

# SRE Economics Lecture 7

## Climate and Real Estate (3)

### Topical discussions

Siqi Zheng

March 2023

(MIT Center for Real Estate)

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# Outline

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- Climate risks in commercial real estate markets
- Insurance market crisis
- Climate resiliency investments in coastal areas

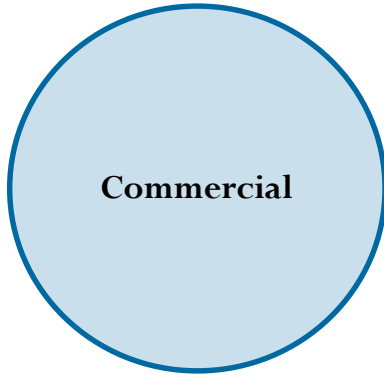
# CLIMATE RISKS IN COMMERCIAL REAL ESTATE MARKETS

# Commercial Real Estate vs. Residential

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Commercial  
Real Estate

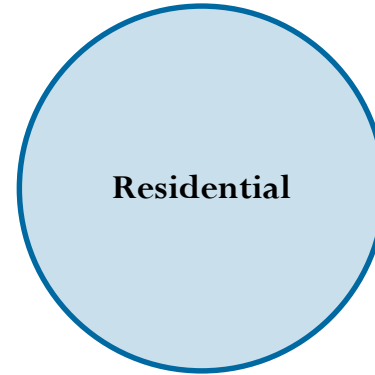


**Commercial**

Common ground

- Physical damage
- Increased insurance costs
- Reduced demand

.....



**Residential**



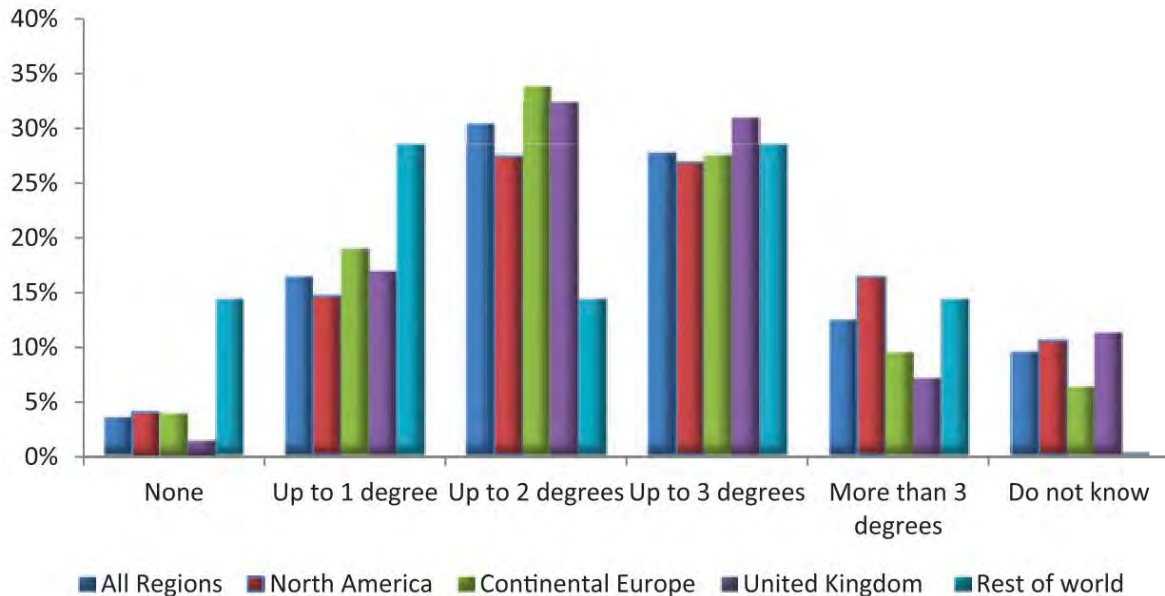
Residential  
Real Estate

**What are the  
differences?**

# 1. CRE: more sophisticated investors

Survey of 439 executive about about the role of climate risks for their institutions

Expectations of Institutional Investors for the global temperature rise by the end of this century



Source: Krueger, P., Sautner, Z. and Starks, L.T., 2020. The importance of climate risks for institutional investors. *The Review of Financial Studies*, 33(3), pp.1067-1111. © Krueger et al. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <https://ocw.mit.edu/help/faq-fair-use/>.

CITYLAB

# Real Estate Investors Want to Know What Cities Are Doing About Climate Risks

The real estate industry is increasingly looking at how resilient communities are to natural disasters before deciding whether to buy or develop land.

Morgan Stanley

Our Insights

## How to Tackle Climate Change in Your Portfolio

BlackRock

Funds

Investment strategies

Insights & education

About us

GLOBAL INSIGHTS

# Getting physical: assessing climate risks

## 2. CRE: Corporation Image and Fiduciary Responsibility

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### BlackRock to Hold Companies and Itself to Higher Standards on Climate Risk

World's largest asset manager to take tougher stance against corporations that aren't providing a full accounting of climate change risks

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- The U.S. Rejoins the Paris Climate Accord: What's Next.
- Biden Unveils Plan to Curb Covid-19 in His First 100 Days.

## Navigating the Transition: Managing Climate Risks and Opportunities

Morgan Stanley's Task Force on Climate-related Financial Disclosures  
Report, 2020

### From Our CEO

Our world faces great uncertainty as the impacts of a global pandemic, changing climate and growing inequalities unfold simultaneously. Against this backdrop, it is increasingly clear that business must engage, not stand apart from, the pressing environmental and societal issues facing us all.



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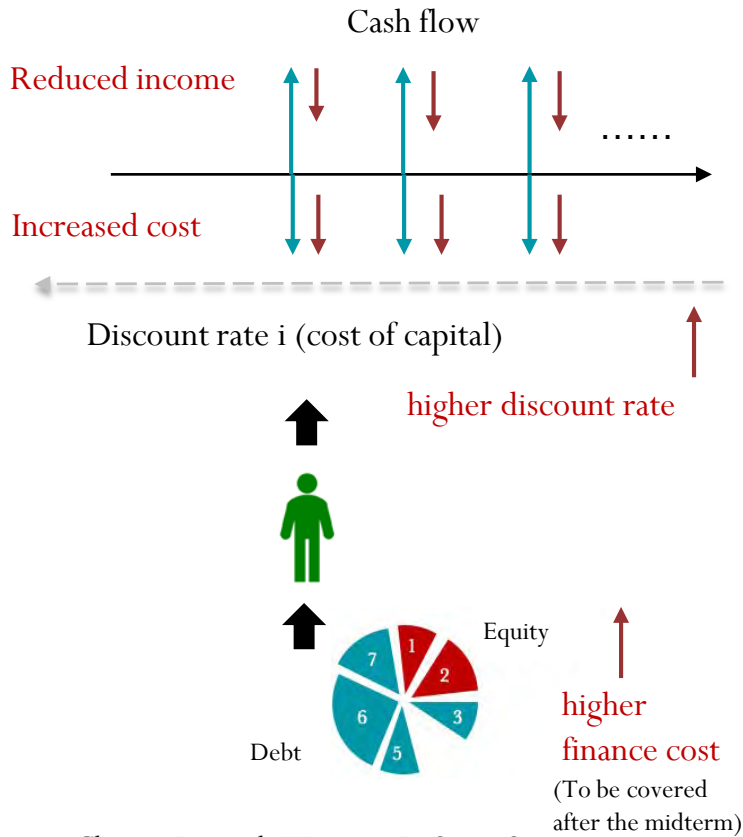
### 3. CRE: Higher Regulatory and Industry Standard Bars



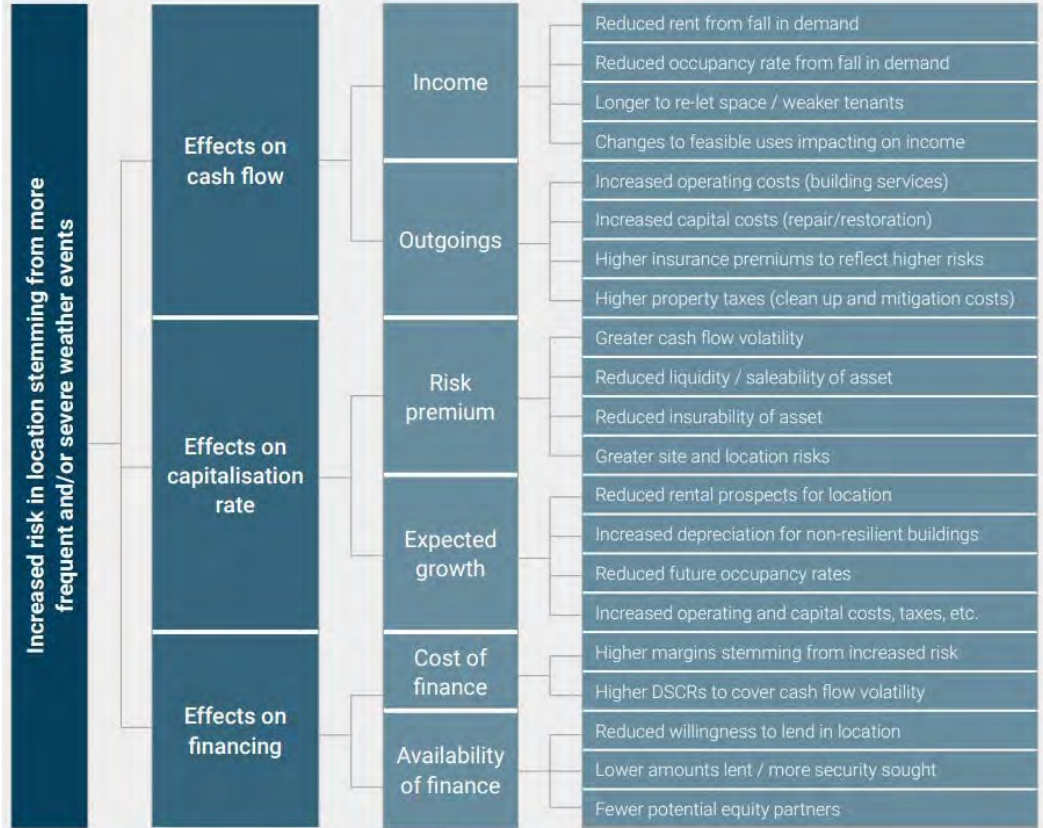
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**Figure: Anticipated effects on commercial real estate asset performance of increased exposure to climate risk**



Developed with reference to de Wilde and Coley (2011)

Source: Clayton, J., van de Wetering, J., Sayce, S., & Devaney, S. (2021). Climate Risk and commercial property values: a review and analysis of the literature.<sup>9</sup>

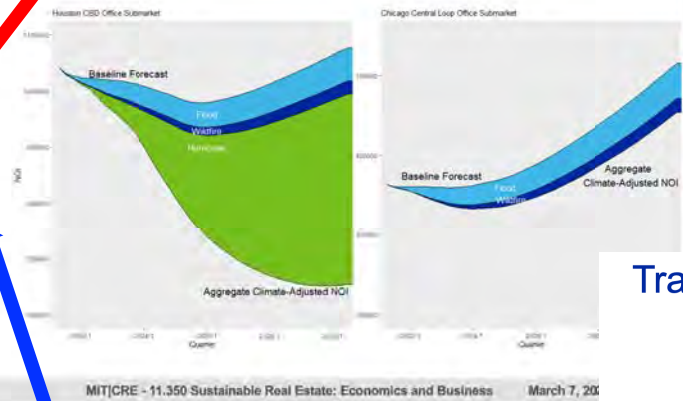
# MIT/CRE + Moody's Analytics

## Using Measured Impact + Expected Increase of Hazards to Model NOI

We adjust our baseline forecast for each submarket accounting for:

MIT/CRE expertise!

- Disaster impact (derived from empirical analysis)
- Event likelihood (derived from our climate hazard risk scores)



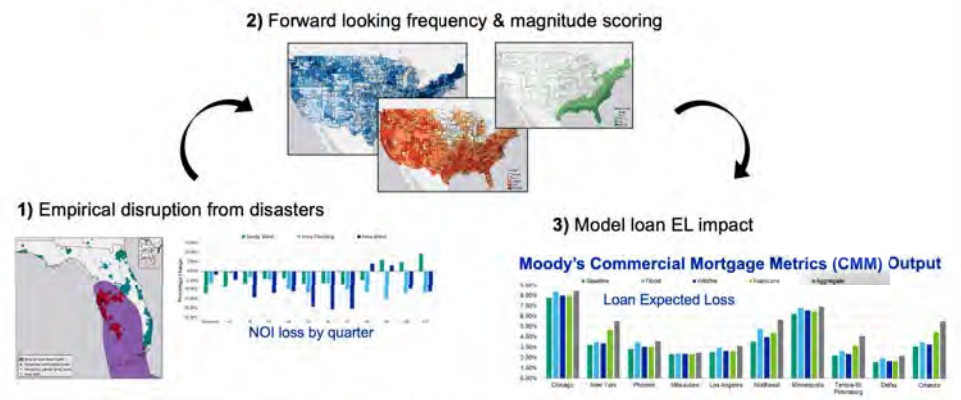
The analysis is available through Moody's CMM (Commercial Mortgage Metrics)

Source: Moody's Analytics CRE  
MOODY'S ANALYTICS

MIT|CRE - 11.350 Sustainable Real Estate: Economics and Business March 7, 2023

MIT climate scientists' expertise!

## Translate NOI Impact to Loan EL



Source: Moody's Analytics CRE (output from Commercial Mortgage Metrics CRE loan risk model)

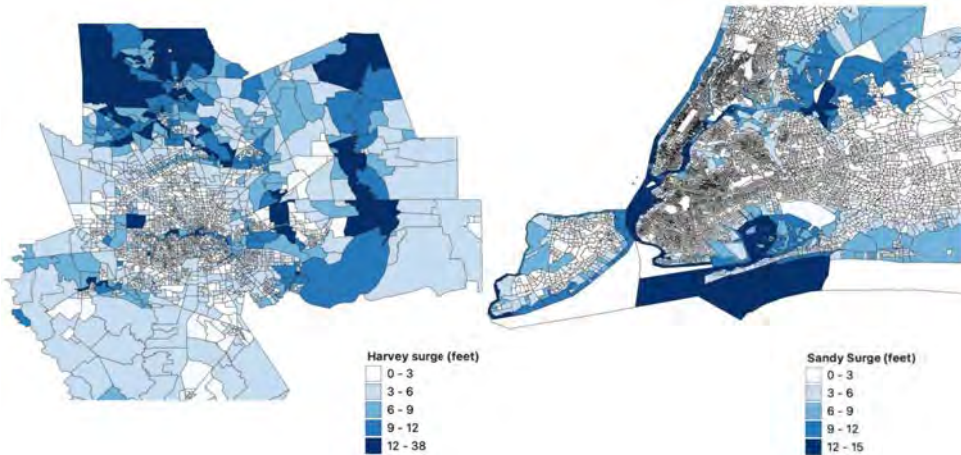
MOODY'S ANALYTICS

MIT|CRE - 11.350 Sustainable Real Estate: Economics and Business

March 7, 2023 14

# Siqi's Research: Hurricane and CRE

- Quantifying the Impacts of Climate Shocks in Commercial Real Estate Markets (Hurricane Sandy, 2012; Hurricane Harvey, 2017)
- Authors: Rogier Holtermans, University of Guelph; Dongxiao Niu, Maastricht University; Siqi Zheng, MIT



Notes: This Figure shows the surge level of inundation area by Census block group in Texas and New York, with a focus on Houston and New York City. The blue shades indicate surge level (feet).

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- Commercial real estate transactions (Real Capital Analytics)  
New York 2007-2017 and Texas, 2012-2021  
Transaction date, price, location, property type, quality, buyer and seller characteristics, etc.
- Hurricanes (3-meter surge map from FEMA Modeling Task Force)

Final sample: 10,359 transactions in New York and 15,312 in Texas State

# Siqi's Research: Hurricane and CRE

- DID model using hurricanes as a climate shock (Ortega and Taşpınar, 2018; Gibson and Mullins, 2020, Meltzer et al., 2021)

Property damage measure (i) surge dummy; (ii) average surge level (feet) at census block level; (iii) high surge (>3 feet) and low surge dummies

$$Price_{it} = \alpha_0 + \alpha_1 * Post_t + \alpha_2 * Surge_i + \alpha_3 * Surge_i * post + \beta * Hedonic_{sit} + T_t + \sigma_c + \mu_{ict}$$

Property transaction price per sq. ft. for property i at time t

=1 if the transaction happened after the specific hurricane (Aug 2017 for TX and Oct 2012 for NY)

- Hedonics: property types, building attributes, such as age, size, number of stories, building quality, etc.
- Year-quarter time trends, Census tract fixed effects

# Baseline results – decrease in transaction price

	Dependent Variable: Log (Price/sq. ft.)					
	Texas			New York		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post</i>	-0.028 (0.049)	-0.040 (0.048)	-0.029 (0.048)	0.595*** (0.033)	0.594*** (0.033)	0.595*** (0.033)
<i>Surge dummy</i>	-0.093** (0.040)			0.043* (0.025)		
<i>Post × Surge dummy</i>	-0.033* (0.017)			-0.009 (0.021)		
<i>Mean surge</i>		0.026** (0.010)			0.004 (0.010)	
<i>Post × Mean surge</i>		-0.035*** (0.008)	<b>\$4.41/sq. ft</b> <b>\$311,500/building</b>		-0.015* (0.008)	<b>\$5.49/sq. ft</b> <b>\$100,335/building</b>
<i>High Surge</i>			-0.052 (0.042)			0.010 (0.033)
<i>Low Surge</i>			-0.143*** (0.043)			0.057* (0.031)
<i>Post × High Surge</i>			-0.088*** (0.022)			-0.033 (0.029)
<i>Post × Low Surge</i>			0.028 (0.023)			0.013 (0.028)
Observations	15,312	15,312	15,312	10,359	10,359	10,359
R <sup>2</sup>	0.703	0.703	0.703	0.912	0.912	0.912

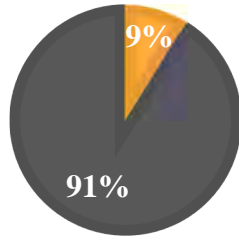
Notes: Standard errors are reported in brackets. Significance at the 0.10, 0.05, and 0.01 level is indicated by \*, \*\*, and \*\*\*.

# Heterogeneity: Place – Price of *New news*

**Inconsistency** between ex ante information on underlying climate risk and ex post damage from actual events

## INUNDATED AREA

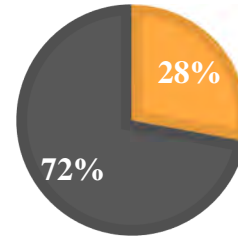
■ FEMA floodplain ■ Non floodplain



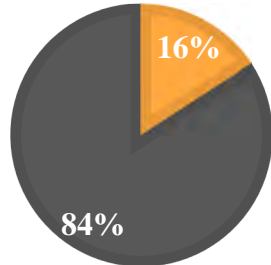
Texas

## OFF-FLOODPLAIN

■ Inundation ■ No inundation

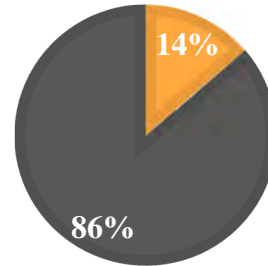


■ FEMA floodplain ■ Non floodplain



New York

■ Inundation ■ No inundation



# Heterogeneity: Place – Price of *New news*

- Hurricane discount mainly observed outside of flood zones (New news can be costly).
- Investors already capitalize flood risks into their asset value based on the flood zone designation.

	Dependent Variable: Log (Price/sq. ft.)							
	Texas				New York			
	Inside- zone (1)	Outside- zone (2)	<500m (3)	<1000m (4)	Inside- zone (5)	Outside- zone (6)	<500m (7)	<1000m (8)
Post	0.064 (0.202)	-0.020 (0.054)	-0.058 (0.080)	-0.062 (0.062)	0.853*** (0.228)	0.608*** (0.033)	0.698*** (0.054)	0.628*** (0.040)
Mean Surge	0.290** (0.117)	0.033* (0.018)	0.040* (0.024)	0.039** (0.020)	-0.127 (0.083)	0.010 (0.010)	0.018 (0.012)	0.013 (0.010)
Post × Mean Surge	-0.019 (0.029)	-0.042*** (0.010)	-0.041*** (0.013)	-0.039*** (0.011)	-0.020 (0.044)	-0.011 (0.008)	-0.023** (0.010)	-0.018** (0.009)
Hedonic attributes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Tract FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,313	6,582	10,184	11,575	312	10,809	3,448	6,518
15 R <sup>2</sup>	0.811	0.741	0.731	0.724	0.937	0.915	0.905	0.910

Notes: Standard errors are reported in brackets. Significance at the 0.10, 0.05, and 0.01 level is indicated by \*, \*\*, and \*\*\*.

# Hurricane and CRE

- Proximity (to coast, elevation) lowers commercial real estate price after Hurricane Sandy
  - New York directly hit by Sandy and damaged
  - Boston spared by Sandy but at risk
  - Chicago unaffected due to in-land waterfront location

	Main Effect		
	New York (1)	Boston (2)	Chicago (3)
<i>Proximity</i>	-0.216*** (-2.579)	-0.095*** (-3.346)	-0.004 (-0.082)
<i>Flood Zone</i>	-0.434*** (-2.697)	0.175* (1.730)	-0.687** (-2.448)
<i>Local Establishments</i>	-0.157 (-0.149)	1.739 (1.362)	0.781 (0.762)
Year-Fixed Effects	Yes	Yes	Yes
Zip Code-Fixed Effects	Yes	Yes	Yes
Observations	2,216	1,394	951
Adj. R-squared	0.190	0.200	0.286

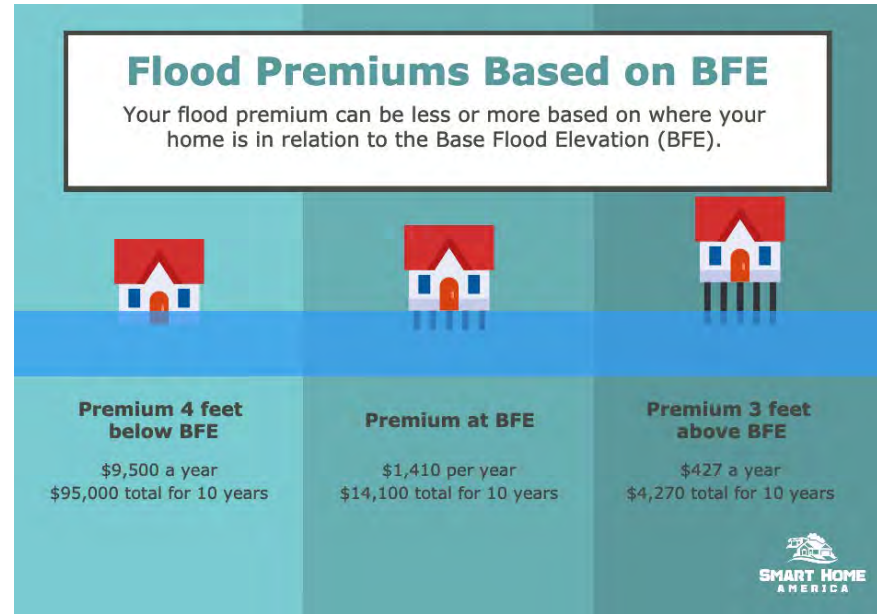


# INSURANCE MARKET CRISIS

# The National Flood Insurance Program (NFIP)

## Introduction to the NFIP program.

- Insurance rate is determined by the location of your property with respect to the **flood zones**.
- Homeowners can reduce the insurance premium by **elevating the building** (example presented on the right).



Note: Calculation based on \$250,000 building coverage only (does not include content). AE (high to moderate) zone, single-family, one-story structure without a basement. The calculation is based on standard NFIP deductible.

# The National Flood Insurance Program (NFIP)

## Introduction to the NFIP program.

- Other mitigation efforts: Example of a New York building ([link](#))

### Mitigating properties against flooding can significantly reduce flood risk and insurance premiums



The average annual premium drops from **\$10,500** to **\$600** for structure elevation



The average annual premium drops from **\$4,400** to **\$820** for basement infill



The average annual premium drops from **\$4,000** to **\$3,300** for raising machinery & equipment



The average annual premium drops from **\$2,900** to **\$1,400** for installing flood vents

# Can we insure against Climate Risk?

Discussion about the possibility of owners to insure properties against climate change.

- The prevailing strategy among real estate investors to use insurance as their primary means to protect their properties against extreme weather and climate events (ULI & Heitman, 2020).
- The number of disasters is growing, and the losses for insurance companies are also growing
  - The basic economics of insurance companies is to stabilize income: transfer money from good times (no disaster) to bad times (disaster period)
  - The increase in frequency and severity of disasters challenges the traditional business model. Consequences: Rise premiums and rise in number of uninsured properties.

Source: Swiss re (2020) Natural catastrophes in times of economic accumulation and climate change

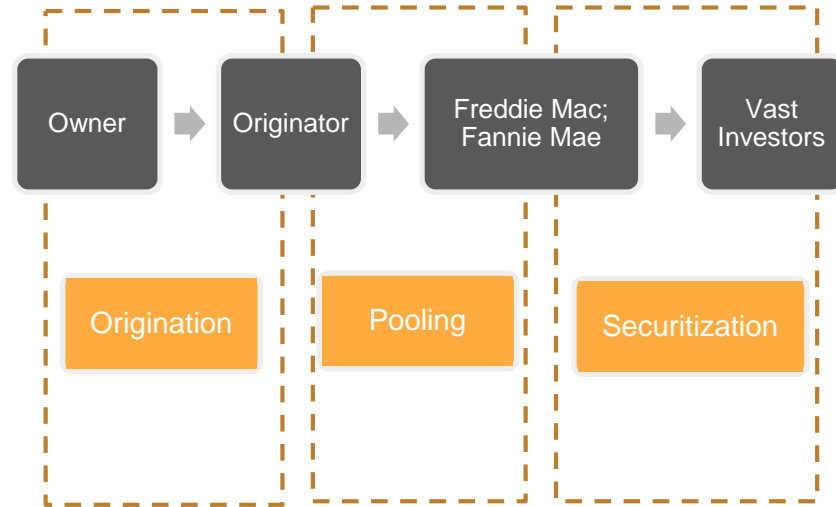
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# Climate Risks in Mortgage Markets

What is the impact on Freddie Mac and Fannie Mae; and also the problem of information asymmetry

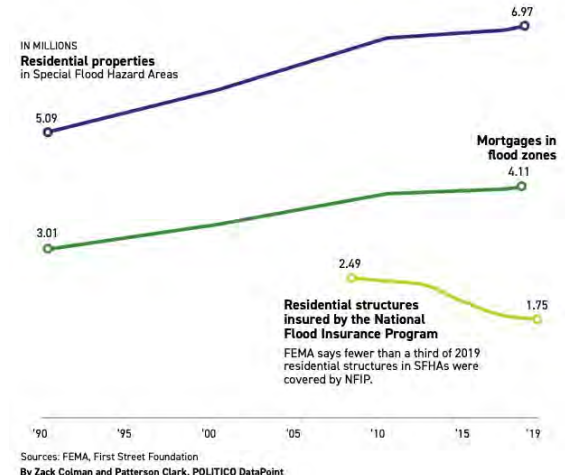
- Hurricane Harvey resulted in significant home price discounts inside the 100-year floodplain.
  - Before Harvey, homes inside the flood zone in Harris County, which is home to Houston, sold for 2.3 percent less than those outside the area. After Harvey hit, that discount more than doubled to 5.5 percent.
- Fannie Mae and Freddie Mac, the government-sponsored, taxpayer-backed enterprises that stand behind roughly half of the nation's \$11 trillion in residential mortgages.
- However FMs don't price differently loans with and without climate risk in the finance houses
  - Pricing those risks is likely to introduce discrimination into the housing markets, and compromise social justice since minorities are overly exposed to certain climate risks



# Climate change threatens U.S. mortgage market

## Are we creating a new housing bubble?

- Fannie and Freddie rely on another government enterprise, the National Flood Insurance Program (NFIP), to cover the cost of flood damage to homes with their mortgages. But the flood insurance program itself is insolvent after years of paying out more than it collects.
- Homes in flood plains are **overvalued** by **\$34 billion** because homebuyers don't fully price in the high risk of climate-related disasters.
- Mortgage in floodplains are rising steadily from 2006 onwards:
  - Nearly 600,000 houses were built in 100-year floodplains, bringing to 7 million homes
  - 300,000 mortgages were added to homes in floodplains, bringing the total number of loans to 4.1 million.
- However, insurance policies in floodplains shrunk: 2.5 million residential structures insured in 2008. Which had fallen to fewer than 1.8 million in 2019.



# SUL Research: Climate Risk and Appraisal Values

How climate risks lead to mis-valuation of single-family homes in climate-vulnerable neighborhoods in the appraisal process



## Data:

1. Appraisal record and transaction record
2. Climate risk/shocks data
3. Regulatory and socio-economic data

- **Step 1:** comparing the appraisal value of homes under high climate risk with homes with low risk and otherwise similar attributes. By comparing the “climate risk discount” in the appraisal value and in the transaction value, we can examine how climate risks affect the deviation of appraisal value to the transaction value, i.e., **appraisal bias**.
- **Step 2:** studying the heterogeneity in the appraisal value difference regarding information provision, actual climate shocks, and neighborhood attributes.

Team: Siqi Zheng (MIT), Nils Kok (UM), Juan Palacios (MIT/UM), Dongxiao Niu (UM)

# Low Take-up of Flood Insurance

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**The New York Times**

## **Hurricane Ian's Toll Is Severe. Lack of Insurance Will Make It Worse.**

In Florida's hardest-hit counties, fewer than 1 in 5 homes have flood insurance. That means communities will struggle to rebuild, experts warn.





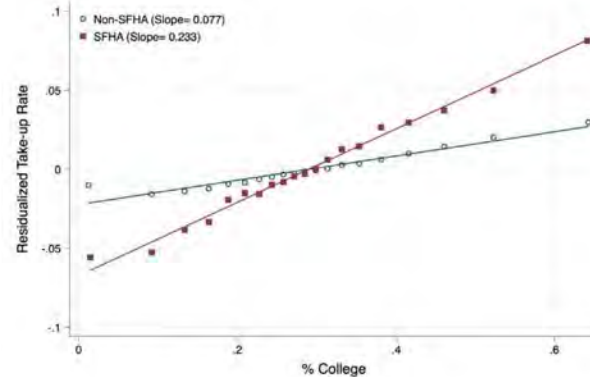
# Low Take-up of Flood Insurance

## Low take-up rate and inequality.

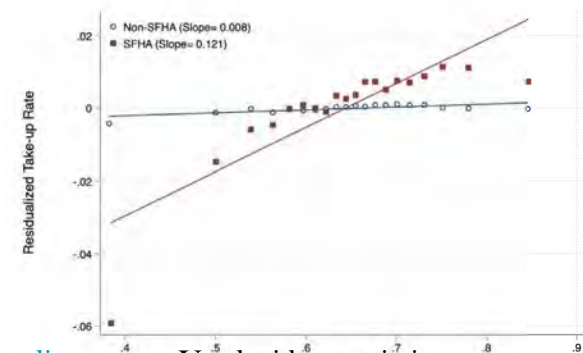
- Low insurance take-up: Only **20%**, among the households flooded in New York City during Hurricane Sandy and in the greater Houston area during Hurricane Harvey.
- Higher take-up rate for **highly educated** group and for people getting **mortgage** within the Special Flood Hazard Area (SFHA, “flood zone”).
- Problems beyond low take-up: NFIP uses broad, outdated, and inaccurate flood zone designation
  - Adverse selection: High-risk households get insured.
  - Rainfall-related flood risks are not considered.  
→ 1/3 of flood claims are out of the SFHA

Source: Bradt, J. T., Kousky, C., & Wing, O. E. J. (2021). Voluntary purchases and adverse selection in the market for flood insurance. *Journal of Environmental Economics and Management*, 110, 102515.

(a) % Population with a College Degree



(d) % Households with Mortgage



# Insurance Market Regulation

“Risk Rating 2.0”: More accurate flood risk assessment and fairer price.

The New York Times

## *The Cost of Insuring Expensive Waterfront Homes Is About to Skyrocket*

New federal flood insurance rates that better reflect the real risks of climate change are coming. For some, premiums will rise sharply.

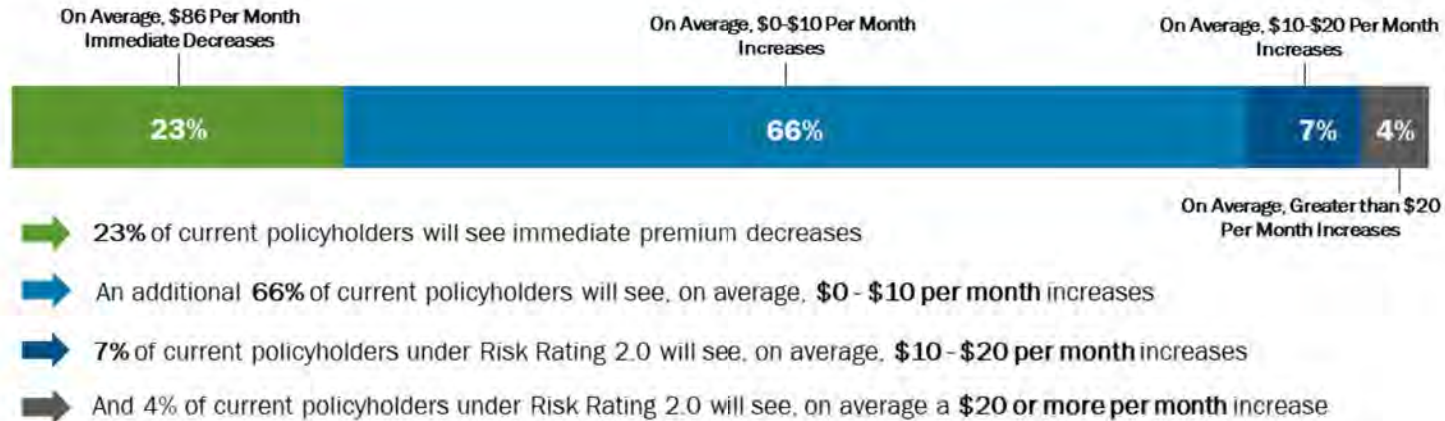


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# Insurance Market Regulation

“Risk Rating 2.0”: More accurate flood risk assessment and fairer price.

- Public flood insurance payouts in the US have increased **twentyfold** in the past two decades.
- High claims years beginning in 2005 and continuing with major storms in 2008, 2012, and 2017 have led the NFIP program to **carry a debt exceeding \$20 billion** despite Congressional approval for \$16 billion in debt forgiveness after Hurricane Harvey in 2017.
- Since October 1, 2021 (for new policies) or Apr 1, 2022 (for renew policies): “**Risk Rating 2.0**”
  - (1) Will reflect individual property’s flood risk;
  - (2) use the latest actuarial practices to set risk-based rates.



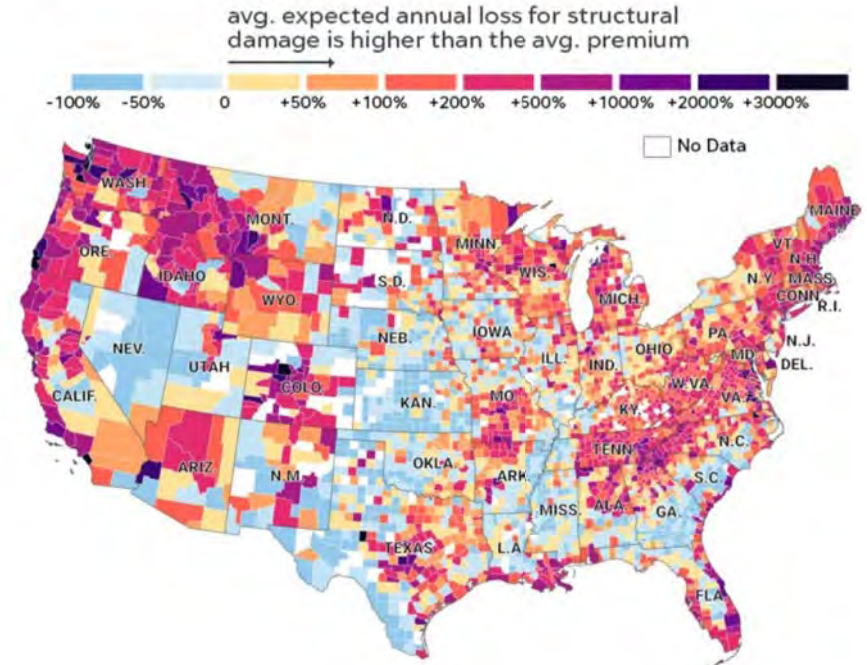
# Insurance Market Regulation

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“Risk Rating 2.0”: More accurate flood risk assessment and fairer price.

- A more accurate mapping of the actual flood risk for properties will create major shifts in pricing. (picture on the right shows the NFIP mispricing)
  - Largest gaps in the **Southeast and Mid-Atlantic regions** in places such as Florida, South Carolina and New Jersey.
- However, even a modest increase could prove difficult for **lower-income** communities.
  - Three hours to the southwest in Monongalia County, West Virginia, more than a fifth of households fall below the federal poverty level. The most severe flood-prone homes there would have to pay premiums 527% higher than today to cover the risk.

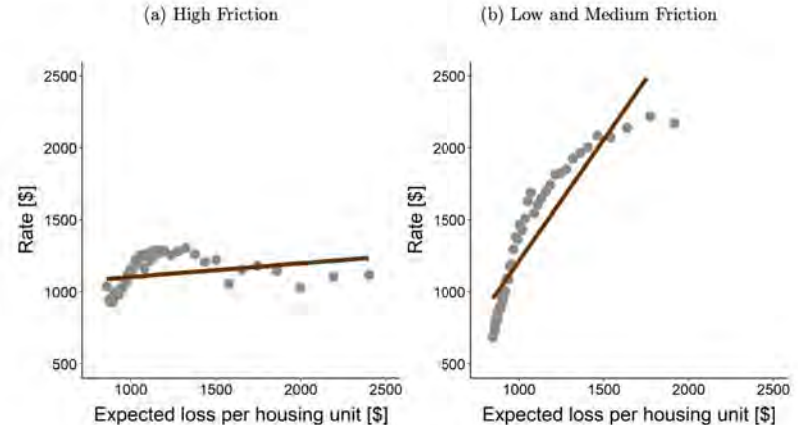
Estimated NFIP insurance premiums compared to economic risk for residential properties with substantial flood risk, 2021



# Insurance Market Regulation

Insurance rate regulations cause private insurance companies to leave.

- State regulations on insurance rate: Change premiums (rates) needs lengthy regulatory review and approval.
- Some regulators require home-insurance rates based on **historical loss experience**, not **projections of future losses** that are determined by catastrophe modeling.
- **“high friction”** drives the decoupling of insurance rates from underlying risks.
- Insurance companies are **leaving**:  
E.g., Insurance giants Chubb, Liberty Mutual, and AIG have announced plans to scale back their homeowner coverage in California, where they insist future climate-related losses will likely prevent them from turning a profit.



Public domain content courtesy of Federal Reserve Board.

Source 1: Oh, Sangmin S., Ishita Sen, and Ana-Maria Tenekedjjeva (2022). “Pricing of Climate Risk Insurance: Regulation and Cross-Subsidies,” Finance and Economics Discussion Series 2022-064.

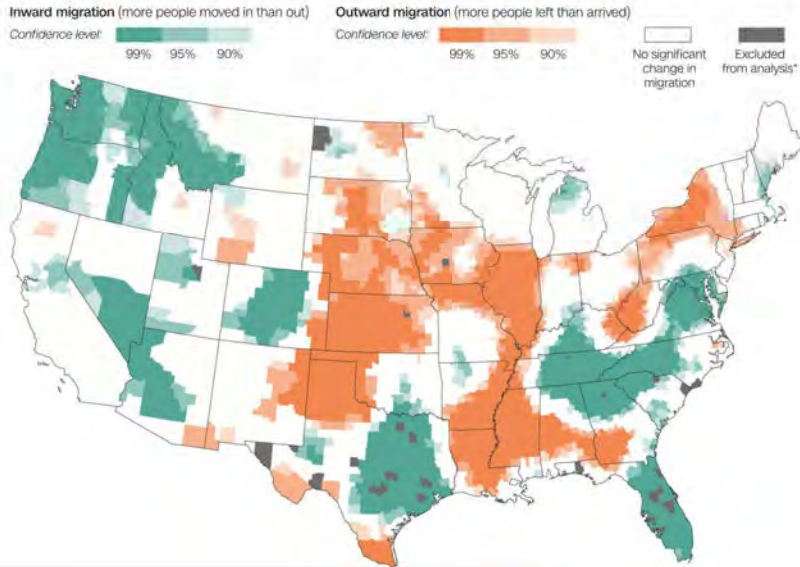
Source 2: <https://jacobin.com/2022/02/california-wildfires-home-insurance-coverage-fossil-fuel-industry>

# CLIMATE RESILIENCY INVESTMENTS IN COASTAL AREAS

# Expanding Coastal Population Escalates the Risk

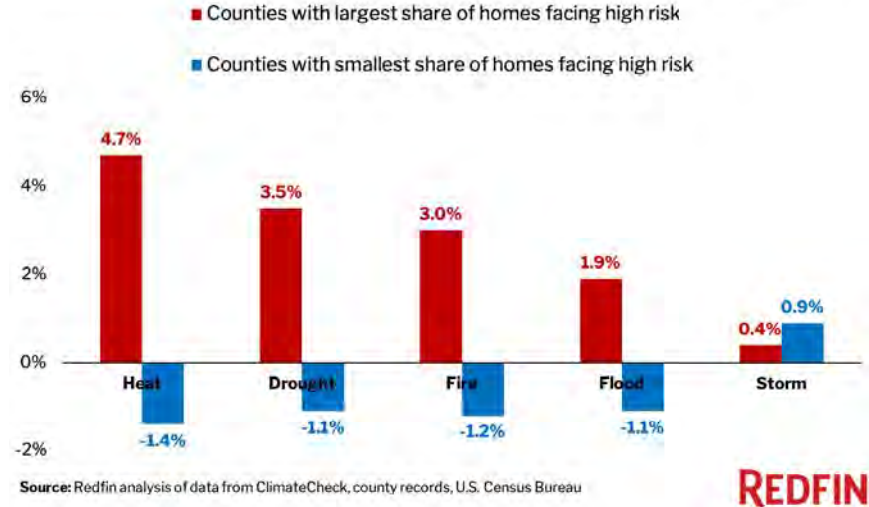
## Americans are moving into high-risk zones for wildfires, drought, hurricanes

Researchers at the University of Vermont analyzed how climate and natural hazards affected migration in the United States between 2010 and 2020. Their data shows that, in general, people moved away from areas affected by frequent heat waves, but toward areas that are prone to wildfires, drought and intense hurricanes.



## America's Climate-Endangered Areas Are Becoming More Populous

Population change due to net migration in counties with certain climate risks, 2016-2020



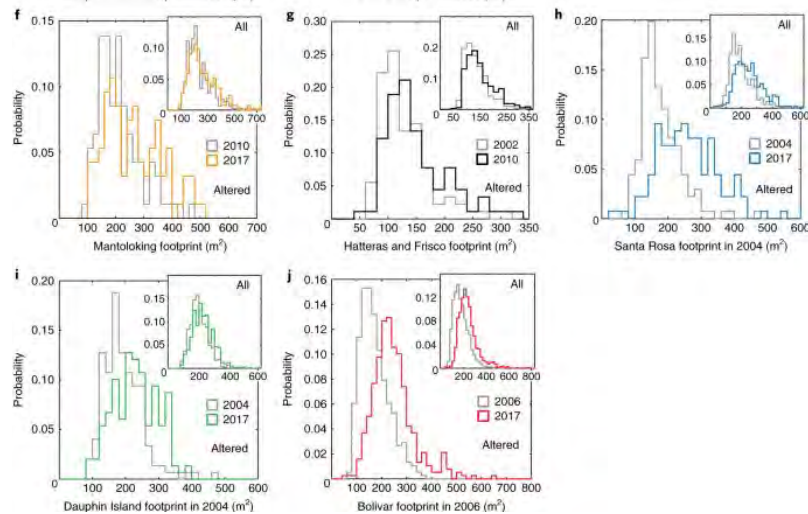
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# Building Back Bigger

Expanding coastal population escalates the risk.

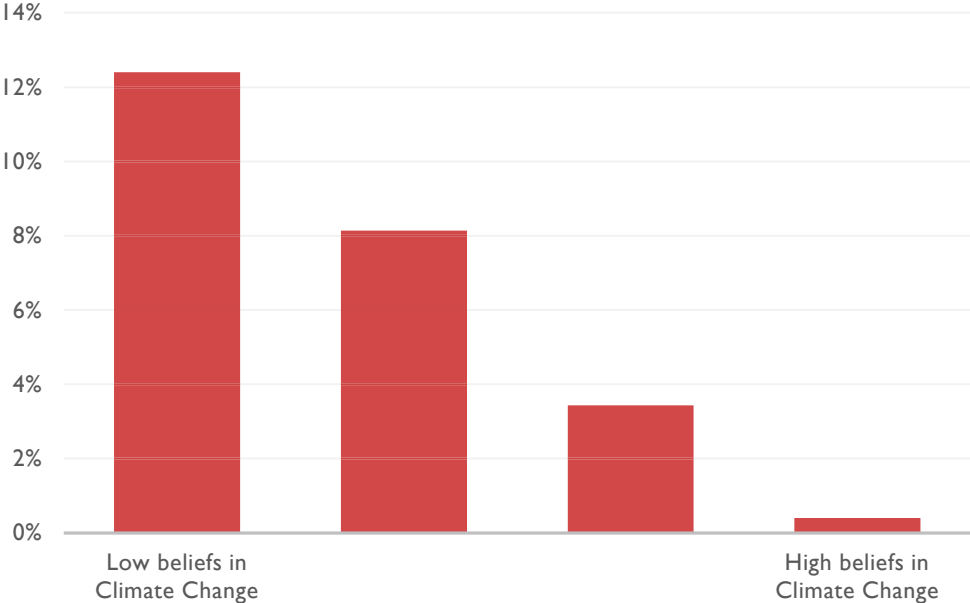
- Despite decades of regulatory efforts in the US, exposure of residential assets to hurricane damage is increasing.
- Comparing plan-view footprints of individual residential buildings before and long after major hurricane strikes, the authors find a systematic pattern of **'building back bigger'** among renovated and new properties.





# Developers Went to Locations with Low Climate Beliefs

Climate belief also plays a role.



# Climate Resiliency Investment Strategies

**BUILD ON FILL**  
Raise the land on artificial fill

**BUILD LIKE THE KEYS**  
Elevate structures on pilings and live with more water

**BUILD ON HIGH GROUND AROUND TRANSIT**  
Promote new development in the least flood-prone areas along transit corridors

**EXPAND GREENWAYS AND BLUEWAYS**  
Expand waterfront parks and make room for canals in our most flood-prone neighborhoods

**CREATE GREEN AND BLUE NEIGHBORHOODS**  
Create a network of small spaces for water in our yards, streets, and parks

**Elevate on Fill**

**Improve Seawalls**

**Elevate Buildings**

**Elevate Critical Equipment**

**Continue Resilient Land Use Planning**

**Strengthen Local & State Building Codes**

**Offer Voluntary Buyouts**

**Increase Waterfront Setbacks**

**Increase Permeable Surfaces**

**Improve the Regional Drainage System**

**Raise Roads**

**Protect & Restore Seagrass Beds**

**Build Artificial Reefs & Breakwaters**

**Restore Mangroves & Marshes**

**Improve Local Stormwater Management**

**Expand Green Spaces**

**Increase Living Shorelines**

**Deploy Temporary Flood Panels**

**Preserve Wetlands**

**Restore Coral Reefs**

**Enhance Barrier Islands**

**Enhance Dunes**

**Renourish Beaches**

**Key Tools**

- A leaf icon indicates a potential co-benefit of reducing greenhouse gas emissions
- A sun icon indicates a potential co-benefit of reducing heat

Source: <https://miami-dade-county-sea-level-rise-strategy-draft-mdc.hub.arcgis.com/>. © Miami-Dade County, FL. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <https://ocw.mit.edu/help/faq-fair-use/>.

# Leave or Rebuild? Striking Inequality

The New York Times

## ***Miami Says It Can Adapt to Rising Seas. Not Everyone Is Convinced.***

Officials have a new plan to manage rising water. Succeed or fail, it will very likely become a case study for other cities facing climate threats.



## ***Climate Change Is Bankrupting America's Small Towns***

Repeated shocks from hurricanes, fires and floods are pushing some rural communities, already struggling economically, to the brink of financial collapse.

# A Tale of Two Towns: Miami-Dade and NC- Fair Bluff

Rich coastal regions are also acting to prevent population loss.

- Disaster experts have increasingly urged local officials to reduce their exposure by encouraging people to leave vulnerable areas. But cities and counties often resist that advice, worrying that retreat would hurt their economies and upset voters.
- Example: Miami-Dade County
  - [An upbeat strategy](#) for living with more water.
  - With some of the most expensive coastal real estate in the world, it has an **ample tax base** to experiment with solutions — and also enormous **economic incentive to dissuade buyers and investors from leaving**.



# A Tale of Two Towns: Miami-Dade and NC- Fair Bluff

Repeated climate disasters cause small towns to face existential threats.

- Climate shocks are pushing small rural communities, many of which were already struggling economically, to the brink of insolvency.
- Example: Downward spiral of the Fair Bluff
  - A small town in eastern North Carolina, hit by 19 hurricanes between 1954 and 2016
  - Rather than bouncing back, repeated disasters cause residents and employers leave (aided by buyout programs), the tax base shrinks and it becomes even harder to fund basic services.
  - Rebuild plan: Turn the old downtown into park and build a new downtown. Yet \$10M is too much.



# Leave or Rebuild? Striking Inequality

## Income and race inequality in WTP and sorting.

- Low income and minority residents are more likely to move into high risk flood zones.
  - White/Asian people with low incomes are willing to pay \$710 per year to avoid living in an area at high risk of flooding  
Black: \$500; Hispanic: \$618.
  - The WTP is rising with income.
- The costs of insurance price reform fall more heavily on low income and Black/Hispanic residents as a fraction of annual income.

Source: Bakkensen, L. A., & Ma, L. (2020). Sorting over flood risk and implications for policy reform. *Journal of Environmental Economics and Management*, 104, 102362.

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## Black and Hispanic People More Likely to Live in High-Risk Flood Zones, Study Finds

Some reforms to the National Flood Insurance Program could have disproportionately negative impacts on the same groups, according to researchers.



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# FEDERAL INFRASTRUCTURE INVESTMENT

# Federal Infrastructure Investment

Federal grey infrastructure reinforces coastal development.

- The **2021 Bipartisan Infrastructure Act**:  
Allocate \$47 billion over several years for climate resiliency.  
Mostly to protect existing infrastructure.
- **Moral Hazard**  
Would government spending reinforce the expansion of high-risk zone?
- Example: In Charleston, S.C.
  - The city is considering a \$1.1 billion project, largely funded with federal money, to build an eight-mile-long sea wall to protect infrastructure.
  - It also has approved a development on what is largely Guggenheim family land to place thousands of new structures in the flood plain.

Source: <https://www.nytimes.com/2022/10/04/opinion/hurricane-ian-coast-rebuilding.html?se>

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The New York Times

## *Billions for Climate Protection Fuel New Debate: Who Deserves It Most*

The \$1 trillion infrastructure law funds programs that tend to favor wealthy, white communities — a test for Biden's pledge to defend the most vulnerable against climate change.



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# Federal Infrastructure Investment

## Billions for climate protection fuel new debate: Who deserves it most?

- Historically, it is wealthier, white communities — with both high property values and the resources to apply to competitive programs — that receive the bulk of federal grants.
- The new climate provisions in the infrastructure bill inject billions of dollars into competitive grant programs. Cities/counties submit applications and federal agencies rank.
  - The **ability of local officials** to use sophisticated tools and resources to write successful applications differs.
  - Communities are required to **pay a share of the project** — often 25 percent, which is unaffordable for struggling towns/counties.
  - Cost-effective: Governments need to demonstrating the **value of the property** that would be protected is greater than the cost of the project, giving disadvantage to low-income neighborhoods.



# Is Managed Retreat an Option?

The New York Times

## To Save America's Coasts, Don't Always Rebuild Them

Oct. 4, 2022



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The New York Times

## *U.S. Flood Strategy Shifts to 'Unavoidable' Relocation of Entire Neighborhoods*

Using tax dollars to move whole communities out of flood zones, an idea long dismissed as radical, is swiftly becoming policy, marking a new and more disruptive phase of climate change.



# Is Managed Retreat an Option?

- What is different for managed retreat?
  - (1) Buyouts on a much **larger scale**  
(greater numbers of people/ whole neighborhoods)
  - (2) Ideally doing it **before disaster strikes**.
- The Obama administration began experimenting with relocation after Hurricane Sandy in 2012. The program ended by President Trump.
- The Federal Emergency Management Agency detailed a new program, worth an initial [\\$500 million](#), with billions more to come, for large-scale relocation nationwide; A similar \$16 billion program is started by The Department of Housing and Urban Development.
- New Jersey has bought and torn down some 700 flood-prone homes around the state and made offers on hundreds more

Discussion: *What would be the pros and cons of managed retreat?*



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