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Economic Impacts of Climate Change

Redwood Grove Capital launched in 2017 because we had a differentiated, contrarian market view. **There was compelling evidence climate change was real. Within our 5-year investment horizon, we reasoned that the economic costs and opportunities would manifest in the capital markets.** We also believed, contrary to the market's perception, that the market's re-pricing of carbon risk would not happen gradually over decades. Instead, when climate change costs become obvious to market participants, there will be a quick adjustment to asset valuations. A recent example of the speed of transition can be seen in the market values of Exxon Mobile (XOM) and Tesla (TSLA), two names we do not own. In May of 2019, XOM's market value, the value of the outstanding equity, was over \$300 billion. Tesla's market value was just over \$30 billion, approximately 1/10th the valuation of XOM. Just over a year later, the market value for Tesla is (as of this writing) about \$360 billion, twice XOM's. Most of that change took place in the first six months of 2020.

We would be the first to acknowledge that many factors like GDP growth expectations, new extraction technologies, and a run on momentum stocks among other things influence the price of XOM's and TSLA's stock price. Yet, it is also clear that the market has come to value the impending transition to a low carbon economy and the opportunities that transition may bring to well positioned companies like TSLA. In this case, we think the pendulum has swung so far that TSLA overstates that value.

We have started to see upward re-valuations in most companies that play a clear and direct role in the transition, and it has benefited the approximately 18% of the portfolio invested in these companies. However, companies' with more nuanced yet substantive competitive advantages have not yet repriced. This gray area appears in companies whose core business is not obviously applicable to a low carbon economy but where the company maintains a competitive advantage because of its long-term approach to climate change. Often, these strategic, economic advantages can be difficult to identify, understand and quantify. Examples we have discussed in past letters include construction companies well positioned to help re-build after increased storm damage and growing infrastructure spend on climate change resilience to companies building the backbone of an interconnected and more efficient economy in the Internet of Things. Finding these investments requires deep company-specific research, an understanding of climate science and the path toward a low carbon economy. These gray area companies account for over 95% of the S&P 500 Index. Some have material economic tailwinds due to climate change, and even more

face headwinds. We believe that understanding the risks and opportunities for these gray area companies is the greater economic opportunity for our investors.

Research Process

In addition to not investing in Tesla because of its high valuation, we missed investing in another company because we required additional research into the company’s role in the economics of climate change. We think one can learn as much from a manager about the missed opportunities as the successes. Also, it illustrates the depth of our research process as well as some of its limitations. As framing, our research categorizes the economic cost and opportunity trends caused by climate into four main buckets: energy/technology transitions and innovation; physical impacts of climate change; regulatory impacts; and consumer behavioral changes. Broadly, we have seen these trends accelerate in recent years, with United States regulation lagging, though that may change with the next election.

One of the significant direct impacts of climate change is flood risk from storms and sea level rise. We are particularly interested in where it may not be priced into public equity valuations. Folks like Spencer Glendon at Probable Futures and Phil Duffy at Woods Hole Research Center, Dickon Pinner at McKinsey Consulting and First Street Foundation have all done great work to help us better understand these opportunities and risks. Flood risk can manifest itself in a variety of ways, but we were drawn to mortgage providers and real estate because it is a large market with significant mispricing. Much of that mispricing is due to FEMA’s outdated flood maps, which are the official determinate of 100-year flood zones.

A 1 in-a-100 year flood zone may not sound risky, but it is FEMA’s highest flood risk designation. High-risk flood zones have a 26% chance of flooding during the life of a 30-year mortgage. These properties are so vulnerable that mortgages on them come with a mandatory flood insurance requirement. Homes with federally backed mortgages can buy insurance from the National Flood Insurance Program (NFIP), another federally guaranteed program. Others can buy flood insurance in the private insurance market which is often subsidized at the state level. The problem arises because 75% of FEMA’s flood maps are outdated, and more importantly, they do not account for increasing threats created by climate change. There are several reasons these maps remain woefully inadequate, ranging from bureaucratic inertia to local government officials protecting property values (and tax basis) by not increasing the area subject to FEMA flood zones. However, the ability for climate scientists and statisticians to map these flood risks is no longer a reason for the maps’ inaccuracy.

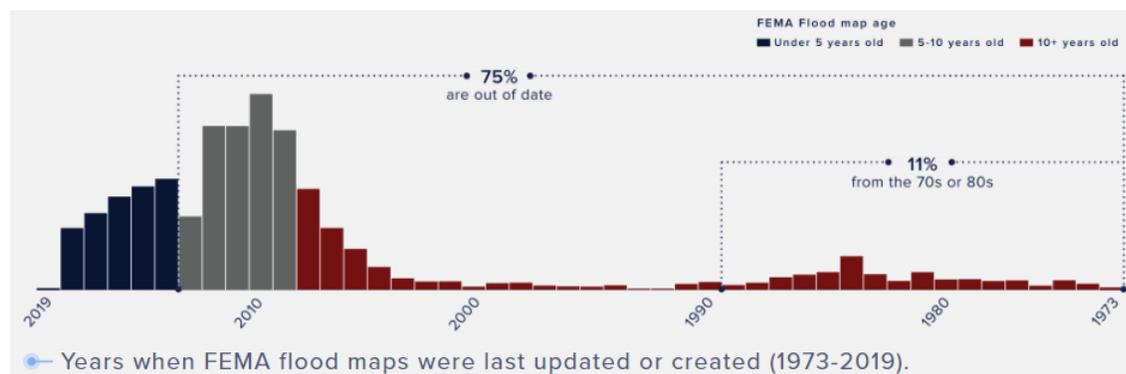
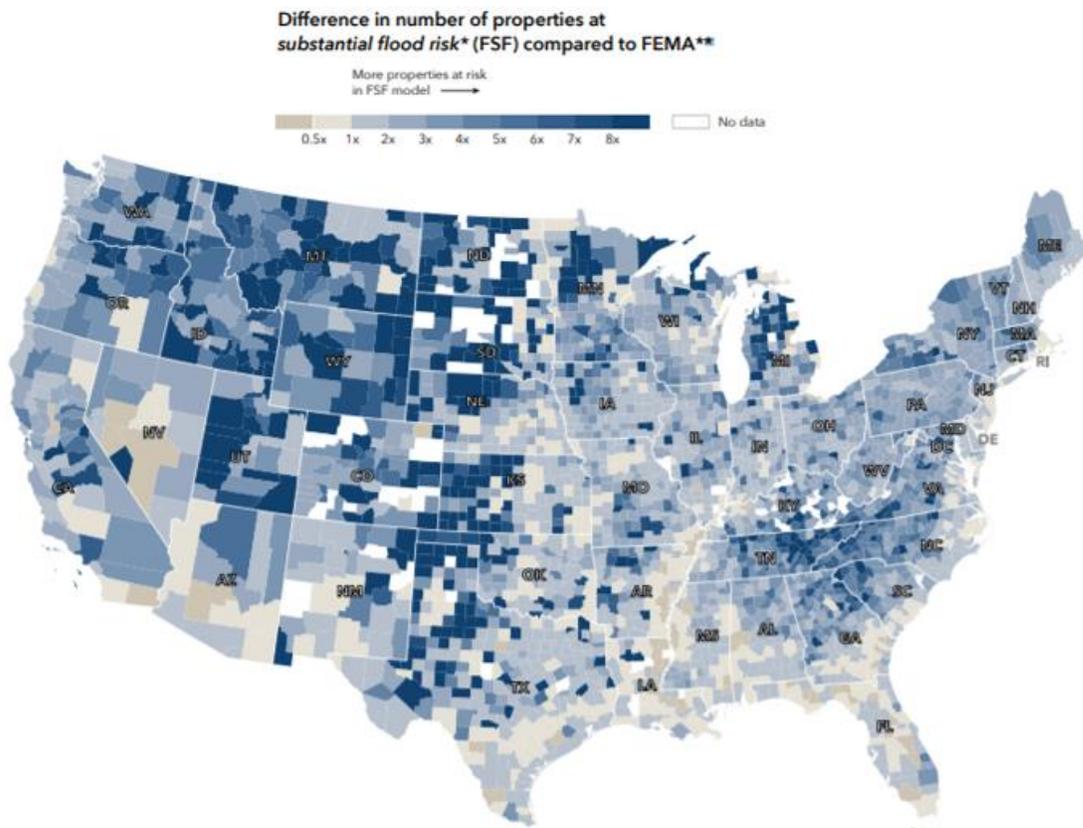


Chart 1: Percentage of flood maps that have not been updated in over 5 years as required by the National Flood Insurance Reform Act of 1994. From the First Street Foundation

The 1-in-a-100 year flood zone insurance requirement creates what Spencer Glendon refers to as “temporal mismatches”, because mortgages are a 30-year contract opposed to the insurance contract which is re-priced every year. As a result, mortgages with 1-in-a-100 year flood risk are de facto being re-underwritten every year by the insurance company. If the insurance market or the NFIP were to reprice flood risk based on the most recent climate science, it could leave 14.3 million properties or, more than 10% of real estate in the United States with potentially unaffordable insurance premiums. Unable to afford new insurance could result in defaulted mortgage contracts, and substantial declines in home valuations.¹ Of those 14.3 million properties, 5.9 million are not currently in the FEMA’s Special Flood Hazard Area. As a result, they do not currently require any flood insurance. In addition, there are 3.6 million properties or 2.6% of all properties which have a 1-in-5 year probability of flooding.² These properties are likely uninsurable at any price because no level of diversification of those assets will lower the risk to an insurable level.



* Substantial risk is calculated as inundation 1 cm or more to the building in the 100 return period (1% annual risk). See methodology for full model details.
**Comparison of count of properties within a Special Flood Hazard Area (1 in 100 layer) versus those with 1% risk from the First Street Foundation Flood Model. Some counties may show higher FEMA counts due to a variety of factors, including the generalization of SFHAs, assumptions around flood protection measures, and local context.

¹ https://assets.firststreet.org/uploads/2020/06/first_street_foundation_first_national_flood_risk_assessment.pdf
² https://assets.firststreet.org/uploads/2020/06/first_street_foundation_first_national_flood_risk_assessment.pdf

**Chart 2: Differences in FEMA flood risk compared to flood risk as assessed using global climate model projections.
From First Street Foundation.**

Seeing this unpriced risk, we became interested in finding companies that might help the market better assess it. A company that we looked at, CoreLogic, was interesting to us, because among other services they provide mortgage lenders and insurers with detailed information about the FEMA flood map. Corelogic assesses and confirms the risk of flooding. We believe that a company that makes this misrepresented risk transparent could become increasingly important in the mortgage market and potentially more valuable to its client base. While CoreLogic was well-positioned to benefit from this increasingly complex risk assessment, it was unclear from any of their public materials that Corelogic was considering climate change. In fact, while they had numerous reports on extreme weather's impact on the insurance market, climate change was never mentioned once (that we could find).

During the market sell off at the end of the first quarter, CoreLogic's valuation dropped to attractive levels. We arranged several calls with CoreLogic's data scientists to better understand if and how they were incorporating that data into their risk assessments. We learned over the course of many calls, that they are in fact acutely aware of climate changes risks. Sadly, we learned that the highest levels of interest in their climate analysis came from a handful of insurance companies. Their mortgage provider client base generally has low interest in these capabilities. Instead, lenders are happy to rely on (at best) the out of date, historical, FEMA maps because that is what the regulatory requirements mandate. The growing flood risk resulting from climate change can mostly be off-loaded to the State and Federal Government.

Corelogic, like many companies, is responding to its clients' demands but is not acting as a leader to help drive change. Unsatisfied with this, we decided to not buy Corelogic's stock even though its valuation was compelling. Nonetheless, because of its unique position as a data aggregator of flood risk for mortgage providers and insurers, and its data scientists' awareness and ability to incorporate climate risk into their models, we thought Corelogic had the potential to play an important role in the market's understanding of climate flood risk. In addition, as flood risk becomes an increasingly important and complicated factor in determining credit risk for mortgages, it would become more valuable for those able to quantify and distribute it. As a result, we put them on the watch list with an intent to continue the conversation with the company.

Unfortunately, we will not get the opportunity to invest with Corelogic because its share price rebounded quickly with the market. The opportunity ended when it received an acquisition bid at near double the valuations we were considering from a private consortium. We are writing about Tesla and Corelogic because they illuminate the difficulties of having two separate investment processes: fundamental and climate. It can be slow and arduous, and we sometimes miss attractive fundamental opportunities because something does not pass our climate analysis or vice versa. But we believe our commitment to finding companies that meet both criteria has contributed to our outperformance in up and down cycles.

Value Investing

While we are pleased with our relative outperformance since inception, (over 2 percent greater annual returns) we have faced a style headwind created by Value in the first three years of

investing. As Growth has continued to decouple from historical valuation levels, we believe there is increasing reason to be optimistic about Value's prospects.

For over 100 years, investors that consistently purchased companies with lower valuation multiples than their peers outperformed. A dollar invested in 1926 in Value stocks would be worth \$13,447, more than twice as much as a dollar invested in Growth stocks. This worked beautifully because investors consistently preferred safety, and over weighted downside risk. The Prospect Theory developed in 1979 by behavioral economists Daniel Kahneman and Amos Tversky demonstrated that humans have a hardwired loss aversion which explained the sustained market inefficiency. For decades, investors could just invest in companies with lower valuations and over time the strategy would outperform. Recognizing that this strategy worked overtime, by the early 2000s, quant investors were able to eliminate this consistent market bias by essentially removing the human component. Since that time, successful Value Investors need to do deep, company by company research to separate "value traps," where there is no reversion to mean, from temporarily undervalued companies.

Starting in 2007, Value investing has underperformed Growth investing by 6.42% a year, the longest such run of outperformance by Growth. That has only accelerated in the first seven months of 2020, as Growth is beating Value by 27.30% YTD.³ Growth's accelerated outperformance has created some unsettling valuations. Those momentum stocks are now trading at over 30x earnings, a near historic valuation. Growth is trading at a 37% premium to the S&P 500, which is also trading at high valuations. The market has not seen a Growth premium this high since the tech bubble of 2000. In other words, Growth is trading at a historically high premium to an already highly valued market. Compared to Value, Growth is currently trading at a 70% valuation premium also its largest since the Tech Bubble. The below Chart 3 shows the premium and discount to the S&P 500 that Growth and Value have experienced since 2007. We are persistent, clinging to the long-term importance of valuation and the prospect of a reversion to the mean. History has been on our side, but one never knows if this time is different.

³ YTD numbers are as of July 17th 2020



Chart 3: Value stocks’ discount to the S&P 500 (blue line) compared to Growth’s stocks’ premium (green line). Source Factset.

Growth’s historic valuation premium is not the only reason for our optimism around Value. As Merrill Lynch recently pointed in their *July 13th Strategy Snippet*, Value has outperformed coming out of a recession in 14 of the past 14 recessions. As corporate profits improve, they disproportionately grow for Value stocks and profits are what ultimately drive stock prices. Finally, in the short term, technicals may have worked against Value, as investors chasing returns have poured money into Growth mutual funds and ETFs. Active managers are also at historical overweightings in Growth sectors and record underweighting in Value sectors. There is almost no one left in the Value camp, which in our experience is exactly where you want to be. By almost any measure, Value looks cheap on a relative basis compared to Growth.

Closing Thoughts

In past letters we have discussed climate’s systematic risk to financial institutions and economic stability. The Bank of England and others have made substantive steps to incorporate climate into their financial decisions and macroeconomic analysis. Understanding these risks, the Bank of England created a climate stress test for financial institutions last year. However, the Federal Reserve has been relatively muted, though not silent, when discussing climate change and its threats to financial stability. We were happy to sign on to a letter written by Ceres, a non-profit that works with investors to build economic solutions to climate change, to the Federal Reserve Chair Jay Powell. Letters were also sent to the Comptroller of the Currency, the Federal Deposit Insurance Corp., the Commodity Futures Trading Commission among others.

The letter ([here](#)) signed by investors managing close to a \$1 trillion of assets called on the Federal Reserve to more actively incorporate climate change into its mandate of maintaining US market stability and global competitiveness. We believe in the efforts that encourage the capital markets to work to advance solutions to climate change and not against it. The regulatory environment is

an important component of that. So, we were happy to participate, in a small way, to help apply pressure to drive that change. We remain very humbled to be included in the company of the other signatories to help advance the great work that Ceres is doing.

As always, thank you for your continued trust in us. If you have questions, concerns or comments please do not hesitate to reach out.

With gratitude,

A handwritten signature in black ink that reads "Ned". The letters are cursive and fluid.A handwritten signature in black ink that reads "Greg". The letters are cursive and fluid.