

Climate Determinants — Financial Services

Transformative risks for the financial sector, governments and consumers



- **Climate change is everything.** This is the first in a planned series highlighting the pervasive impacts of climate change across all facets of our global society. Not only is climate change physically altering the planet, it is taking an increasing toll on human health, the supply chains for a host of products, and, as we discuss in this note, the financial services sector.
- **Climate change is now.** The western U.S. is burning, hurricane-force winds have wreaked havoc in Iowa and Utah, and the Gulf Coast is still struggling to recover from several deadly hurricanes in recent years.
- **Consumers of financial services will bear the cost.** Costs and availability of mortgages and insurance are already beginning to reflect climate change risks, depending on location, and this trend will likely grow.
- **Financial institutions are waking up.** On September 9, 2020, the U.S. Commodities Futures Trading Commission released a [landmark report](#) that states in no uncertain terms: “Climate change poses a major risk to the stability of the U.S. financial system and to its ability to sustain the American economy.” The report provides a series of concrete recommendations for financial market participants, including regulators, financial institutions and asset owners, to execute the necessary transition to a low-carbon future without destabilizing the economy. Notably, the report reflects a consensus across a range of financial markets participants.
- **What should investors know?** In this report we provide a digestible overview of the key categories of risk and potential impacts, how financial sector participants are beginning to respond, and what questions investors should ask their advisors about how they are factoring systemic financial risk into portfolio allocations.

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Overview: Transformative risks in the provision of financial services

Extreme weather and disasters fueled by climate change take a major toll on society in terms of human suffering, individual losses and systemic risk.¹ The financial services sector, which includes banks, insurers, investment service providers and asset management firms, is highly exposed to the potential costs related to climate change. The series of natural disasters in just this past year — including the coronavirus pandemic — has thrown these risks into even starker relief.

In the U.S. alone, there have been 273 weather-fueled disasters since 1980.ⁱ Altogether these events cost a staggering \$1.79 trillion.² Looking just at wildfires, the 50 years leading up to 2015 averaged approximately \$1 billion per year (inflation-adjusted). That figure jumped to \$10 billion in three of the past four years.³ While proving a direct link between the rise in weather-fueled disasters and climate change is complicated, an October 2019 scientific paper by the PNASⁱⁱ documented “an increasing trend in extreme damages from natural disasters, which is consistent with a climate-change signal... with most pronounced increases in... catastrophic events. This pattern is strongest in temperate regions, suggesting that the prevalence of devastating natural disasters has broadened beyond tropical regions and that adaptation measures in the latter have had some mitigating effects on damages.”⁴

Cornerstone first addressed the risk to global financial assets in our September 2019 report [No Place to Hide? Climate Change and Systemic Financial Risk](#). In that report, strategist Michael Geraghty assessed research studies that estimated the “climate value at risk” of global financial assets out to 2100. According to studies from the Economist Intelligence Unit, London School of Economics and the UNEP Finance initiative, the estimated risk to financial assets from climate change ranges from \$4 trillion to \$24 trillion depending on the study.

The depth and breadth of climate risks to the financial underpinnings of our society are only beginning to be fully appreciated. While insurance companies have begun to reflect climate risks in their policies and large investment banks are beginning to consider them in valuations, the complexities are not well understood by many investors, including many professionals.

The financial services community is beginning to respond in a more concerted manner, however. Notably, the U.S. Commodities Futures Trading Commission (CFTC) has just released a very detailed assessment of the various climate-related risks — physical, transition, and liability risks — as well as their impact across sectors. The [report](#), a collaboration among more than 30 financial markets participants, offers a comprehensive set of recommendations for regulators, financial institutions and asset owners to carefully execute the transition to a low-carbon economy. This is a significant achievement, particularly in the current political climate.

However, while investors may not fully appreciate the nuances of climate risk, the markets provide nearly instant information on how they react to an exogenous shock to the outlook for a region, sector or company.⁵ A sudden shift in investors’ perception of the future risk of climate change on asset values could precipitate their decline, destabilizing investor portfolios and financial institutions’ balance sheets.

ⁱ Including CPI adjustment to 2020

ⁱⁱ Proceedings of the National Academy of Sciences of the United States of America.



On average, there has been only a modest stock market response to large climatic disasters. Results, however, vary widely across disasters. Hurricane Katrina, which resulted in total damage of roughly 1% of U.S. GDP, triggered only a modest stock market reaction, with no discernible drop in the U.S. stock market index. The 2011 floods in Thailand, which hit Thai GDP with a 10% decline, resulted in a drop in the Thai stock market index of over 8% soon after the disaster and a cumulative drop of about 30% after 40 trading days.⁶

Market impact aside, the recorded costs of damage from such disasters are estimates of the spending needed to rebuild properties and businesses.⁷ The full costs include investments not made because of the need to rebuild — investments that might have instead helped grow the economy. The true impact of more frequent destructive weather events may be immeasurable.

Financial impacts on individuals and small businesses

Consumers of financial services will suffer the most from the financial ramifications of climate change

Consumers of financial services will, under our current climate trajectory, suffer the most from the financial ramifications of climate change. Homes and livelihoods are being decimated as we write this, the financial stability of families and business owners upended. The increasing frequency and severity of extreme weather events is causing a variety of financial impacts:

- Climate change may impact the ability of individuals to obtain affordable mortgages and home insurance coverage, especially in areas prone to extreme weather events.
- In coastal areas which experience flooding from rising seas, climate change could spell the end of the 30-year mortgage.
- Climate change could increase the cost for businesses to obtain property insurance for structures and equipment. In some high-risk areas, these types of insurance may not even be available. It may also become difficult to buy business income insurance needed to cover costs if a business has to close temporarily due to repeated flooding or other climate-induced disasters.
- Climate change may boost the cost to municipal governments of raising capital for infrastructure investments, as rating agencies lower their ratings. Ultimately, this will hurt residents in those municipalities, who might have to pay more taxes as a result.

Costs associated with climate change could reduce earnings in public companies and hurt returns on investment, pension and 401k portfolios.

Risks to the financial sector from physical damage to assets

Extreme weather events can lead to increased defaults on bank loans, more frequent and larger losses for insurance companies, and damage to local economies

The physical damage that borrowers, investors and insurance policy holders may experience creates risk for lenders, asset managers and insurers. Extreme weather events that cause flooding, wildfires and damage to property and human health can lead to increased defaults on bank loans, more frequent and larger losses for insurance companies, and damage to local economies. This can negatively impact municipal and securitized bonds.^{8 9} Some examples of the financial costs from recent disasters include:



- Costs from Hurricane Matthew in 2016 exceeded \$10 billion, \$5 billion of which was covered by insurance.
- Hurricane Sandy in 2012 cost over \$40 billion in New York and nearly \$30 billion in New Jersey. Insurance companies paid out over \$3.5 billion to home and auto insurance policyholders.
- In 2015, damage to crops and property from drought-fueled wildfires resulted in over \$2 billion in structural losses in California.¹⁰

Risks differ by industry segment

Smaller, more **regional banks** have greater exposure to physical risks than larger banks, which have more diverse balance sheets. Their risk is concentrated more locally, and they tend to have a larger proportion of their balance sheets exposed to commercial real estate, small business loans and single- and multi-family homes that could be compromised in a flood or wildfire.¹¹

Risks from climate change related events closely align with many banks' risk profiles

Furthermore, risks from climate change related events closely align with many banks' risk profiles. There are material climate risks over a ten-year time horizon, which equates roughly to the average maturity of loans on a bank's books. Banks with a heavy concentration of mortgage or commercial property loans in geographies prone flooding carry a serious potential risk on their balance sheets.¹² Also, banks with heavy exposure to the energy space could be at risk.¹³

The **asset management/capital markets** industry's performance is somewhat less correlated to physical risks. Therefore, an investor might consider the climate change risk less significant for a brokerage firm than for an insurance company.¹⁴

The property and casualty industry is generally most exposed to asset-related risks given the nature of its underwriting activity

Within the **insurance sector**, the property and casualty (P&C) industry is generally most exposed to asset-related risks given the nature of its underwriting activity. Losses may extend beyond standard structural damage such as broken windows, a hole in the roof, or water damage. Insurers may also have to cover the expense of a policyholder living elsewhere while the home is being repaired or rebuilt. On the commercial side of the business, in addition to direct property damage, the policyholder may claim loss of income and extra expenses during rebuilding or relocation.¹⁵

Most U.S. state insurance regulators expect all segments of the insurance sector to experience greater risk over the coming years, and more than half expect climate change to have a high or extremely high impact on coverage availability, underwriting assumptions, pricing, and investment decisions on the part of insurers.¹⁶

A thorough analysis of P&C insurers should also include an analysis of their investment holdings

Moreover, **investments in corporate bonds and stocks held by financial institutions** can also take a hit if the businesses and economies where companies transact are struck by natural disasters. For life insurance companies, which have longer-duration liabilities, longer-term bonds make up the bulk of their assets. However, P&C companies have shorter duration liabilities, so they invest in shorter duration assets and are more exposed to stocks. This means a thorough analysis of P&C insurers should also include an analysis of their underlying holdings. For example, if an insurer owns longer-dated corporate bonds of fossil fuel related companies, an investor needs to consider what happens if those companies need to refinance to pay off the maturing security. Is there a



risk of not being able to raise new funds, which may result in bond defaults or even bankruptcy? Energy companies with stranded assets (i.e., assets that once had value or produced income but no longer do) could default on their bonds and damage insurance companies' earnings and balance sheet.¹⁷

Transition and liability risks to the financial sector

Transition risk includes regulatory risk as well as uncertainties regarding the rate of disruption, social expectations, and technological developments around climate change

In addition to being exposed to physical asset risks, financial institutions are also exposed to **transition risk**, which encompasses **regulatory risk**. Political initiatives aimed at reducing carbon emissions could render business models built around exploiting fossil fuels less profitable or even obsolete. This would expose investors, lenders and insurers to potential losses due to initially overvaluing a company's assets or potential cash flows and profitability. For example, to promote the transition to a low carbon economy, governments may take actions that negatively impact the economics of the borrower, such as imposing carbon taxation or limiting consumption of the greenhouse gas (GHG) emitting product.^{18 19} In addition to regulatory risk, transition risk includes uncertainties regarding the rate of disruption, social expectations, and technological developments around climate change.

For insurance companies, regulatory risk is compounded by state regulatory oversight. If the insurer faces extreme risks in some areas of a state and "redlines" those areas, regulators may step in and disrupt other businesses the company underwrites in that state. The uncertainty surrounding this state-by-state regulation creates volatility for the insurance business. Ultimately, regulators know that individuals and businesses need access to insurance and a bankrupt insurer helps no one. Eventually, states may have to backstop insurers' losses so that they can make some marginal profit in areas exposed to climate-related flooding or wildfires.²⁰

Heavy emitters of CO2 and pollutants, along with the financial firms that finance and insure them, are more exposed to legal efforts to hold them responsible for the negative effects of climate change

The financial sector may be exposed to **liability or litigation risk**. Heavy emitters of CO2 and pollutants, along with the financial firms that finance and insure them, are more exposed to class-action lawsuits and other legal challenges that may seek to hold them responsible for the negative effects of climate change. For example, people living in coastal areas may demand compensation from companies responsible for climate change induced flooding.^{21 22} In turn, lenders, insurers and investors in these businesses may experience unexpected losses as a result in terms of missed loan payments, exposure to possible insolvency on the part of non-financial company customers, or the potential for large, unexpected insurance loss payouts related to business interruption.

To evaluate these risks, analysts at asset management funds sometimes focus on the types of projects and loans the institutions are financing — e.g., whether the institution avoids lending to the coal industry and limits potential exposure to stranded assets. Stranded assets could be an obsolete piece of equipment or a resource, such as coal, oil or gas resources that have not yet been extracted. If coal is no longer being used due to new green regulations, the coal left in a mine becomes a stranded asset. They may also assess the commitment of financial institutions to environmental, social and governance (ESG) analysis and sustainable practices. Boards of directors should actively monitor a management team's efforts to reduce ESG and climate risk; the absence of such board oversight can be an indication of corporate greenwashing (aka unsubstantiated or misleading claims of being environmentally friendly).²³

What are P&C insurers doing to mitigate risk?

Some insurers are expanding their teams of in-house climatologists, computer scientists and statisticians to redesign models to incorporate the effect of the warming earth

Insurers are addressing climate change risks by building models that aim to better estimate the impact. Some insurers are expanding their teams of in-house climatologists, computer scientists and statisticians to redesign models to incorporate the effect of the warming earth on hailstorms, hurricanes, flooding and wildfires. Swiss Re, for example, now uses climate data from the past 25 years only, instead of longer-term history, because rain now falls so much more heavily and frequently in many locations vs. decades ago. Using the shorter observation period exhibits a higher rate of torrential downpours resulting in property damage in many parts of the world. This has made rainfall a higher-priority peril.

Insurance companies see the need to curb global warming. This has spurred the creation of some insurance policies that provide incentives to policyholders to contribute to these efforts. Examples include discounts on auto insurance policies for driving fewer miles and policies for green building construction.²⁴

What are banks doing to mitigate risk?

Banks are requiring larger down payments and selling the loans to government-backed buyers, shifting the risk of mortgage defaults to taxpayers

Banks are waking up to the risk of long-term, 30-year mortgages in coastal areas. They are requiring larger down payments and selling the loans to government-backed buyers such as Fannie Mae and Freddie Mac. Climate change risk has started to weaken home pricing in areas susceptible to coastal flooding and wildfires — situations seemingly exacerbated by climate change. If coastal mortgagees defaulted on their loans, Fannie and Freddie would take a hit — a hit that could be passed on to taxpayers.²⁵

Transition risks are forcing banks to write off stranded assets. Banking regulators around the world are now formalizing new rules for climate-risk management. Ratings agencies are incorporating climate factors into their assessments. As climate risk increases, banks need to protect their balance sheets from uncertainty.²⁶

Risks and mitigation for municipalities

Climate change exposes the muni bond market to serious credit risk by potentially impacting the tax base and infrastructure of some communities

Municipalities issue bonds to fund public schools, local airports or other special purpose needs and to finance capital expenditures. Climate change exposes the \$3.8 trillion **municipal bond market** to serious credit risk by potentially impacting the tax base and infrastructure of some communities. For example, coastal areas along the southern Atlantic seaboard of the U.S. may be affected by storm surge and extreme weather events such as hurricanes and excessive rainfall. Inland cities located along waterways such as rivers are also at risk from floods resulting from climate-induced excessive rainfall. Higher temperatures from climate change boost the risk of drought-related wildfires, impacting local agricultural production and raising the risk of illnesses and mortality.

Damage to property and infrastructure can devastate municipal budgets. Harm to human health can constrain the local labor market and increase health-related costs to the municipality. The climate issue can pile on costs at a time when the federal budget deficit is rising, in turn affecting federal emergency aid via the Federal Emergency Management Agency (FEMA).

Moody's Investors Service warned local governments in 2017 that they might face lower bond ratings if they fail to adapt to climate change. This would likely result in higher borrowing costs for municipalities.^{27 28} The risk to investors, primarily retail investors in the municipal bond space, is a decline in the value of their bonds held in portfolios, missed interest payments or even bond defaults.

Mitigating climate risk via the municipal bond market

In 2017, Miami voters approved a \$400 million forever bond to address issues such as rising sea levels

To address climate risk, some South Florida counties have invested in projects to adapt to the threat of rising seas to offset the hidden cost of climate change. Miami Beach, for example, invested half a billion dollars in pumps and road raising. In 2017, Miami voters approved a \$400 million forever bond to address issues such as rising sea levels.²⁹

WASD is an enterprise unit of Miami-Dade County. It operates as a separate business unit within Miami-Dade County. WASD's business is to evaluate any construction projects and their related impact on commercial and residential customers' drinking water and wastewater services. The goal is to protect public health. Its finances are functionally separate from the county at large. In October 2019, WASD issued \$233 million in revenue bonds to finance a portion of its long-term capital improvements program. The capital program makes upgrades to both drinking water and wastewater projects and includes a mixture of standard maintenance and replacement of aging facilities, improvements to comply with health and environmental regulations, and upgrades to reduce energy consumption and better withstand the impacts of climate change.³⁰

This is just an illustration of the types of investment municipalities in vulnerable areas will need to make. The question will become whether and when vulnerable areas can no longer raise funds through the markets.

Key questions for investors

Many if not most fund managers and investment advisors do not fully comprehend climate risks to the financial services sector

Given the complexity of the issues briefly outlined in this report, it's likely that many, if not most, fund managers and investment advisors do not fully comprehend climate risks to the financial services sector. Even fossil fuel free portfolios may contain bank or insurance firm holdings that are heavily exposed to the energy sector or to regions at high risk of natural disaster, either through their lending/underwriting activities or their investment holdings. Below we summarize the key questions for investors and advisors to explore in order to fully understand their climate risk exposure.

- 1) In evaluating financial services sector investments, do you consider the sector's systemic vulnerability to climate-related impacts? Does this include an analysis of both physical risk and risk from investment holdings? How does your analysis influence your recommendations?
- 2) With regard to funds investing in corporate, government and/or municipal debt: do you integrate climate risk considerations into your balance sheet management and asset purchases? What exposure does the fund have to extreme weather, flood, or wildfire prone regions?

- 3) Do you consider different regulatory scenarios in assessing climate risk? Have you considered the impact of unanticipated policy responses? What would happen if government policy changes abruptly result in stranded assets or a rapid reallocation of capital across sectors?
- 4) What process do you use to analyze the risk of securities in my portfolio?
- 5) Do you assess and monitor the exposure and implications of climate-related risks for company balance sheets / fund holdings? How?
- 6) Do you track information on the carbon emissions of portfolio holdings?
- 7) Can you recommend investments in companies/funds that are working to solve climate risks?



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Notes

¹ International Monetary Fund - Global Financial Stability Report, April 2020 Chapter 5: Climate Change - Physical Risk and Equity Prices; May 29, 2020

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³ <https://www.nytimes.com/2020/09/16/us/california-fires-cost.html>

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⁸ <https://www2.deloitte.com/gr/en/blog/risk-advisory/2020/financial-risks-stemming-from-climate-change.html>

⁹ <https://kleinmanenergy.upenn.edu/policy-digests/climate-change-and-financial-risks>

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¹¹ Interview with Dan Dorman, bank and asset management analyst, Calvert Research & Management.

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