



Manage Financial Risk Under Climate Change

risQ leverages data and physical sciences to drive climate adaptation

Why municipal bonds and climate risk, now?

Past:

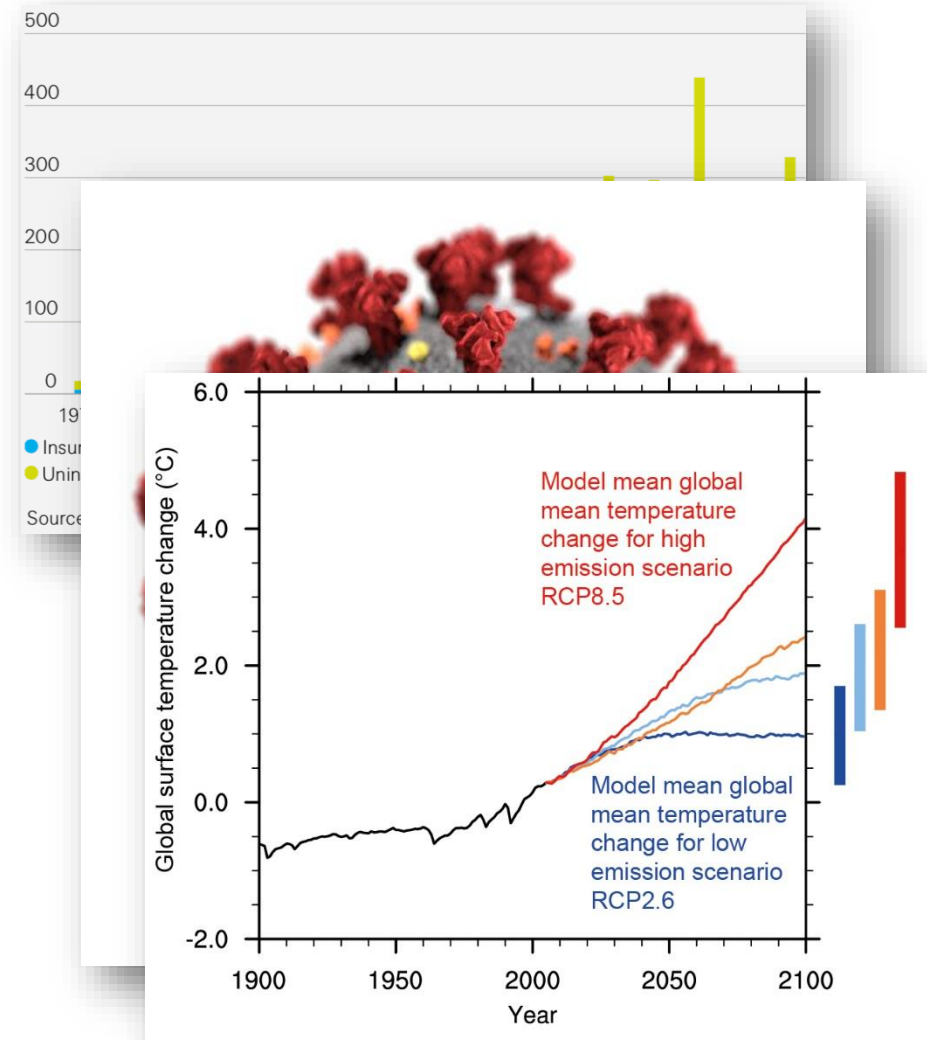
While you weren't looking, the insurance industry increasingly mitigated their climate risk exposure, increasing the risk for others

Present:

While you were looking, the pandemic shredded the balance sheets of municipal bond issuers

Future:

As we'll all see, the climate risk is already tangible and is only going to increase in financial impact over time



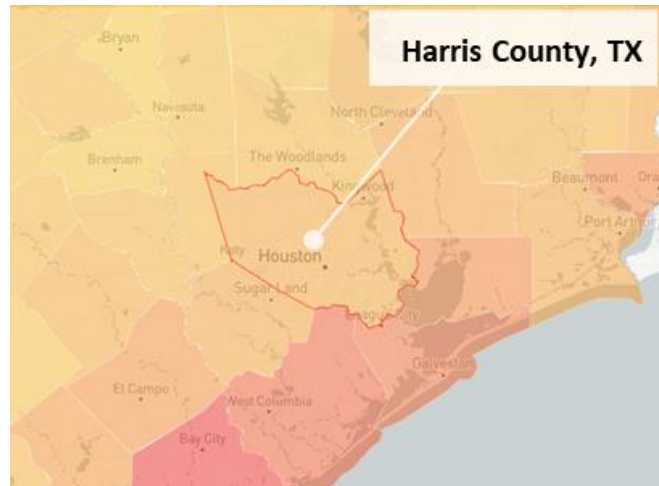
Mapping climate risk to economic value



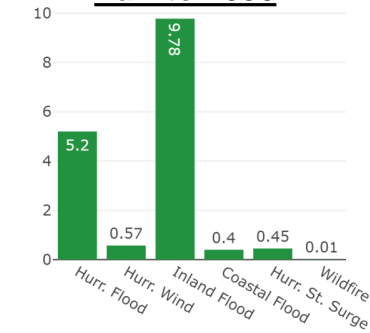
**Property
Value at Risk**



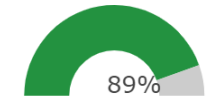
**GDP
Impairment
Risk**



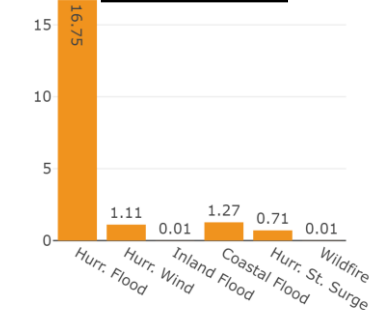
**Cumulative Property
VaR to 2030**



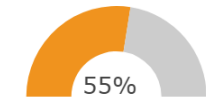
**National Percentile
(County Cohort)**



**Cumulative GDP Imp.
Risk to 2030**

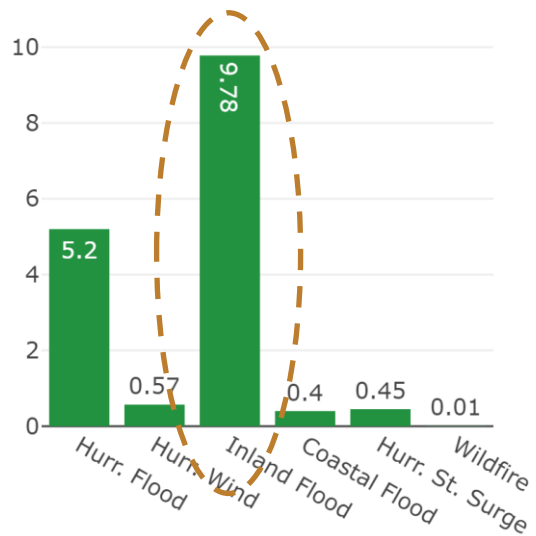


**National Percentile
(County Cohort)**

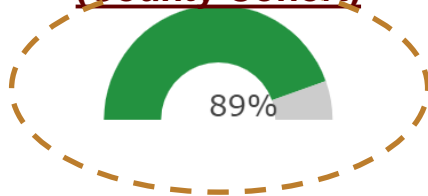


From climate risk to real world outcomes

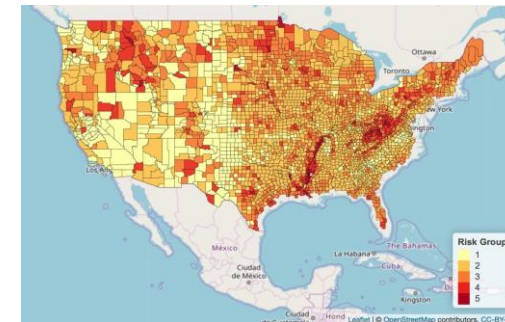
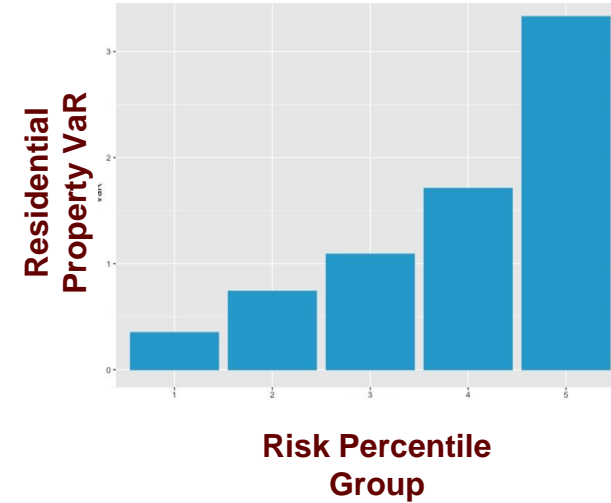
**Cumulative Property VaR to
2030**



**National
Percentile
(County Cohort)**

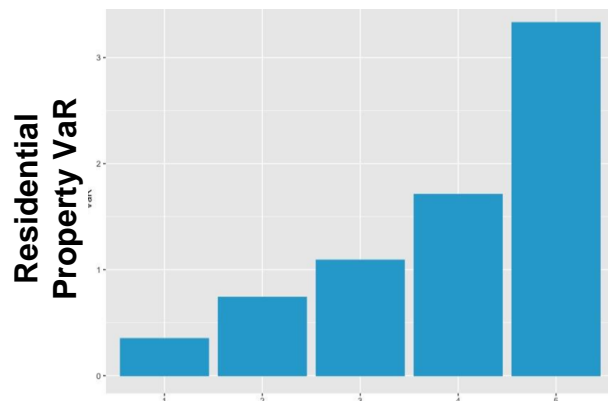


risQ Inland Flood Groups

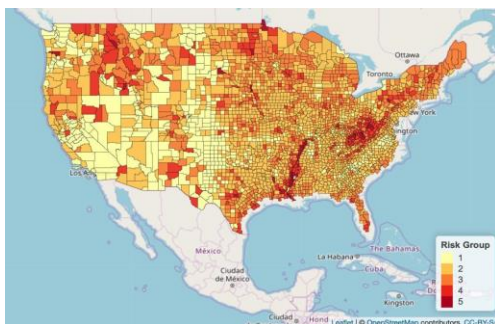


Climate's impact on obligor health: Flooding

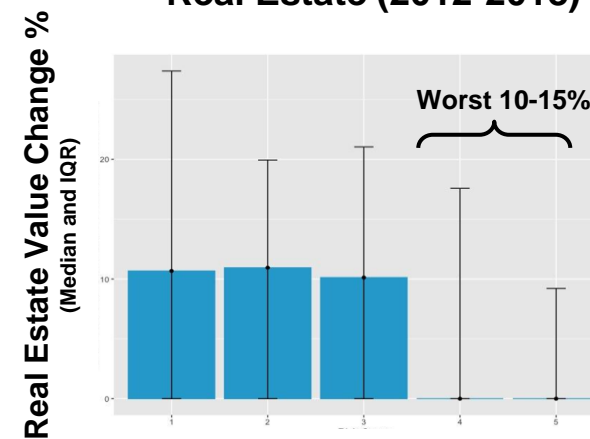
risQ Inland Flood Groups



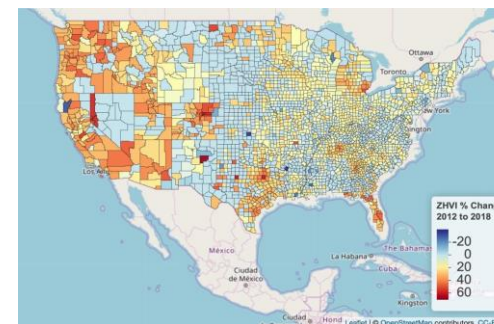
Risk Percentile Group



Real Estate (2012-2018)

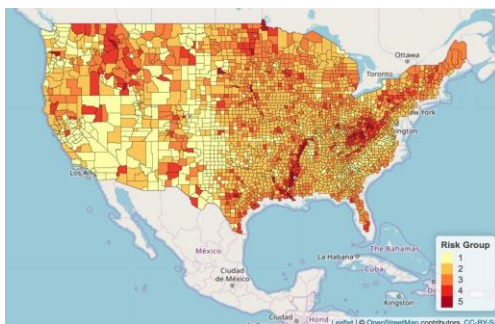
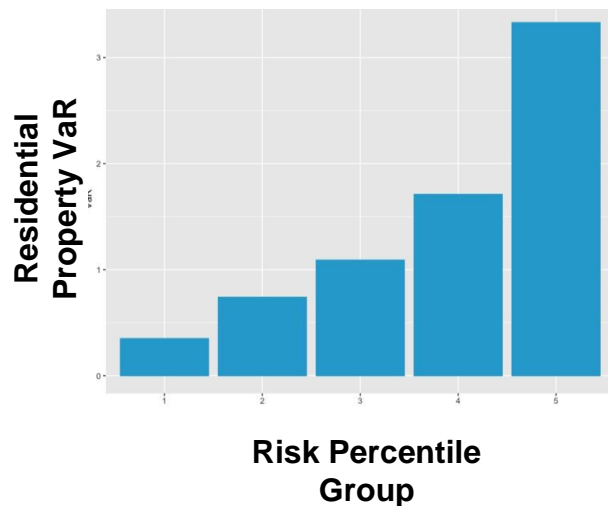


Risk Percentile Group

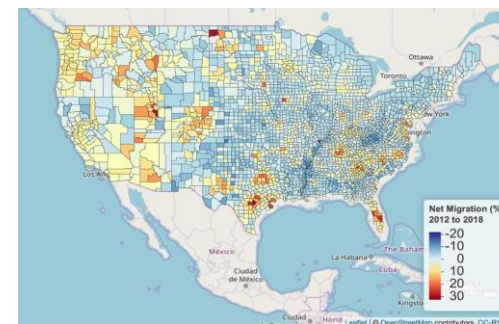
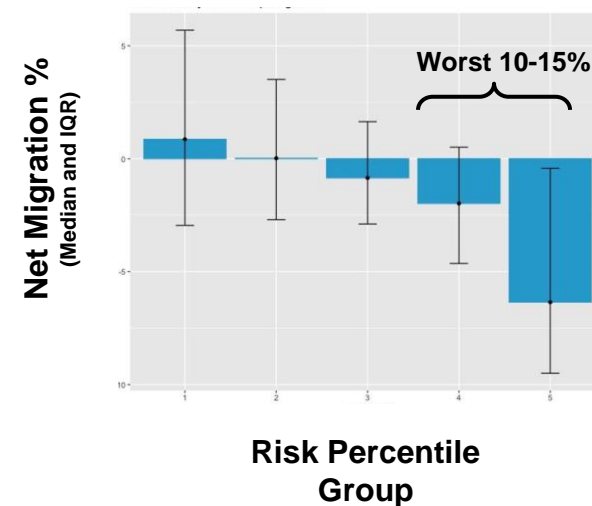


Climate's impact on obligor health: Flooding

risQ Inland Flood Groups



Net Migration (2012-2018)



The finances of hurricanes and issuers



State of Florida

- \$3.17 billion spent (the equivalent to ~9% of the state's 2019 available funds) since 2017 in response to **Hurricane Irma** and **Hurricane Michael**.
- Expects only 54% of that will be reimbursed by Federal government



Bay County (Hurricane Michael)

- Employment remains 9% below pre-Michael levels county-wide 18 months later, including jobs associated with recovery efforts
- School enrolment remains down 10%, and 15% off the 2017/18 peak
- Two hospitals—Bay Medical Sacred Heart and Gulf Coast Regional Medical Center—suffered significant damage



Flagler Hospital

- **Hurricane Matthew (2016)** caused a \$5.4 million operating loss over just 5 months due to impact on the hospital service area
- **Hurricane Irma** caused minimal damage on the facility, but still reduced service to emergency only for 4 days causing ~ \$1 million in incremental operating loss

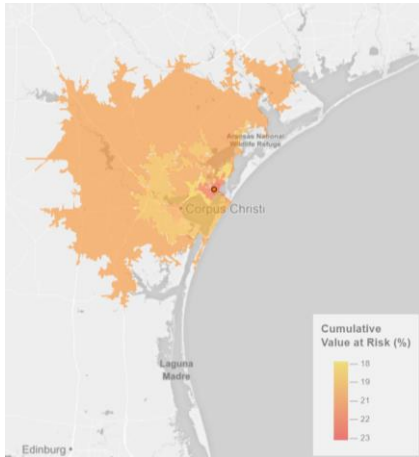
The biggest climate risks are where impairment is common

First Time Payment Defaults, Full Year (#), Excludes PR											
	2010	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
Retirement	15	13	9	10	13	22	10	13	12	5	122
Local Housing	17	8	4	1	3	3	5	3	11	-	55
Charter School	3	4	6	4	9	8	6	9	7	-	56
Hospital	6	6	1	8	-	3	2	2	5	-	33
PR	5	5	4	9	2	3	3	5	5	-	41
Land Secured	79	53	24	16	18	10	9	3	3	-	215
Higher Education	1	1	2	1	4	2	2	-	2	-	15
Independent School	3	1	1	-	3	2	1	-	2	-	13
Hotel	3	1	1	-	-	-	-	-	1	-	6
Jail	1	6	2	4	3	2	-	-	1	-	19
Other Not-For-Profit	3	1	1	4	1	1	2	-	1	-	14
Student Housing	-	-	1	-	1	-	-	1	1	-	4
TIF/TAB	3	2	4	1	3	2	1	-	1	-	17
Airport	-	1	-	-	-	-	-	-	-	-	1
Electric/Gas/Power	1	1	-	-	-	-	-	-	-	-	2
Garvee	-	-	-	-	-	-	-	-	-	-	-
Local GO	-	-	1	-	1	1	2	2	-	-	7
Local Non-GO	1	2	4	1	-	2	1	1	-	-	12
Parking	-	1	1	-	1	-	1	-	-	-	4
Ports	-	-	-	-	-	-	-	-	-	-	-
PreRefunded	-	-	-	-	-	-	-	-	-	-	-
Sales/Special Tax	-	1	-	-	1	-	-	-	-	-	2
Solid Waste	2	-	1	1	-	-	-	-	-	-	4
SRF & Loan Pools	-	-	-	-	-	-	-	-	-	-	-
State Credit						1					1

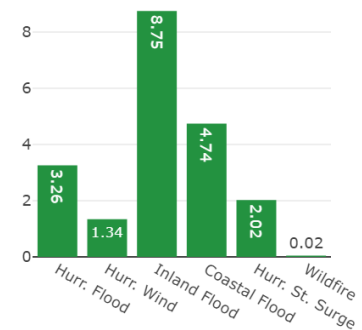
Data courtesy of MMA

Plenty of hospitals in high risk locations

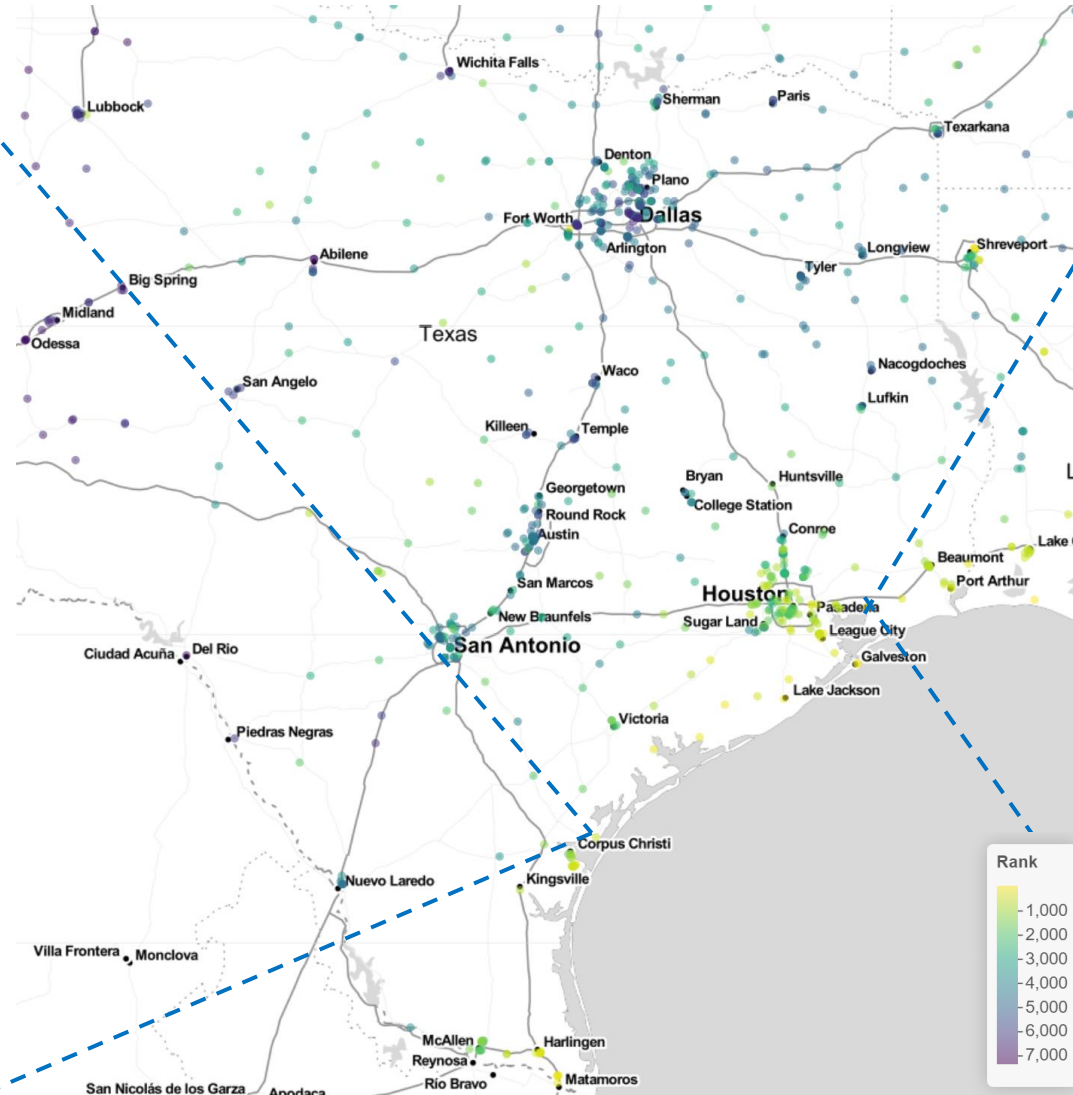
Care Regional Med.
97th percentile highest risk
hospital nationally
(out of 7,500)



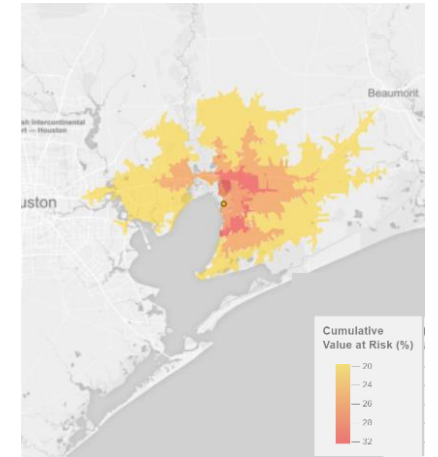
Absolute value at risk



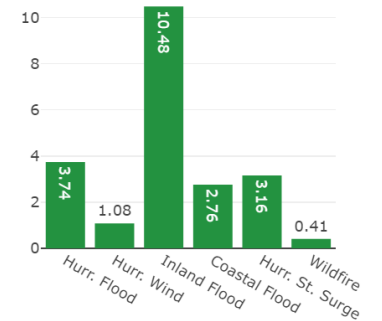
**Shut down permanently after
Hurricane Harvey**



Bayside Hospital
97th percentile highest risk
hospital nationally
(out of 7,500)



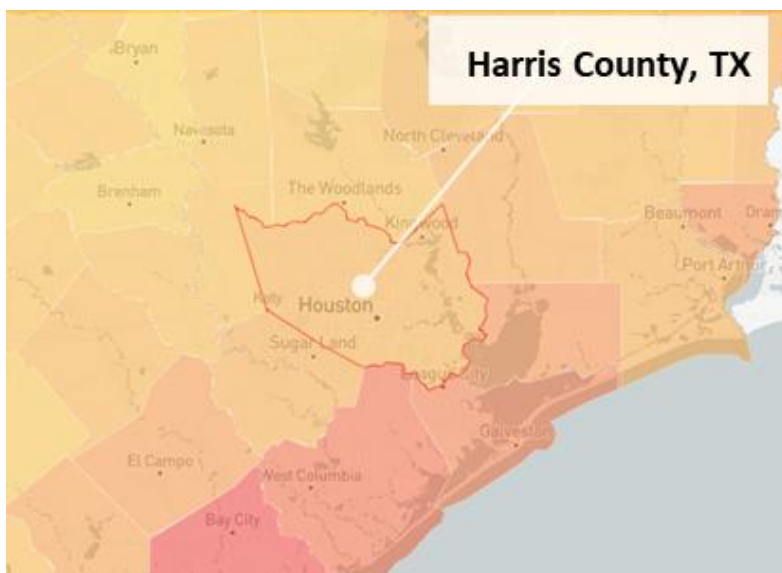
Absolute value at risk



Ensuring geospatial specificity is critical

Property VaR, Harris Co. Overall

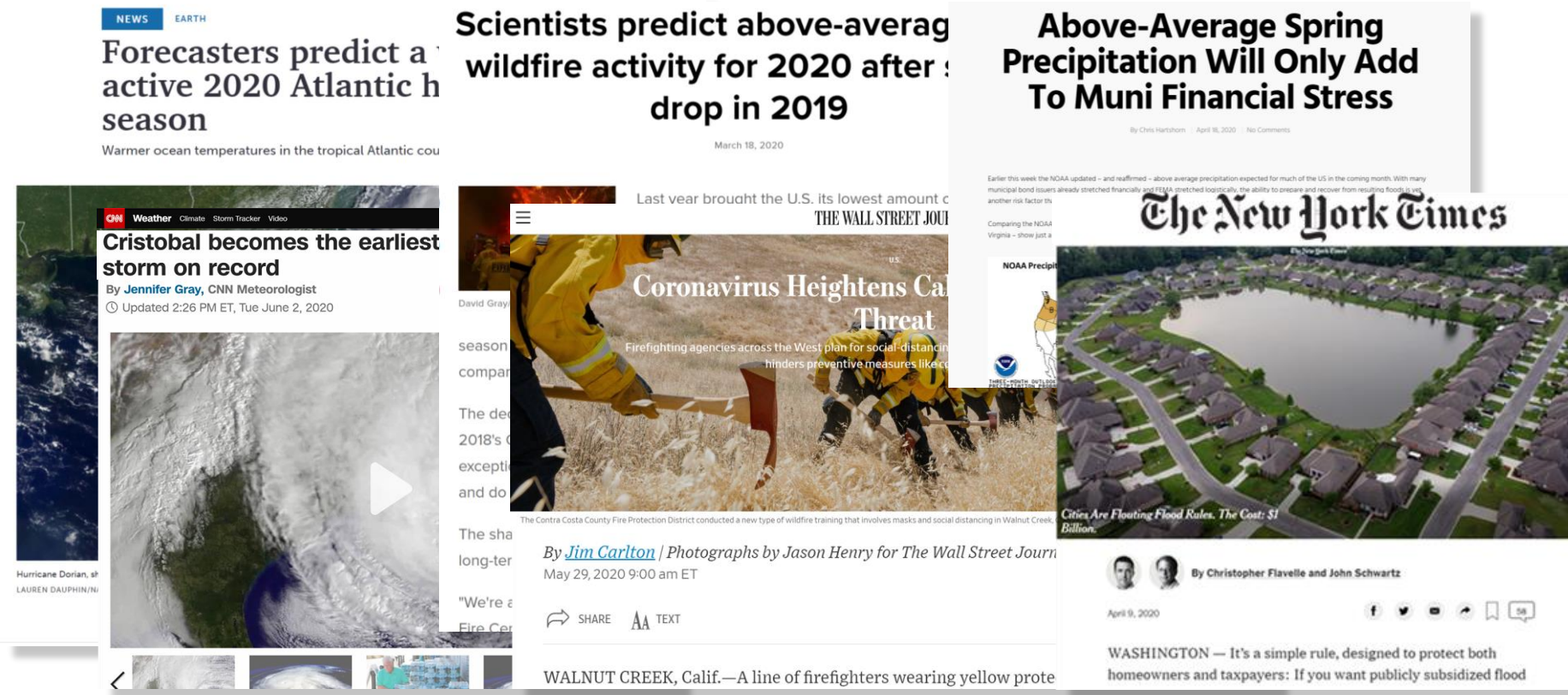
100 Year Inland Flood	500 Year Inland Flood	Hurricane Flood
13.3	18.1	20.0



Property VaR, Harris County MUD CUSIPs

Harris Co. MUD#: Example CUSIP	100 Year Inland Flood	500 Year Inland Flood	Hurricane Flood
MUD 411: 41421BCU2	20.7	25.9	40.1
MUD 33: 414947JN2	28.1	42.2	36.4
MUD 421: 41422NAK9	20.2	22.6	31.2
MUD 480: 41424KBJ5	13.3	20.8	29.6
MUD 489: 41423LDB9	17.5	19.5	26.0
MUD 391: 413958VA4	25.8	27.9	20.6
MUD 374: 413897PF0	22.5	24.9	17.2
MUD 450: 41422GHS0	9.3	11.3	13.2
MUD 63: 41422KCY3	13.5	20.3	11.4
MUD 449: 41423EFC1	5.1	6.3	10.0
Imp. Dist. 15: 414182AL9	7.9	10.0	9.4
MUD 213B: 41424JAK6	12.8	14.1	7.1

In case anyone was wondering what to expect in 2020



The entire municipal bond market is under threat of a “double-whammy” COVID-19 plus climate catastrophe



Start a Conversation

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