

# Sea Level Rise and Real Estate Values

**Professor Christopher Mayer**  
**Co Director, Milstein Center for Real Estate**

# Mortgage market is at risk if homes flood

*“The areas hit by last year’s hurricanes and wildfires are experiencing the ‘pig in a python’ effect on their local delinquency rates. Early-stage delinquencies have largely dropped back to normal, while serious delinquency remains elevated. In hard-hit markets, like the Houston and Naples metro areas, serious delinquency is triple what it was before the hurricanes. And in the San Juan area of Puerto Rico, serious delinquency has quadrupled.”*

- Frank Nothaft  
Chief Economist at CoreLogic

SERIOUS  
DELINQUENCY RATES



**higher than before  
the hurricanes in  
hard-hit markets**

# Climate Change vs. Great Recession

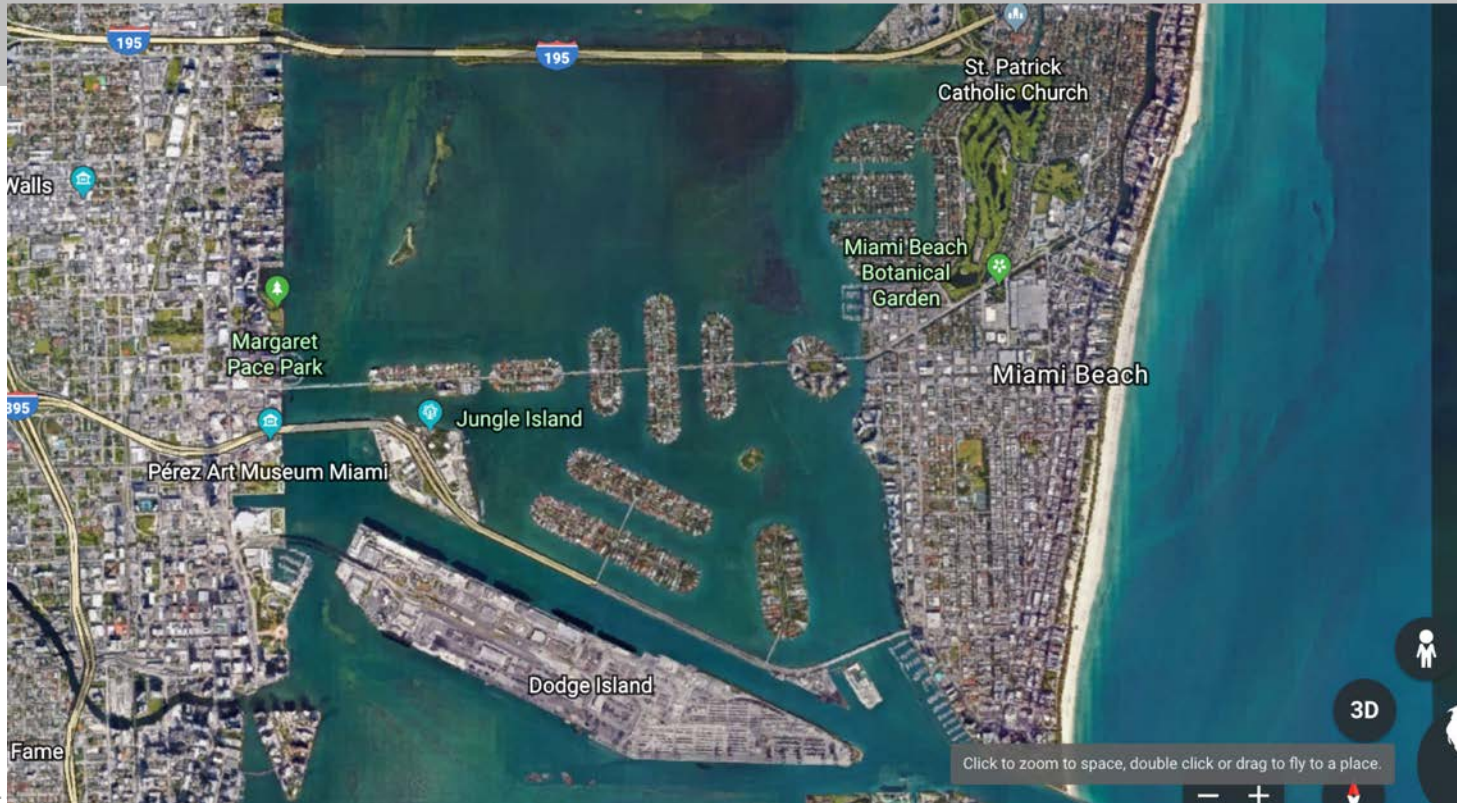
- According to Zillow (June 2017)
  - In early 2012, at its peak, the total dollar amount of “underwater housing” (negative equity) was \$1.2 trillion
  - **By 2100**, when sea levels have risen as predicted, “The total combined current value of **all homes at risk of being underwater** with a 6 feet rise in sea levels is **\$882 billion.**” (2% of all US homes)

# 1 in 8 Florida homes may be underwater

State	Number of Potentially Underwater Properties	Fraction of Total Housing Stock Underwater	Total Value of Potentially Underwater Properties
California	42,353	0.44%	\$49.2B
Texas	46,804	0.61%	\$12B
New York	96,708	2.10%	\$71B
Florida	934,411	12.56%	\$413B
Pennsylvania	2,661	0.06%	\$730M
Georgia	24,379	0.75%	\$10.2B
North Carolina	57,259	1.64%	\$20.6B
New Jersey	190,429	7.35%	\$93.1B
Virginia	46,287	1.77%	\$14.4B
Washington	31,235	1.32%	\$13.7B
Massachusetts	62,069	3.10%	\$51.2B



# Bike riding near Miami Beach

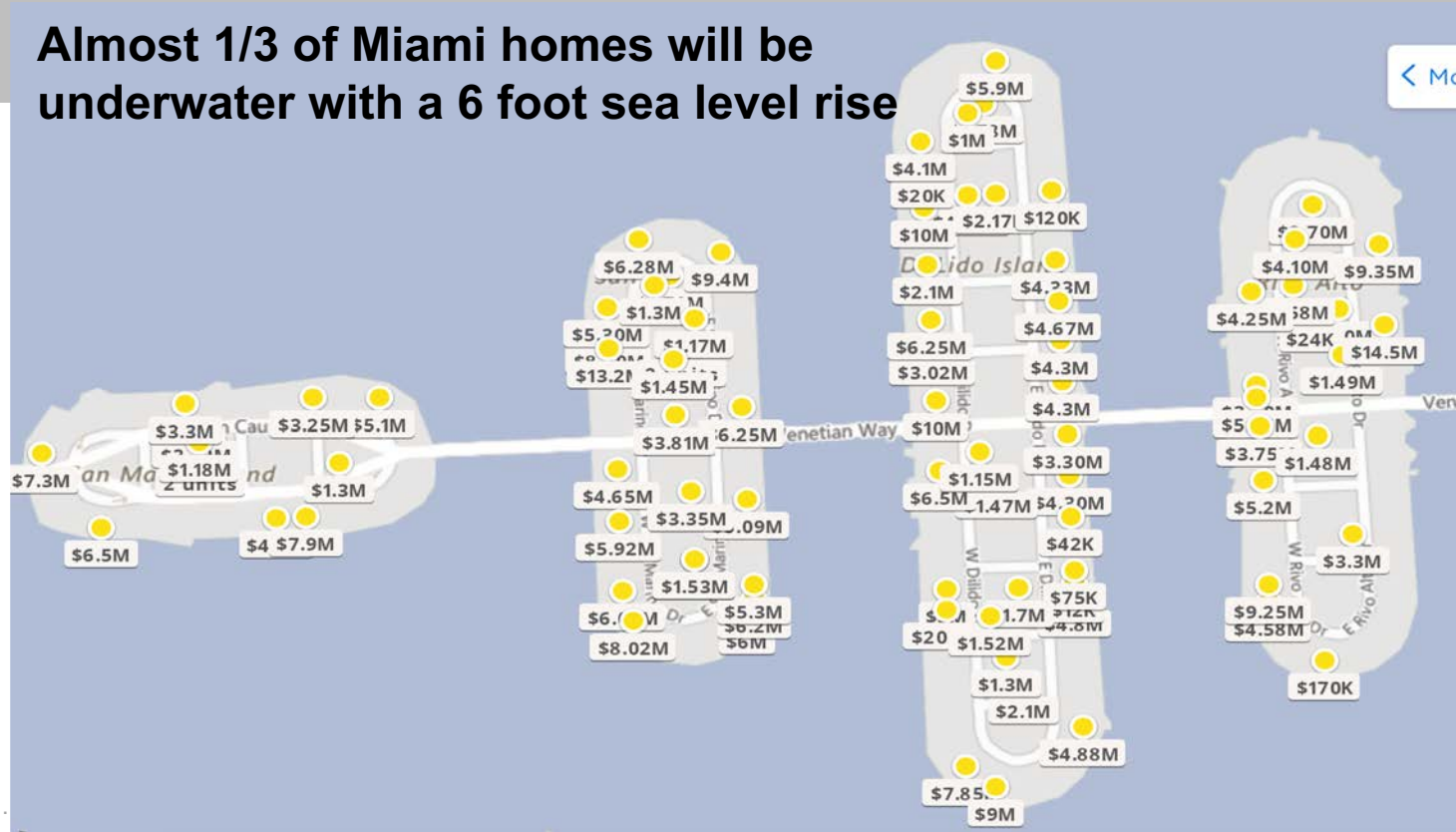


# Bike riding near Miami Beach



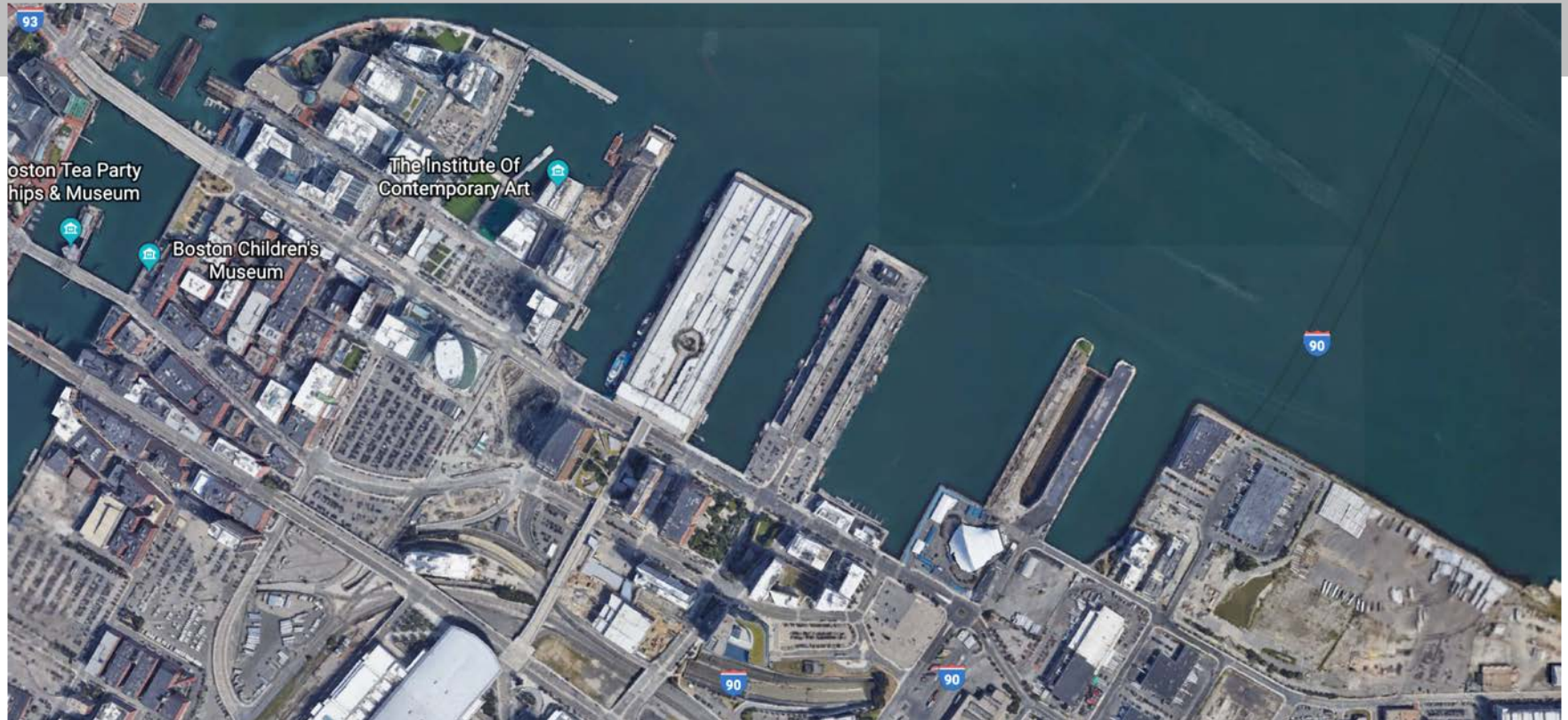
# “Recently Sold Homes” on Zillow

Almost 1/3 of Miami homes will be underwater with a 6 foot sea level rise





# Building boom in Boston Harbor





# What about NYC?

- In 2010, the value of property within the 100-year floodplain was \$58.7 billion, according to a report by the city comptroller
- By 2014, that value had climbed to \$129.1 billion with new development and price increases
- Even if properties are safe, will public infrastructure like subways, tunnels, and roads be usable after a storm?
- City has challenged a new FEMA map that substantially increased the number of homes in the flood zone

# Academic studies: Sea level rise & home prices

- Examine effect on housing market from:
  - Redrawn flood maps
  - Higher flood insurance rates
  - Hit by actual storm
  - Greater elevation
  - Investor vs. Owner-occupied home
  - Rents vs. Prices

# NYC Home Values (Gibson, et. al. 2017)

- Examine home values from 2003-17
- Higher insurance rates from Biggert-Waters in 2012 minimally decreased sale prices (1.7%)
- Sandy flooding reduced prices by 5-7% (minimally flooded) vs 8-13% (average inundation)
- Non-flooded properties in new FEMA floodplain fell as much as 18% (insurance rates rise as much as \$2,500/year)
- Google searches for “floodplain” increased with each change

# Property sales near water (Bernstein, et. al. 2018)

- Examine 480,000 sales within 0.25 mile of coast, 2007-16
  - Control for distance to coast & various property attributes
  - Examine before/after UN IPCC report in 2013 (document large increase in Google searches in affected areas)
  - Measure exposure using NOAA's SLR calculator
- Basic finding: Properties exposed to SLR (sea level rise) of up to 6 feet trade at an average discount of 7.5%
- Discount rises with exposure: If flood at 1-foot SLR discount is 19% vs 6-foot SLR discount of 5.5%



# Property sales near water (Bernstein, et. al. 2018)

- Owners of exposed properties less likely to renovate and more likely to be sold (after IPCC report)
- Investor properties trade at 11% discount, whereas owner-occupied discounts are minimal
  - Investor discount grew from 8% to 14% after media coverage of IPCC report in May 2014
- Rents do not vary with SLR exposure
- Less capitalization in locations that express less worry about climate change

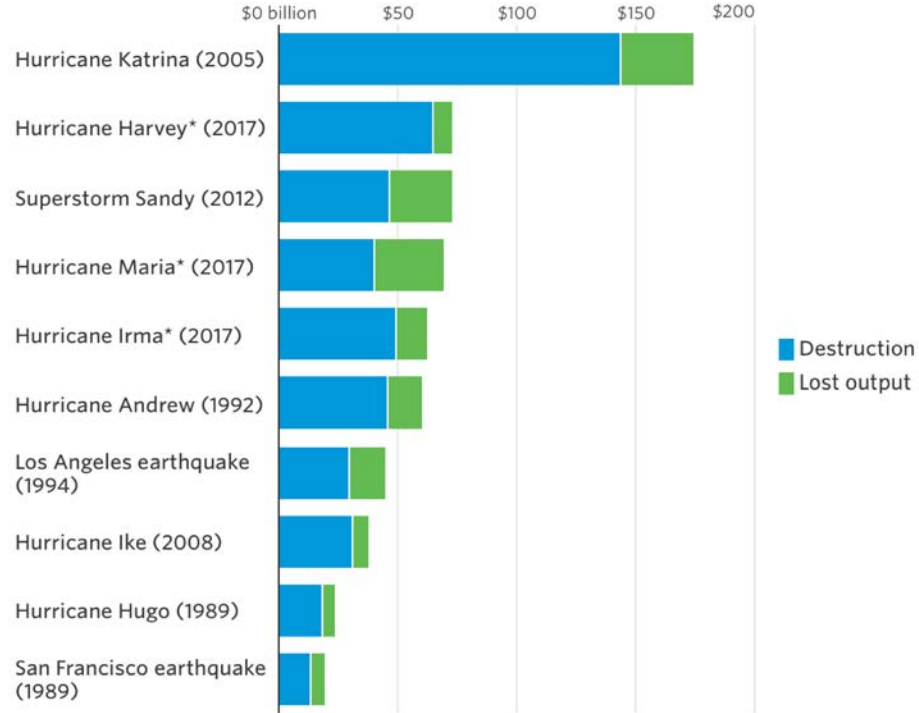
# Takeaways

- Information about flood risk and insurance rates appears to impact home prices
- Hard to determine how actual flooding impacts home values due to property damage
- Price capitalization likely understates actual risk
  - Buyers of homes at greater risk are most optimistic or have the highest discount rates
  - Government subsidies and bailouts reduce financial risk from SLR

# Most costly disasters

## Costly Catastrophes

The biggest economic losses from natural disasters in the U.S., in billions



Note: Figures are inflation-adjusted. \*Estimates as of Oct. 27.

Source: Moody's Analytics

# Why do we still build in flood plains?

- Private costs could be underestimated if public infrastructure fails (will require large expenditures)
- Federal government budgeted \$90 billion for disaster relief including Harvey in 2018
- Programs to redraw FEMA flood maps and require flood insurance have been delayed and “watered down”
- Institutional investors have shorter time horizon
- Lenders just starting to fully consider risks of loan payoff (subject of future research)