Climate Risk and Real Estate Investment Decision-Making

November 12, 2019 at 12:00pm CT
Climate Risk and Resilience in Real Estate

BILLY GRAYSON, EXECUTIVE DIRECTOR FOR THE ULI CENTER FOR SUSTAINABILITY AND ECONOMIC PERFORMANCE
What is “Climate Risk and resilience”?
GHG Emissions are going up…
This leads to higher average global temperatures...
Which leads to more frequent and intense extreme weather events...
...and more losses for real estate, insurance, and the public sector from natural disasters.
Markets are starting (slowly) to respond
A company’s ability to manage environmental, social, and governance matters demonstrates the leadership and good governance that is so essential to sustainable growth, which is why we are increasingly integrating these issues into our investment process.”

Larry Fink, CEO, Blackrock
Uncertainties around timeframe, magnitude, and location of short and long term impacts makes planning difficult.

Financial shocks (from debt and equity cost and availability to insurance and utilities pricing) may come before biggest physical risks materialize.

Short and medium-term investment horizons and owner/tenant split incentives may complicate long-term resilience planning.

Duty to disclose? Are you more exposed knowing climate risks (and not sharing) or not knowing risks?
People are already starting to evaluate your climate risk and resilience.
Getting started with a climate risk analysis

- What geographic locations present the highest risk?

- Risk is physical and transitional
  - Financial impact of extreme weather event
  - Ability to sell asset at end of hold cycle

- What else is in my risk assessment?
  - Ability and cost of asset to reduce risk through resilient design/retrofit
  - Likelihood public sector will invest in resilience to reduce my event risk
  - Likelihood that insurance will change during my hold cycle
Assessment and mitigation? **Don’t do this**

- **Over-react:**
  - Leave all coasts immediately
  - Invest in hardening assets at any cost
  - Pull back on real estate investment altogether

- **Under-react:**
  - Avoid assessing risk because it’s “not material” during your hold cycle
  - Avoid talking with insurers and other stakeholders because you are worried they will over-react

- **Think about the following:**
  - Better to do this alone (then share with stakeholders) or do it together?
  - Better to be quiet (assess, mitigate, engage) or loud (alert, work to get public sector and markets to price it better, then fix it)?
Investing today with a focus on tomorrow.

Our investment process is guided by **Environmental, Social and Governance (ESG)** principles. We seek to influence and improve the world in which we live and work, while delivering the investment outcomes our investors require.
Climate Risks Make Location Even More Relevant

Gateway Cities Especially Exposed to Climate Risk
Rising Sea Levels Pose Risk to Institutional Real Estate Investment

TOP 50 NPI METRO AREAS AND DEGREE OF SEA-LEVEL RISE RISK

67% of NCREIF Property Index value, or $360 billion, is in metro areas whose primary cities are among the 20% most exposed to sea-level rise in the United States.

Source: Heitman and ULI, with analytical support from Four Twenty Seven.
How Sustainable is Your Property if You Can’t Get to It?

Sustainability vs. Resiliency
Findings from existing literature, interviews with 25 investors and investment managers, and case studies of a range of practices and activities taking place across the industry.
Potential Risk Impacts on Real Estate

**Types of Climate Risk and Their Potential Impact on Real Estate**

<table>
<thead>
<tr>
<th>Category</th>
<th>Potential Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Risks</strong></td>
<td></td>
</tr>
<tr>
<td>Catastrophic events</td>
<td>- Costs to repair or replace damaged or destroyed assets, value impairment</td>
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<tr>
<td></td>
<td>- Property downtime and business disruption</td>
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<tr>
<td></td>
<td>- Potential for increased insurance costs or reduced insurance availability</td>
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<tr>
<td>Changes in weather patterns</td>
<td>- Increased wear and tear on or damage to buildings, leading to increasing maintenance costs</td>
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<tr>
<td></td>
<td>- Increased operating costs due to need for more, or alternative resources (energy and/or water) to operate a building</td>
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<td>- Cost of investment in adaptation measures, such as elevating buildings or incorporating additional cooling methods</td>
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<tr>
<td></td>
<td>- Potential for increased damages from catastrophic events</td>
</tr>
<tr>
<td></td>
<td>- Potential for increased insurance costs or reduced insurance availability</td>
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</table>

| **Market**           |                                                                                  |
|                      | - Reduced economic activity in vulnerable markets                                |
|                      | - Reduced occupier demand for properties                                         |
|                      | - Reduced asset value                                                            |
|                      | - Potential for increased real estate taxes                                      |

| **Policy and Regulation** |                                                                                  |
|                          | - Increased cost of doing business due to new disclosure requirements and compliance measures |
|                          | - Increased taxes—both those resulting from public policies such as carbon taxes and those for funding adaptation infrastructure |
|                          | - Loss of subsidies or other funding opportunities                               |
|                          | - Additional capital investment to comply with stricter regulation               |

| **Resource availability** |                                                                                  |
|                          | - Increased costs and reduced net operating income due to higher prices for water and energy |
|                          | - Additional capital expenditures to adapt buildings to operate with reduced/alternative resources |

| **Reputation and market position** |                                                                                  |
|                                   | - Risk to company brand and reputation if no action taken                        |
|                                   | - Lower liquidity and/or reduced attractiveness of assets that have not incorporated climate mitigation |

**Climate Risks**

- Physical risks
  - Catastrophic events
  - Changes in weather patterns

- Transition risks
  - Market
  - Policy and regulation
  - Resource availability
  - Reputation and market position
Is Climate-Related Risk Covered By Insurance?

Mismatch: 1-year insurance horizon vs. 5- to 20-year investment horizon
A NCREIF and National Hurricane Center study found that, for all property types, a hurricane decreased values by almost 6% one year after the storm hit, and by 10.5% after two years.
Dangers Range from Event Risks to Long-Term Existential Threats

- Physical Damage
- Insurance Premium Repricing
- Tax Increases to Fund Infrastructure
- Investment Liquidity Reduced
- Economic & Demographic Damage
- Abandonment of Riskiest/Least-Resilient Locations
Screening Heitman’s Portfolio with Big Data Through 427

PROPERTY RISK SCREENING

Heitman screens new acquisitions and assets under management on climate and environmental locational risks through Four Twenty Seven.

Each asset receives a score between 0-100 for each of the following risks:
- Flood
- Hurricanes / Typhoons
- Sea-level rise
- Water stress
- Heat stress
- Earthquakes
- Wildfires (2019)
Underwriting for Climate Risk in the Investment Process

**Initial Review**

Identify climate risk exposure, insurance premiums, and real estate taxes

**Due Diligence**

For high risk, additional climate analysis and property assessment for capital expenses

**Residual Value / Disposition**

Higher sensitivity for at-risk properties, and upon exit, potentially a limited buyer pool/less demand
Climate risks can cause increased investment by landlord and potentially decreased demand from investors and tenants.

**PHYSICAL RISKS**
- Earthquake
- Hurricane
- Flood
- Wildfires
- Storm surge/sea-level rise
- Heat stress
- Water stress

**TRANSITION RISKS**
- Capital Markets
  - Reduced investor interest
- Rental Revenue
  - Reduced occupier demand
- Operating Expenses
  - Increased operating expenses (maintenance and resource costs)
  - Increased insurance
  - Increased real estate taxes
- Capital Improvements
  - Increased capital expenditures

**APARTMENT FINANCIALS**

<table>
<thead>
<tr>
<th>+</th>
<th>Residential Rental Revenue</th>
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<tbody>
<tr>
<td>- Landlord</td>
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<tr>
<td>Operating Expenses</td>
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<td>Insurance</td>
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<td>Real Estate Taxes</td>
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<td>Capital Improvements</td>
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| = | Apartment Cash Flow |
Climate Change Considerations for Real Estate

Lisa Dickson, PG
Resilience Leader, Americas
The 10,000 Year Hall Pass

source: Petit, et al., 1999
In general:
Wet places get wetter and dry places get drier
BUT
Not evenly throughout the year…

From NCA 2018
Temperature Projections

From NCA 2018

Sources: Arup; Climate Ready Boston 2016 & Weathershift
Polar Vortex – Extreme Cold

Air pressure and winds around the Arctic switch between these two phases (Arctic Oscillation) and contribute to winter weather patterns.
The Economics of Climate Change

Cost to US GDP
$3.9 trillion by 2025

Lost Business Sales
$7 trillion by 2025

Lost Jobs
2.5 million jobs in 2025

Cost to Families
$3,400 per year

Globally:
$54 trillion in damages as early as 2040

Sources: NOAA; ASCE; IPCC
Projected Climate Migration within the US by 2100

Top ten outflow states

- Florida
- Texas
- New York
- California
- Louisiana
- New Jersey
- North Carolina
- Georgia
- Massachusetts
- South Carolina
- Virginia

From M. Hauer, 2017. Nature Climate Change 7(5). DOI: 10.1038/nclimate3271
Economic Impacts of Climate Change (2080-2099)

Hsiang, Kopp, Jina, Rising, et al. (2017)
Direct Physical Impacts

All elevations are assumed to be in Boston City Base

- 2070 0.1% (23’-0”)
- 2070 1% (21’-6”)
- BPDA 1’ freeboard (20’-4”)
- 2030 1% (19’-6”)
- BPDA SLR-BFE (19’-4”)
- FEMA BFE (17’-6”)

Include recent flood events

All elevations are assumed to be in Boston City Base
"Outside the Fence" Vulnerabilities

Flooding and Transportation Systems

Telecommunications
What is the ROI of preparing for extreme weather?

- $1 invested in building resilience and reducing exposure saves $4 in disaster response and recovery
- $1 invested in resilience saves $4-7 in response and $5-10 in avoided economic losses
- $1 on disaster risk reduction saves $7 in response activities
- $1 on disaster preparedness saves $7-10 on response

Overall ROI equals $3-15 per dollar invested over a 30 year period.
The upfront costs of resilience

1. Planting and retaining walls act as protective reef against storm surge
2. Ground floor and top of parking set at 19'-0", above high flood level
3. Critical patient programs located above ground floor
4. Operable windows keyed open in event of systems failure
5. Mechanical, electrical and emergency services located within enclosed penthouse out of harm’s way.

Credit: Perkins + Will and Partners Healthcare
Climate gentrification and the role of flood insurance in South Florida

CCIM-ULI Webinar

John W. Rollins, FCAS, MAA
Consulting Actuary, Milliman
What is “climate gentrification”? And what does it mean for local economies, families, and community leaders?

- Potential migration from low-lying but socioeconomically affluent areas to areas of higher elevation but greater socioeconomic challenges
- Homeowners make long-term commitments to property ownership to raise families, build wealth, and set social roots
- But the same homeowners are increasingly aware of climate-related changes in physical hazard, such as sea level rise and increased tropical storm precipitation, that manifest in unpredictable increases in flood and storm surge risk in South Florida
- Key questions for leaders and planners:
  1. How might hazard increases affect the desirability of living in various communities in a metropolitan area?
  2. Does insurance play a role, and what incentives does it create?
  3. How do we manage the socioeconomic impact of these trends?
Defining the risk
South Florida is one of many “climate crucibles” in the U.S.

Multiple challenges set up the region for potential gentrification

Key elements of a climate crucible:

• A mostly urban, highly populated area
• A wide range of income levels
• An area with well-mapped local hazards (e.g. floods from rainfall and storm surge)
• An area seeing a documented increase in hazard due to climate (e.g. sea level rise)

Climate-adjusted hazard risk is a huge problem, so leaders should systematically define and prioritize the crucibles, says Milliman in http://www.milliman.com/insight/2019/Climate-gentrification-and--the-role-of-flood-insurance/
How variable are regional socioeconomics and flood risk?

A quadrant framework helps think about the various household risk profiles

Four approximate profiles defined by Milliman:

- **Stable** areas are Census Block Groups that are not in the bottom 25% of household income for the region, and do not have the majority of land area inundated in a flood with a 1% annual chance in a scientifically plausible sea level rise risk scenario for the year 2050, as defined by our collaborator*.

- **Emigrating** areas have higher incomes like the Stable areas, but will be inundated in the same climate-adjusted flood scenario.

- **Destination** areas stay dry in the climate-adjusted flood, but have incomes in the bottom 25%.

- **Crisis** areas will be inundated in the climate-adjusted flood scenario, AND have lower incomes.

* We worked with *Jupiter Intelligence* on this project.
Examining the risk profile of South Florida
Building the quadrants and study data sets
Inundation and income were combined, then assets were placed in quadrants

- Climate-adjusted future inundation from 1% annual flood
- Census block groups with incomes in bottom/other quartiles
- Milliman Market Basket with 10% sample of insurable homes
How scattered are regional future hazard risk and impacts?

- A large swath of coastal, upscale communities and suburban neighborhoods may face incentives to migrate to more urban land closer to city centers.

- A collar of outer suburban communities are likely to be less affected.

- Several distinct pockets across the region are most at-risk and yet least able to adapt given their resources.
Implications for insurable value at risk
How many households and what assets are affected?
Milliman’s Market Baskets and Florida Hurricane Catastrophe Fund data help us estimate

<table>
<thead>
<tr>
<th>QUADRANT</th>
<th>OWNER-OCCUPIED HOUSEHOLDS</th>
<th>% OWNER-OCCUPIED HOUSEHOLDS</th>
<th>TOTAL INSURABLE VALUE AT RISK (BILLIONS)</th>
<th>% TOTAL INSURABLE VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable</td>
<td>153,718</td>
<td>45.8%</td>
<td>$33.232</td>
<td>48.0%</td>
</tr>
<tr>
<td>Emigrating</td>
<td>91,630</td>
<td>27.3%</td>
<td>$19.568</td>
<td>28.2%</td>
</tr>
<tr>
<td>Destination</td>
<td>50,654</td>
<td>15.1%</td>
<td>$9.189</td>
<td>13.3%</td>
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<tr>
<td>Crisis</td>
<td>39,444</td>
<td>11.8%</td>
<td>$7.314</td>
<td>10.6%</td>
</tr>
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</table>

- **Stable** areas are a plurality but not majority of both households and insurable home value.
- **Emigrating** areas are a significant population that may want to migrate either within the region or out of it altogether. They would likely migrate toward the Destination areas – how would that change those neighborhoods?
- **Destination** areas constitute a significant population and would need to adjust to the influx of residents.
- **Crisis** areas hold over 10% of the population, a large constituency in need of consideration by emergency managers, urban planners and community leaders.
Flood insurance costs and migration incentives
Would flood insurance costs affect incentives to migrate?

Milliman’s Market Baskets and Federal flood insurance (NFIP) rating plans can provide insight

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<th>% TIV</th>
<th>AVERAGE NFIP RATE (PER $1,000)</th>
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<td>153,718</td>
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<td>48.0%</td>
<td>2.12</td>
<td>2.69</td>
</tr>
<tr>
<td>Emigrating</td>
<td>91,630</td>
<td>27.3%</td>
<td>$19.568</td>
<td>28.2%</td>
<td>2.43</td>
<td>3.61</td>
</tr>
<tr>
<td>Destination</td>
<td>50,654</td>
<td>15.1%</td>
<td>$9.189</td>
<td>13.3%</td>
<td>3.02</td>
<td>3.15</td>
</tr>
<tr>
<td>Crisis</td>
<td>39,444</td>
<td>11.8%</td>
<td>$7.314</td>
<td>10.6%</td>
<td>3.82</td>
<td>4.20</td>
</tr>
</tbody>
</table>

- **Stable** areas have the lowest Federal flood insurance rates, not surprisingly.

- **Emigrating** areas have higher rates than Destination areas when limited to the maximum $250,000 of Federal flood coverage ($3.61 > $3.15)

  - *But relative to total home value, the relationship is reversed* ($2.43 < $3.02). Could the current NFIP rating plan, which does not consider insurance-to-value, provide the wrong incentives to high-income folks in risky areas in future climates?

- **Destination** areas pay on average more per unit of value for Federal flood insurance, even though they are in lower-risk areas under a future climate than the Emigrating quadrant.

- **Crisis** areas pay the highest rates for Federal flood insurance, which reflects the risk – but adds pressure to those with already limited incomes, who may struggle to invest in mitigation or migration to adapt to a potentially changing climate.
Going forward
The insurance market is (slowly) adapting to local risk trends

- Many states, led by Florida, are encouraging private flood insurance
  - Broader coverage than NFIP to facilitate recovery
  - Reflects insurance to value and better aligns risk signals with socioeconomic incentives
  - Reflects hyper-local data to distinguish views of risk for stakeholders and policyholders
  - Prices can adjust more rapidly to latest science in a changing climate to keep incentives aligned

- Federal flood insurance pricing and coverage will be changing soon
  - FEMA’s Risk Rating Redesign project will roll out new rate plan, slated for 2020
Technology is bringing climate science directly to consumers

- “Insurtechs” are targeting individual buying decisions with climate-adjusted risk data – will real estate follow?
  - Risk maps, current and climate-adjusted, being delivered by Jupiter and other firms on demand
  - Property risk data developed by algorithm (e.g. first floor height from street view imagery) being delivered for individual smartphone quotes
  - Milliman PinPoint™ is assimilating customized, relevant geographic data for underwriters and insurtechs at point of quote

- Public leaders must adapt to a world where homeowners know more than ever about current and future hazard
Thank You

Presenters’ Information:

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