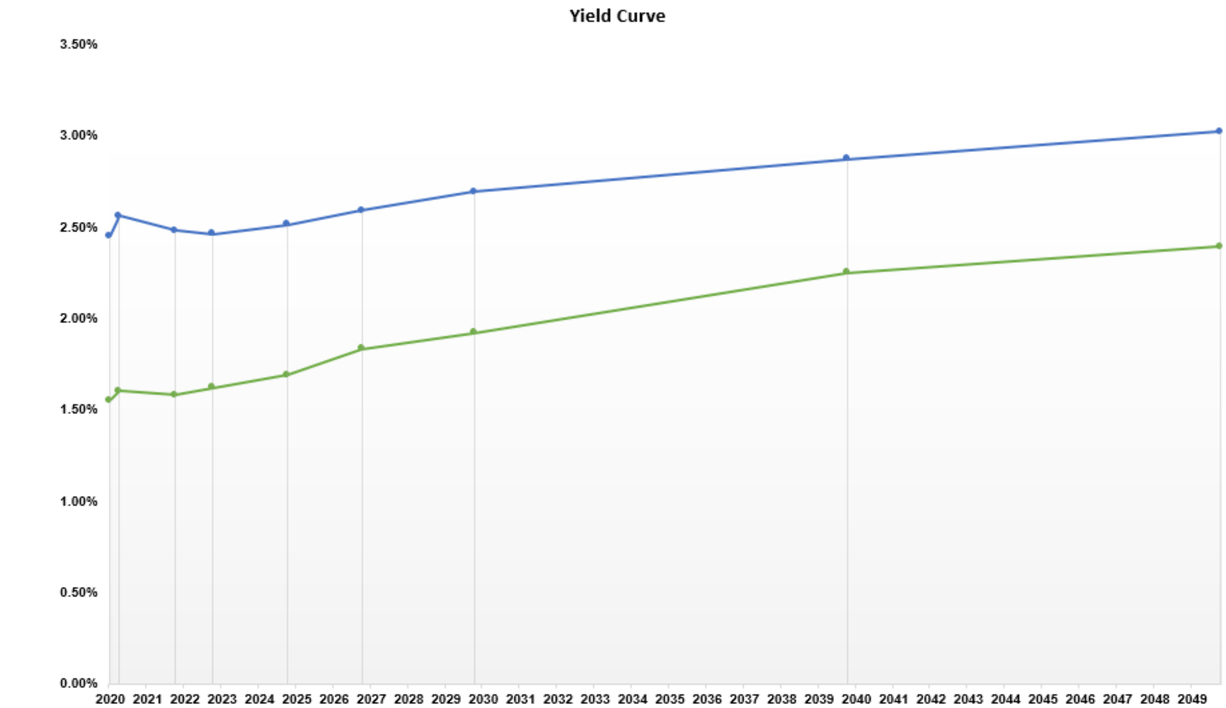

	3/31/2020	6/30/2020	12/31/2021	12/31/2022	12/31/2024	12/31/2026	12/31/2029	12/31/2039	12/31/2049
Today	1.55%	1.60%	1.58%	1.62%	1.69%	1.83%	1.92%	2.25%	2.39%
Last Year	2.45%	2.56%	2.48%	2.46%	2.51%	2.59%	2.69%	2.87%	3.02%

In closing, we continue to monitor markets closely and look for opportunity on your behalf.

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[i] https://deepmind.com/blog/article/alphazero-shedding-new-light-grand-games-chess-shogi-and-go It is worth checking out this site. Items that amazed me: "In Chess, for example, AlphaZero independently discovered and played common human motifs during its self-play training such as openings, king safety and pawn structure. But, being self-taught and therefore unconstrained by conventional wisdom about the game, it also developed its own intuitions and strategies adding a new and expansive set of exciting and novel ideas that augment centuries of thinking about chess strategy." As well as: "For each move, AlphaZero searches only a small fraction of the positions considered by traditional chess engines. In Chess, for example, it searches only 60 thousand positions per second in chess, compared to roughly 60 million for Stockfish." So brute force is no longer necessary, though conceptually it can be done.

[ii] https://en.wikipedia.org/wiki/Stockfish_(chess)

[iii] https://en.wikipedia.org/wiki/Kai-Fu_Lee

[iv] http://www.alltrucking.com/faq/truck-drivers-in-the-usa/

[v] https://www.statista.com/statistics/269959/employment-in-the-united-states/

[vi] Two different views, discuss!: https://evonomics.com/what-will-happen-to-truck-drivers-ask-factory-workers-andrew-yang/ https://hbr.org/2019/09/automation-isnt-about-to-make-truckers-obsolete

[vii] Page 39 of "Talking to Strangers" by Malcolm Gladwell discuss the study. The whole book is a worthwhile read.

[viii] A.I. Is Learning to Read Mammograms
https://www.nytimes.com/2020/01/01/health/breast-cancer-mammogram-artificial-intelligence.html?smid=nytcore-ios-share