

National differences in the NFIP



Background

- Flood damage is **excluded** from standard homeowners and renters insurance.
- Flood insurance is available through the **National Flood Insurance Program (NFIP)** administered by **FEMA**
- Private coverage has only been available **since 2019**
 - Private companies often offer higher coverage (\$500,000 vs \$250,000)
 - Experts note that the current approach to flood risk is not sustainable.
 - People moving into flood prone regions, sea level rise, and extreme weather.

The Risk – Flooding

- Flooding is the **most costly** and **deadly** disaster in the USA
- In 2021, nearly **8 million coastal homes** (East Coast only), representing **\$1.9 trillion** in cost, **are at risk of storm surge**
- E.g. in 2017, three major Hurricanes struck the US (Harvey, Irma, Maria)
 - More than 220,000 claims
 - 10.3\$ billion value
- **Climate change** and continued **development of flood-prone** areas will enhance the losses, potentially by a factor of 20

The Data – Policy and claims

- Census data
- FEMA.gov open data sets
- Flood insurance **policy and claims** published originally in 2019
- **CLAIM DATA:** 2,000,000 redacted claims!!
 - BUT the data portal is undergoing upgrades, and the dataset was not available
- - Instead: a summary of the number of claims per state

The Data – Policy

Policy dataset

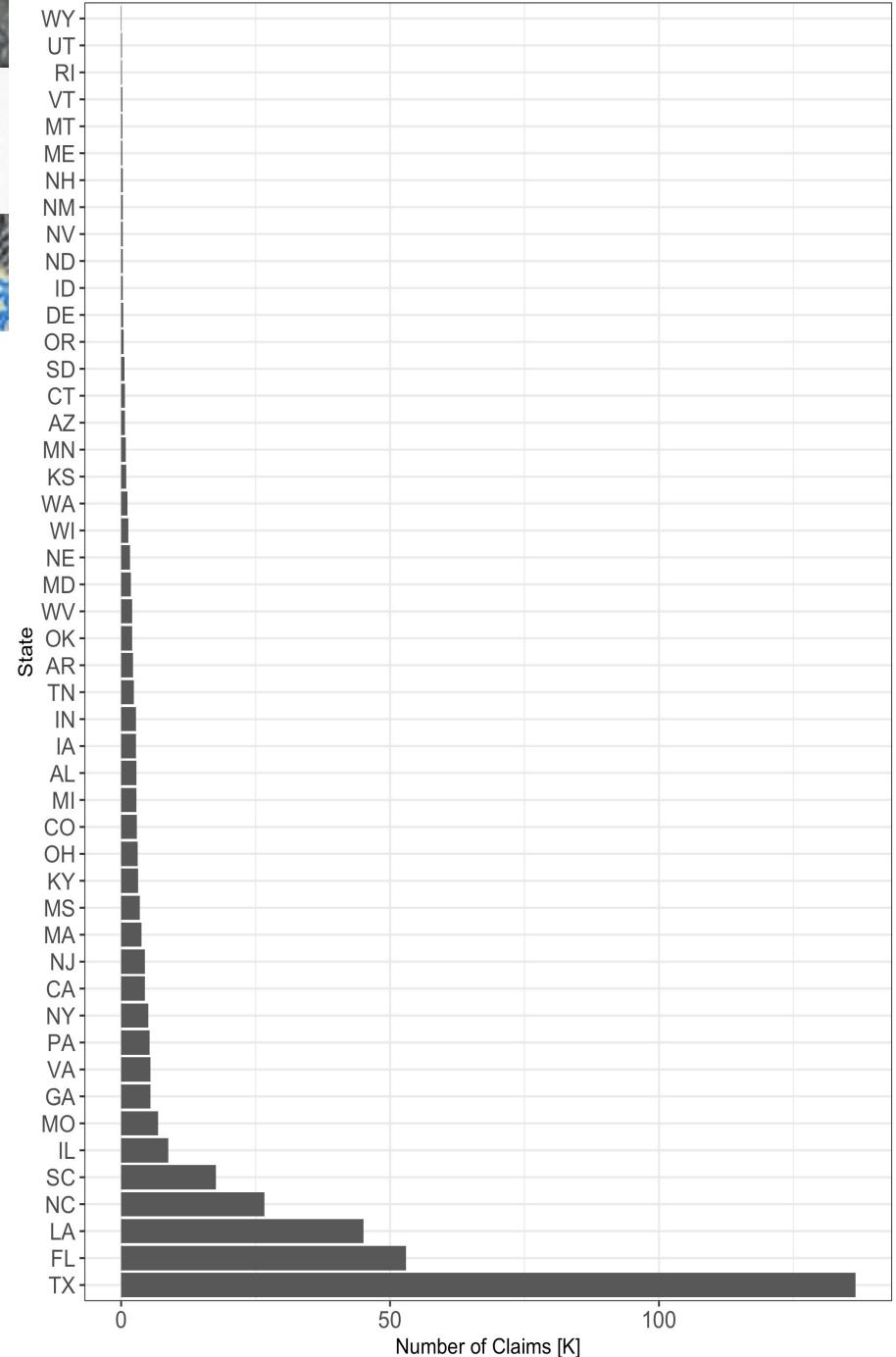
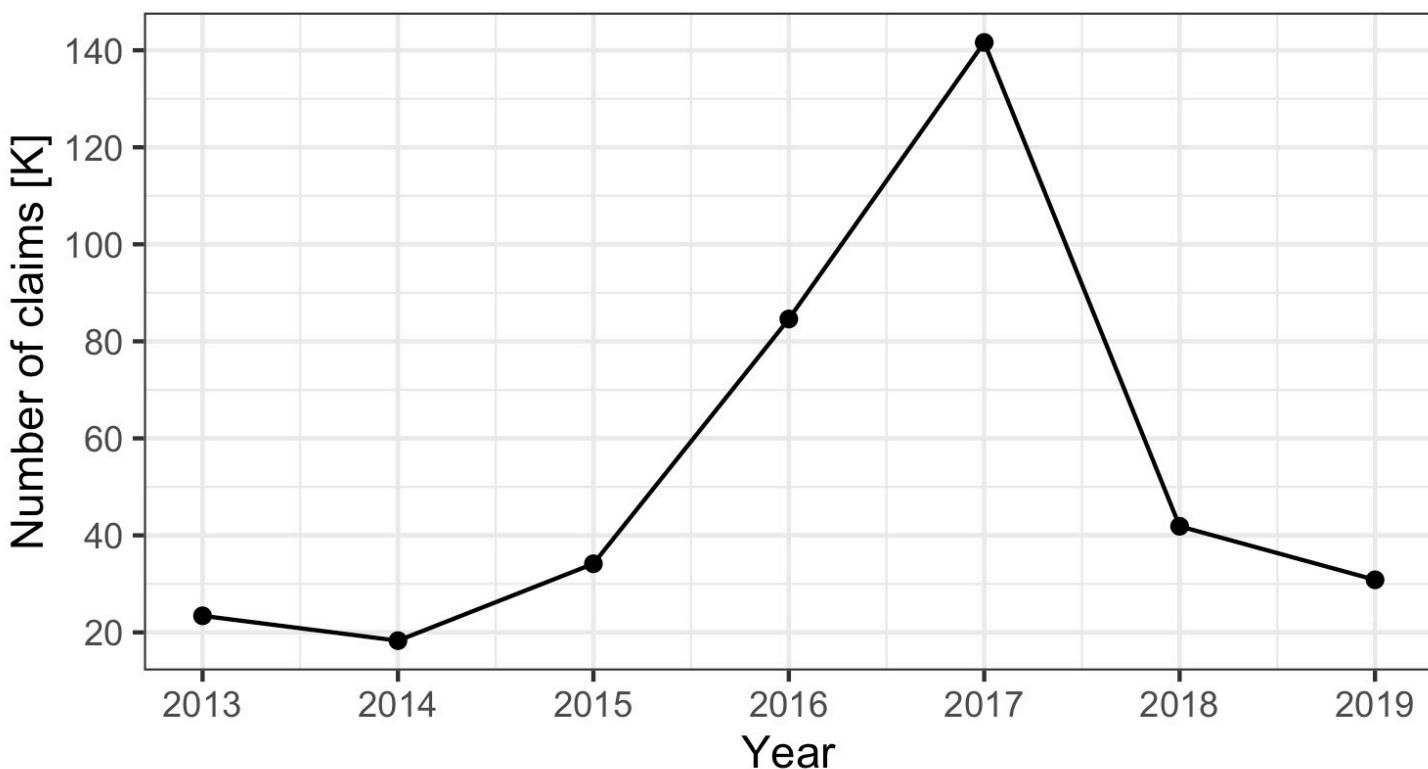
1			
2			
...			
...			
50,000,000			

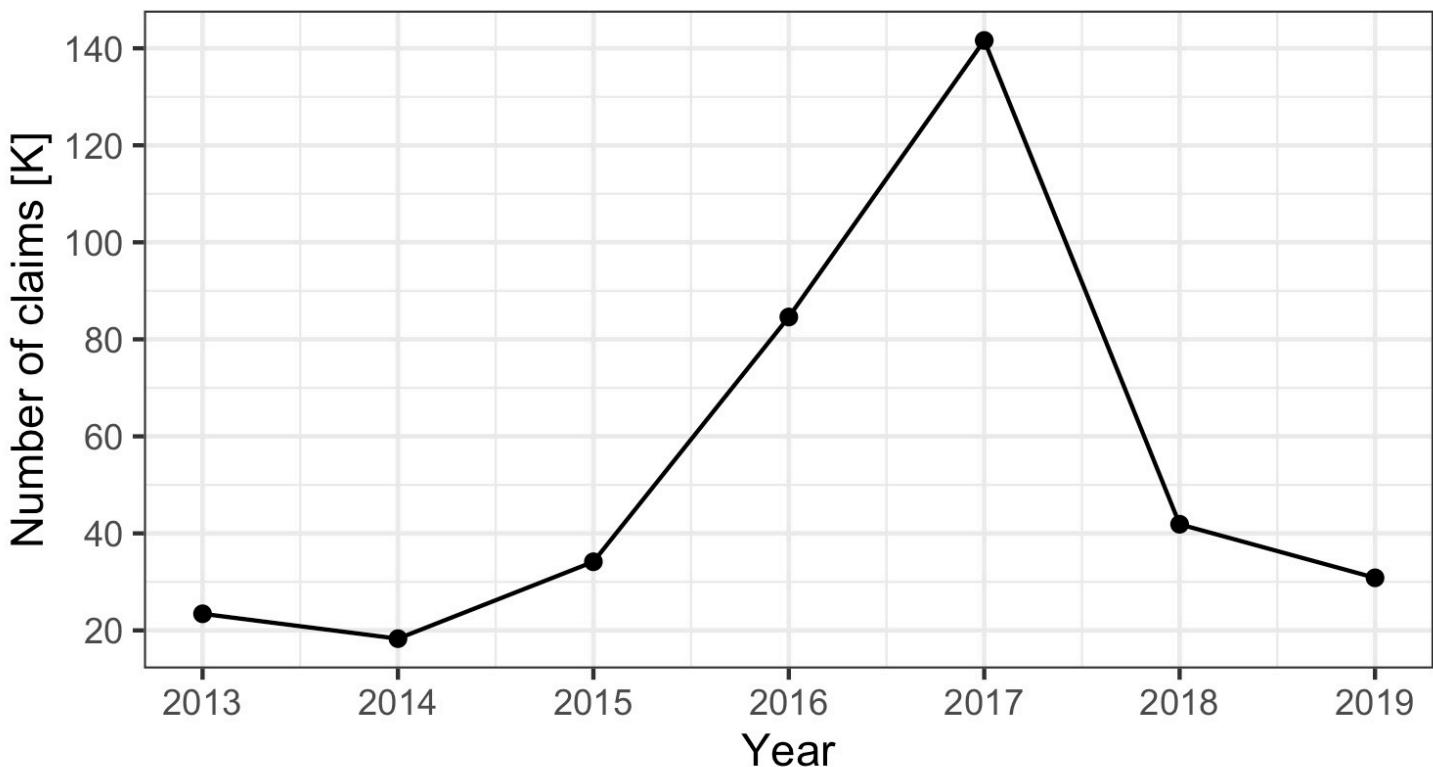
Variables: dates, state, floodzone, amount covered

Time period covered: 2009 – August 2019

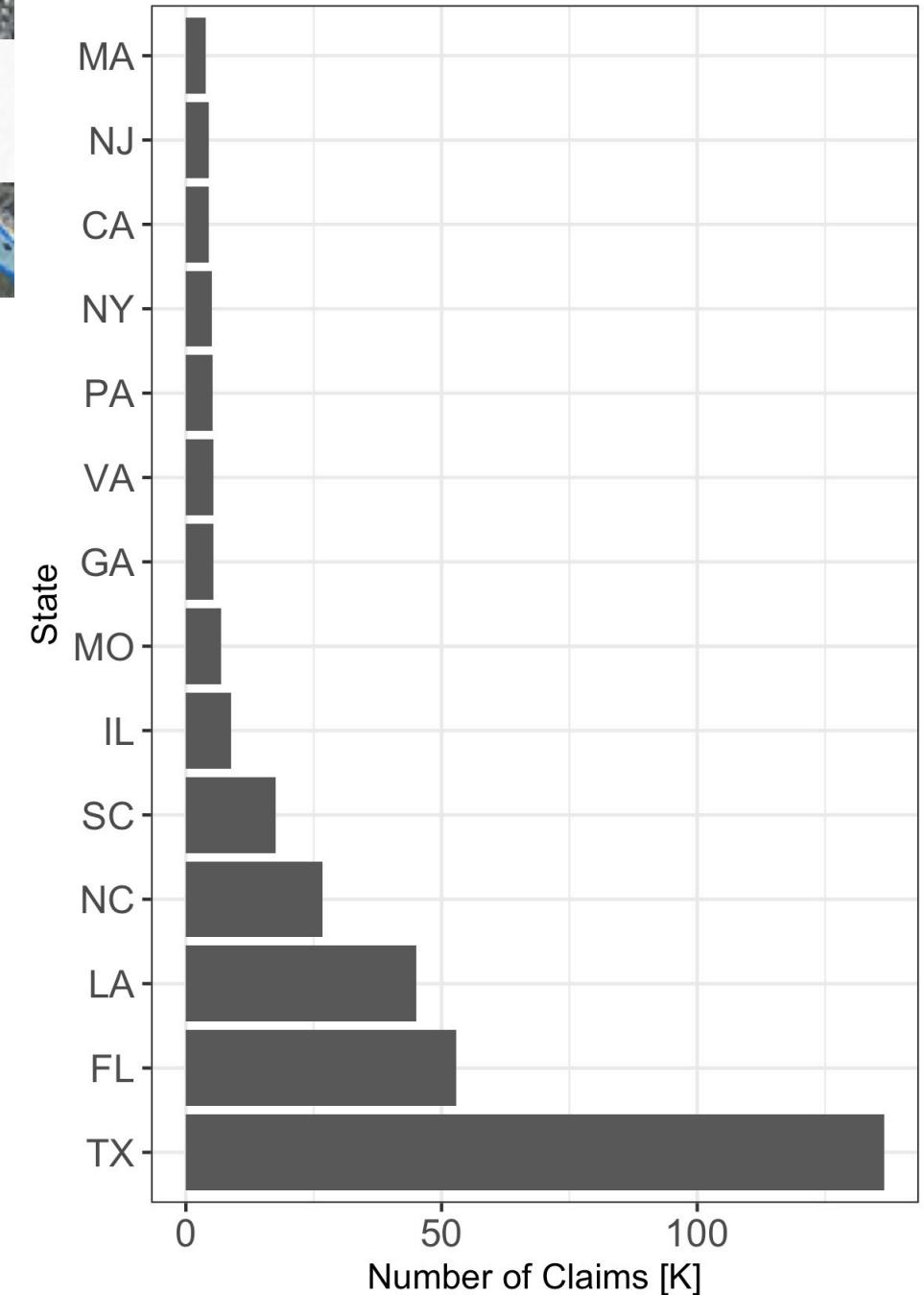


Number of claims 2013 - 2019



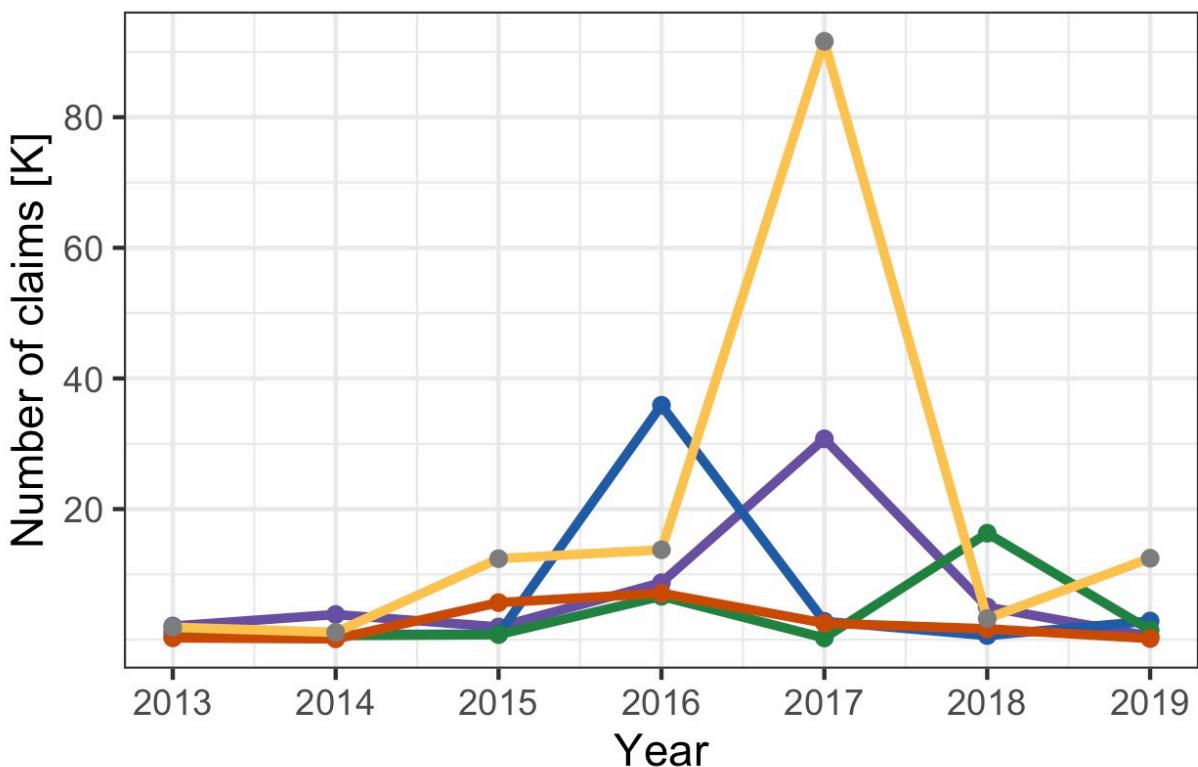


Texas had the largest number of total claims, followed by Florida and Louisiana



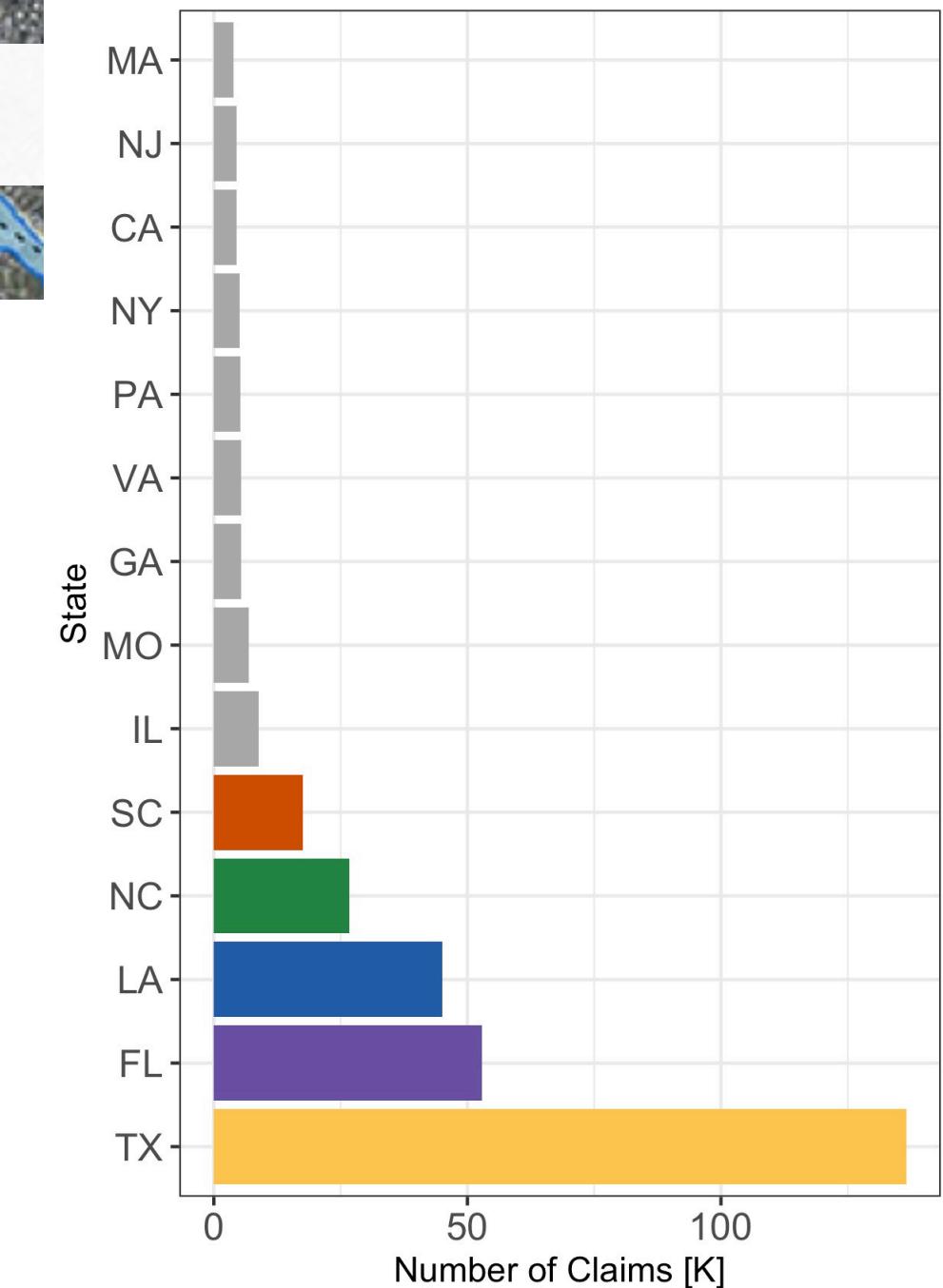


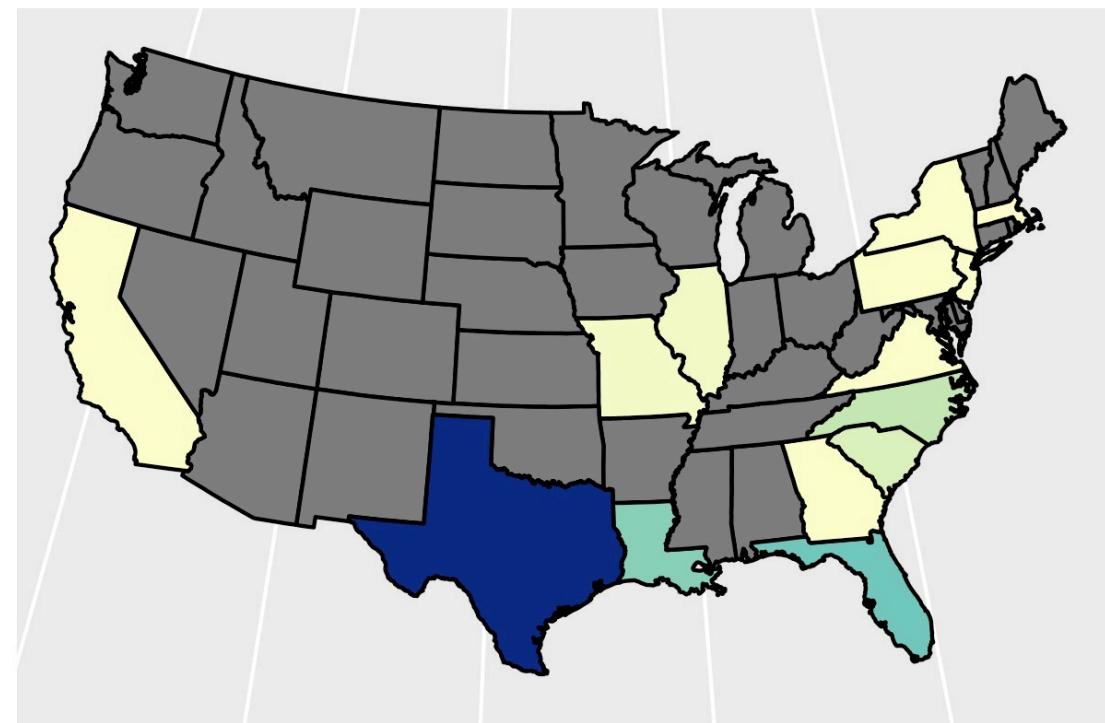
Number of claims 2013 - 2019



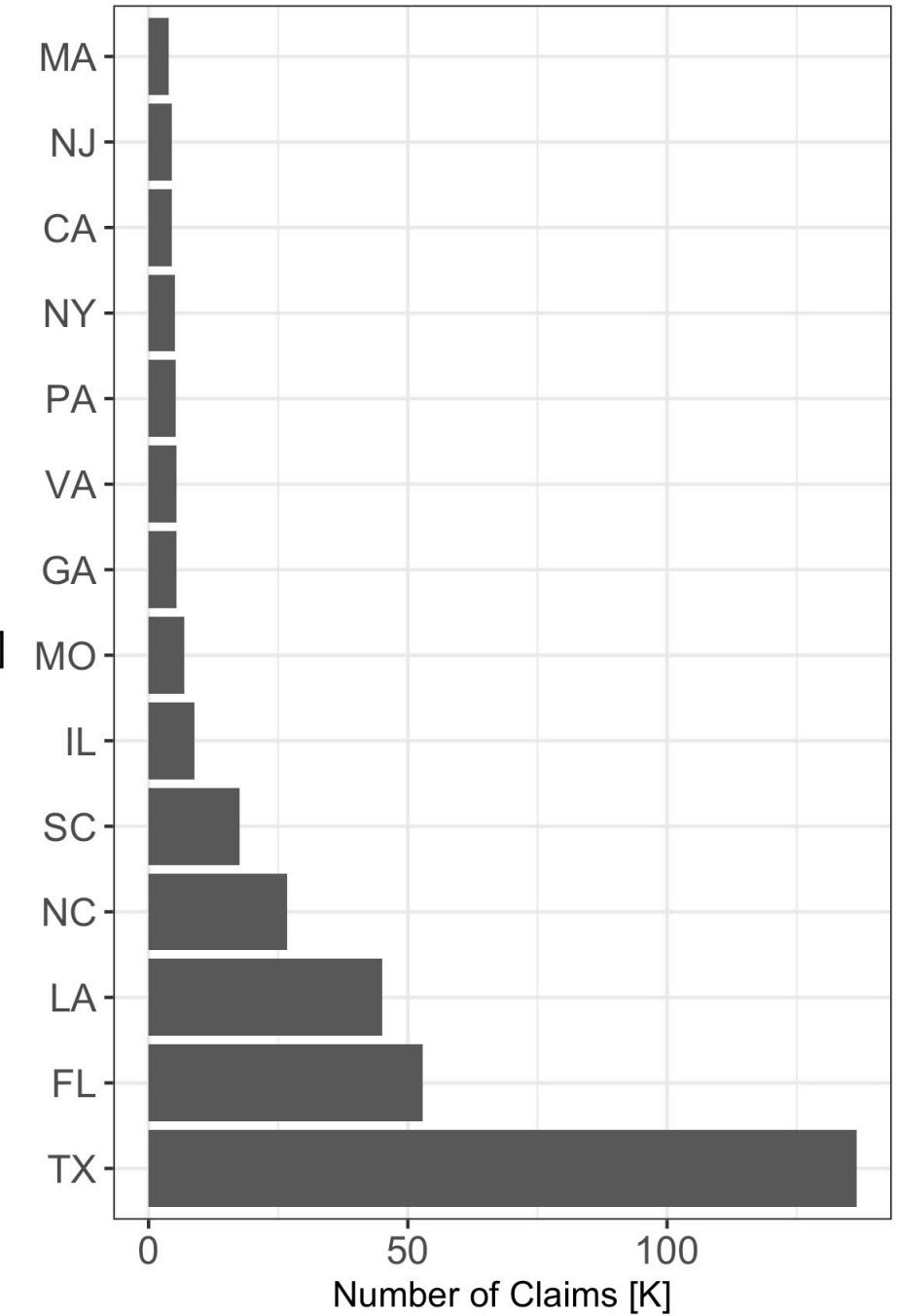
2016: Louisiana flooding

2017: Harvey (TX), Irma (FL)





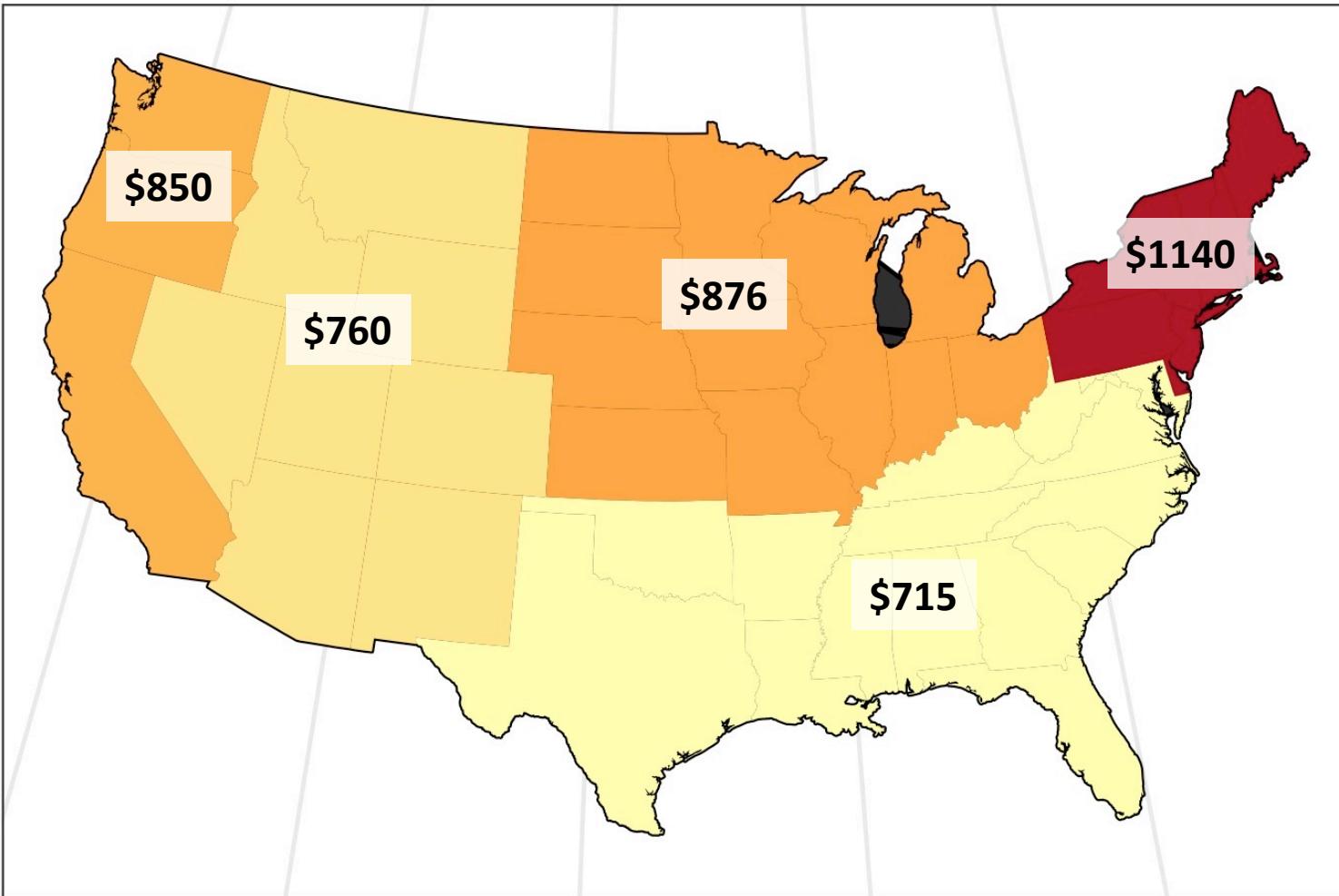
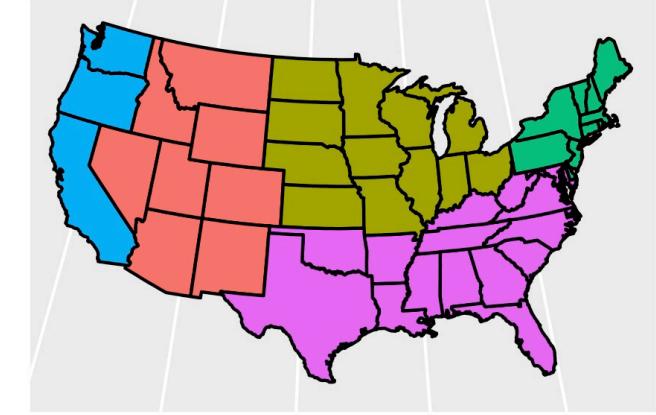
Number of claims [K]





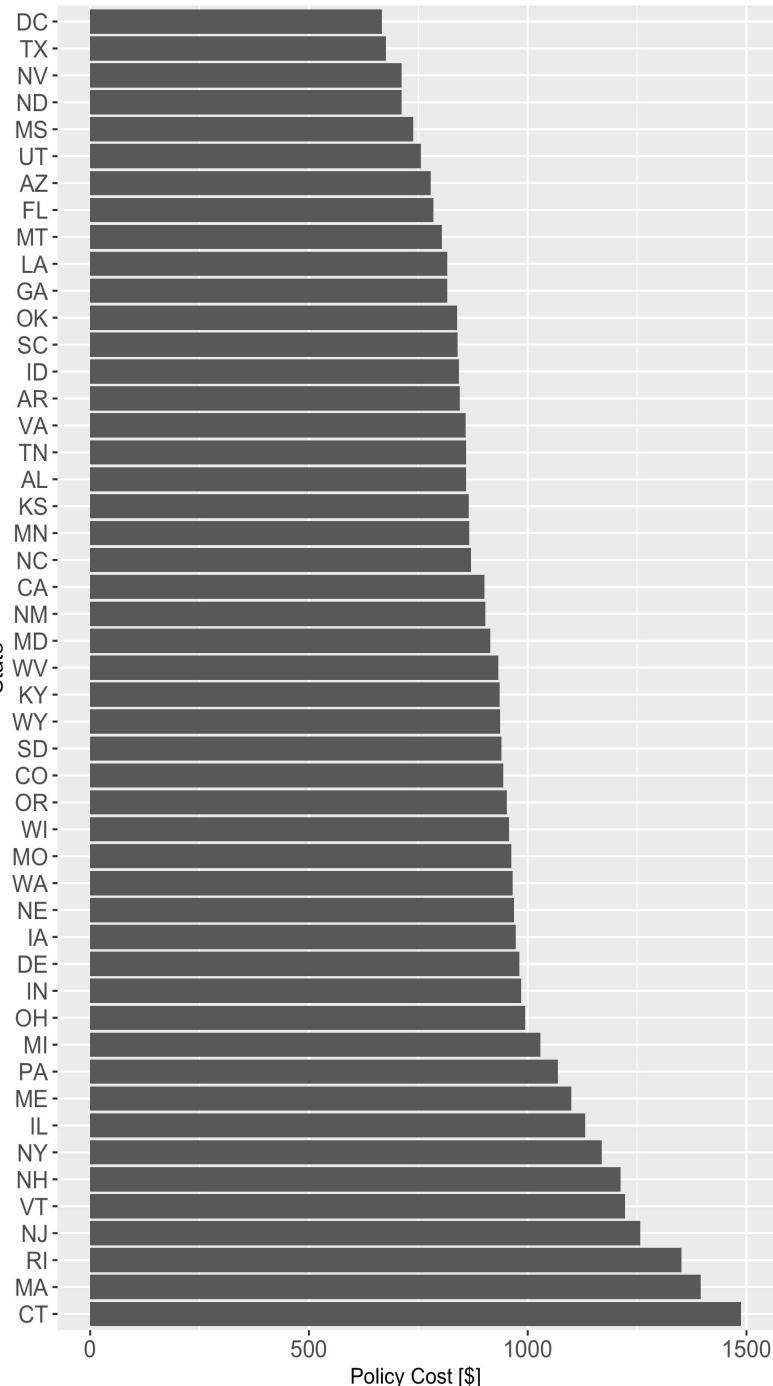
Average Cost – per Region



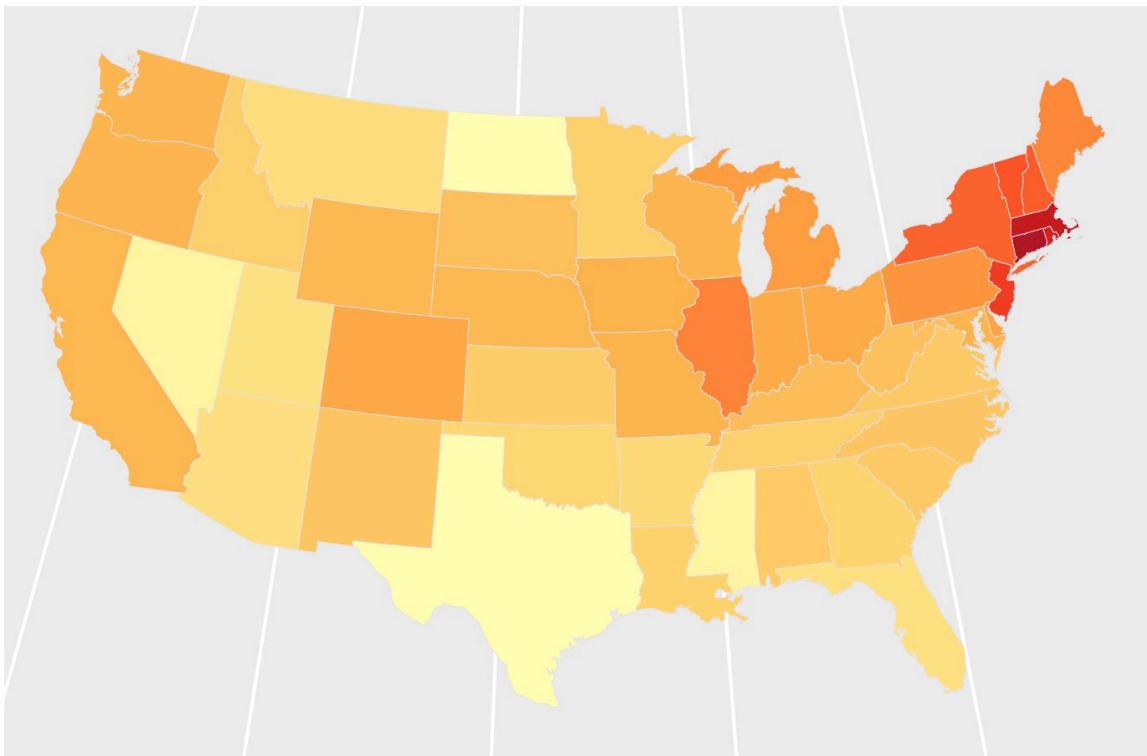


The average cost of flood insurance is lowest in the **south** (**\$715**) and most expensive in the **northeast** (**\$1140**)

Average cost of policy per state



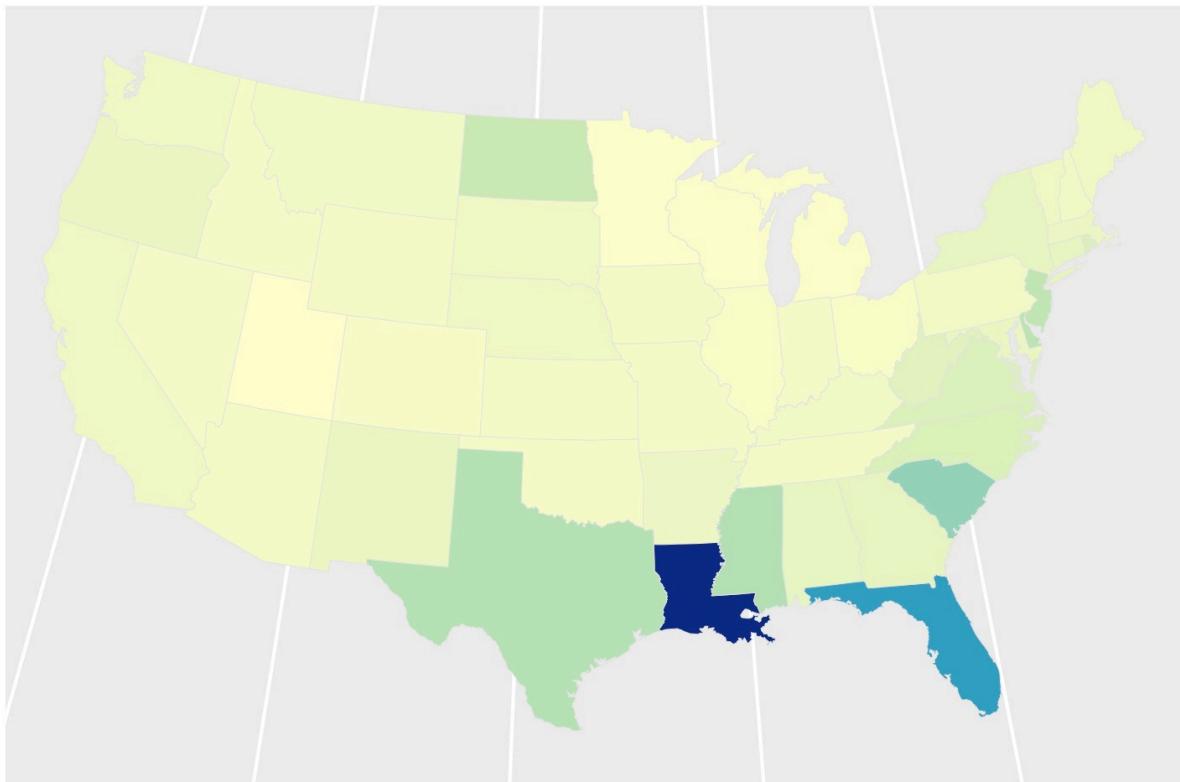
Average Cost – per State



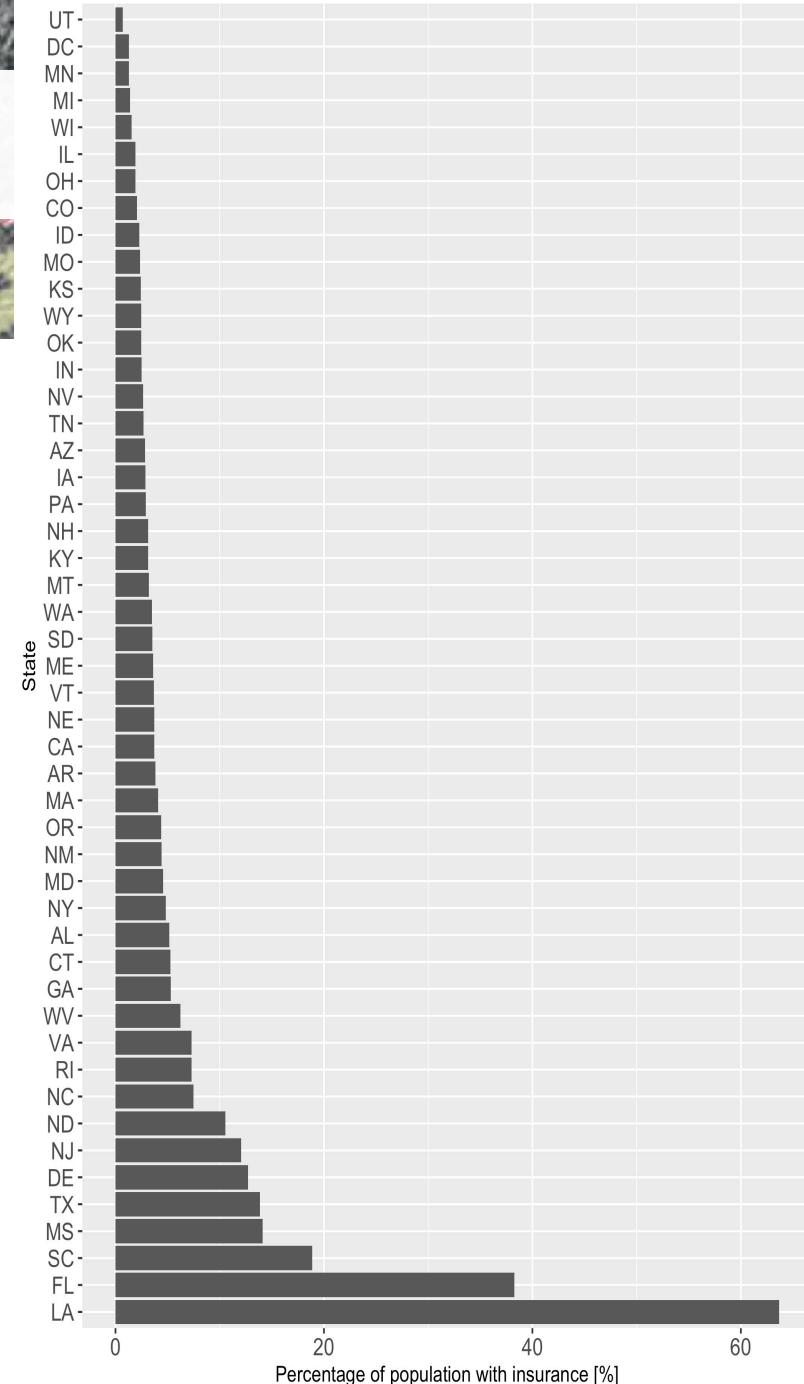
Cheapest: TX, NV, ND (\$720)
Most Expensive: CT, MA, RI (> \$ 1300)



% of population with insurance

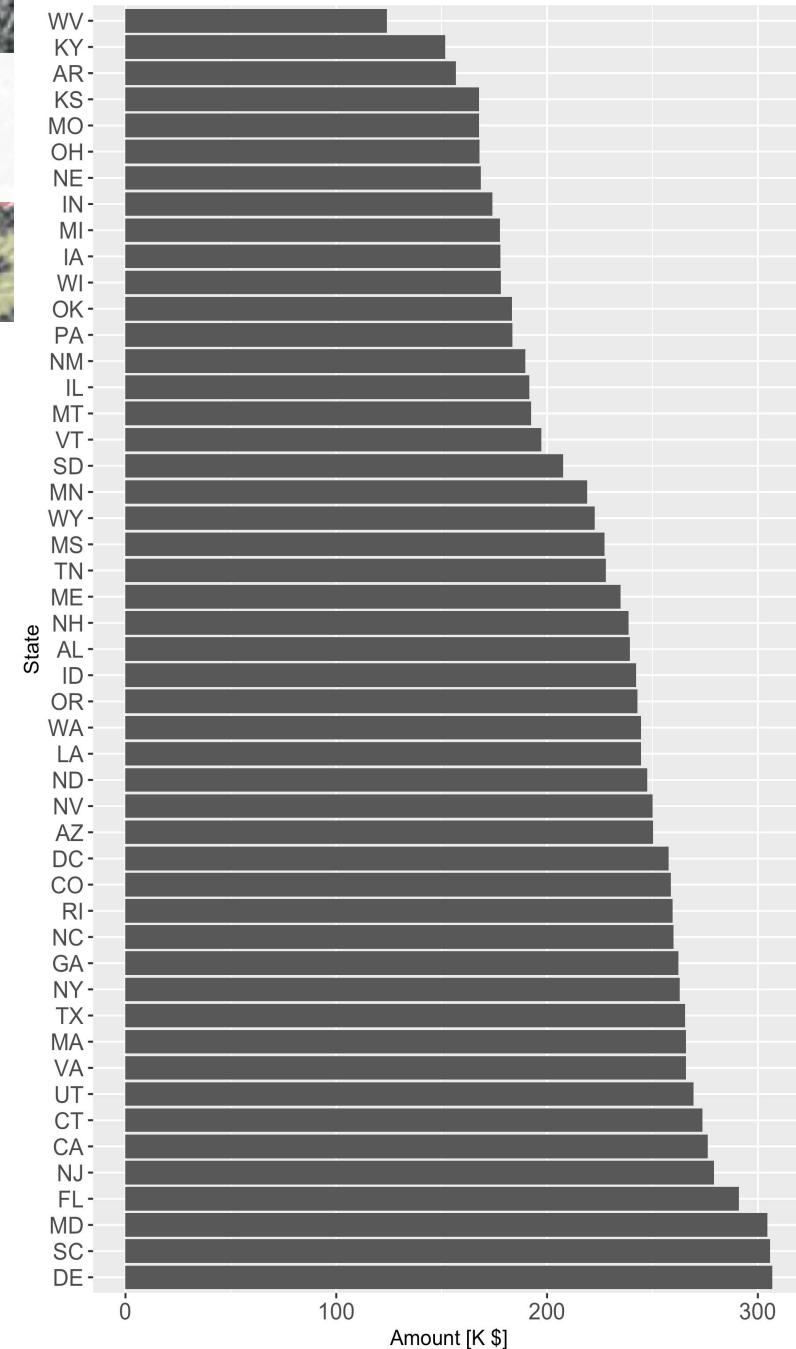
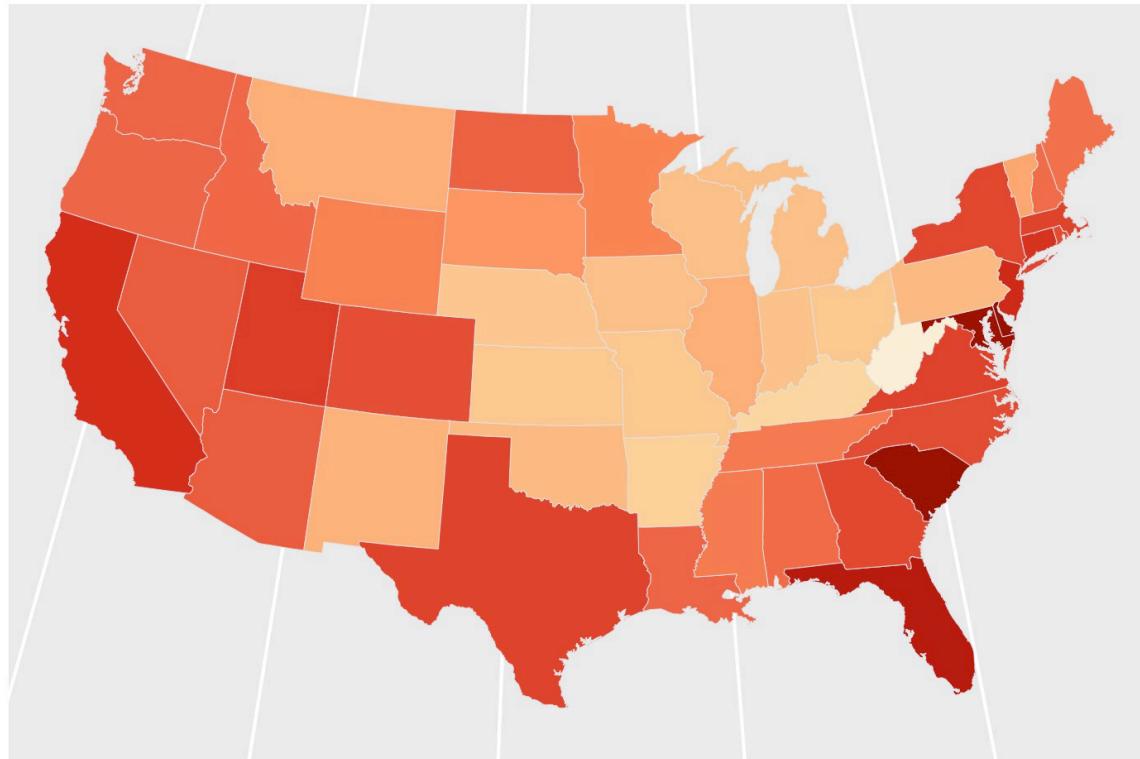


Clear standout: LA (> 60%)
But also: FL, SC, MS, TX





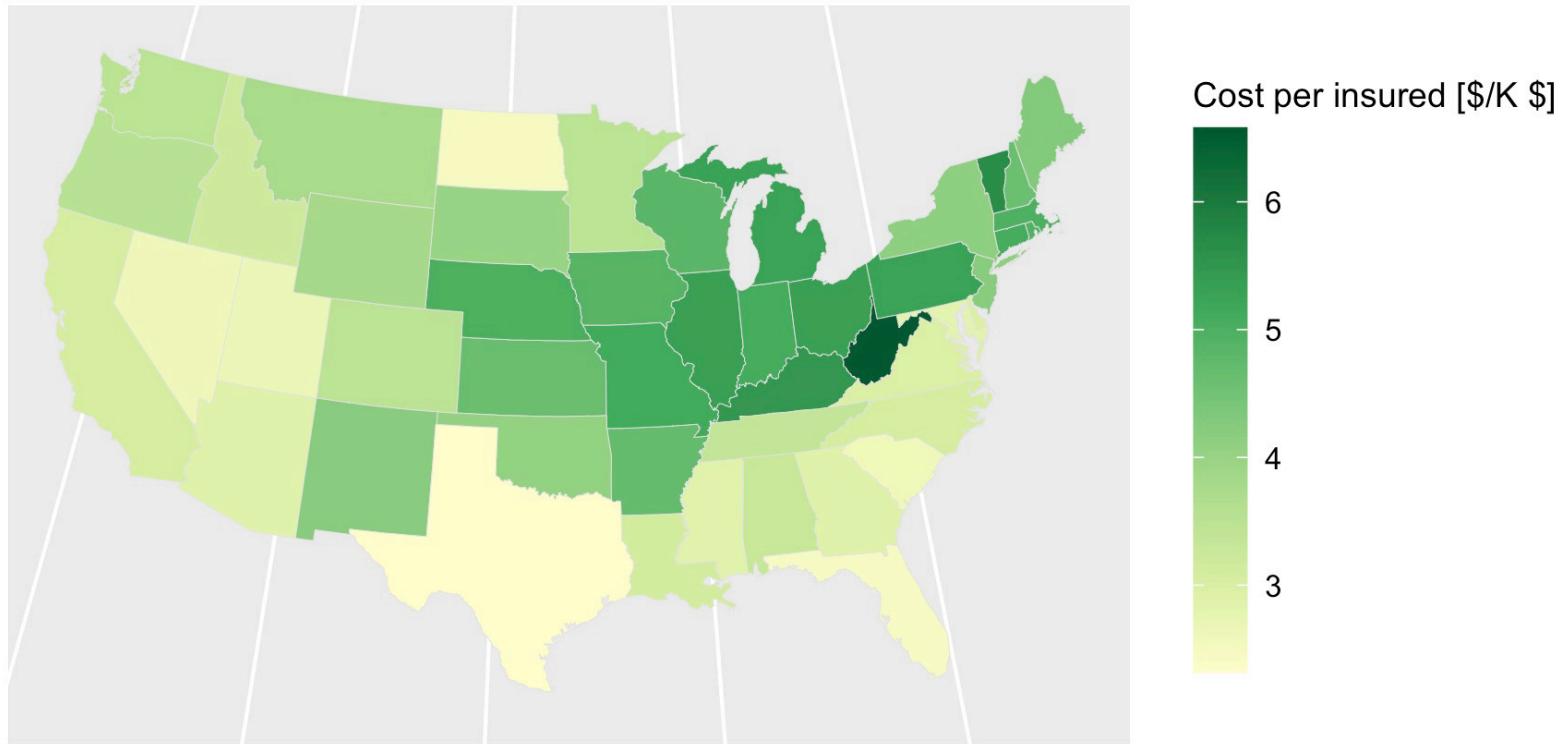
\$\$ Insured (building + content)



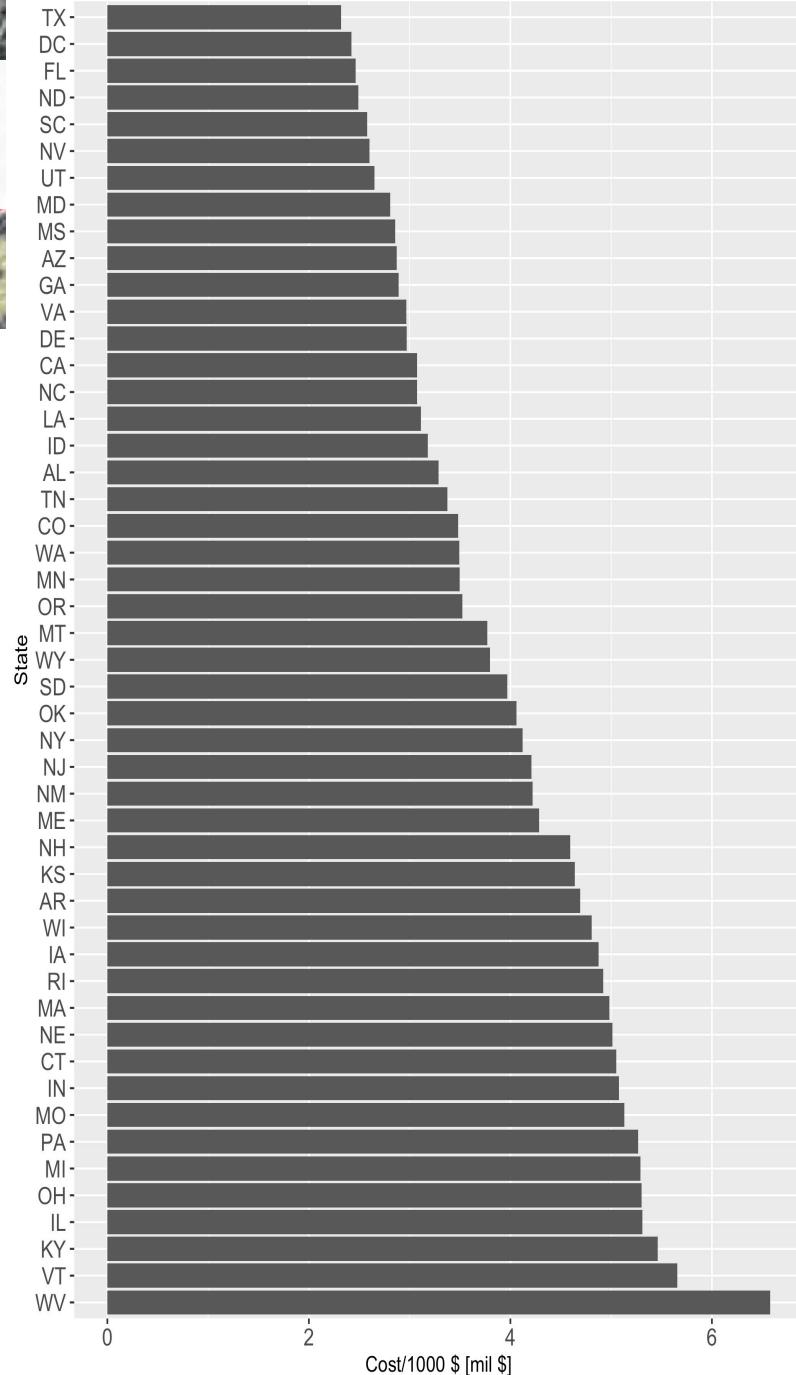
Clear standout: East coast
But also: Gulf Coast and CA

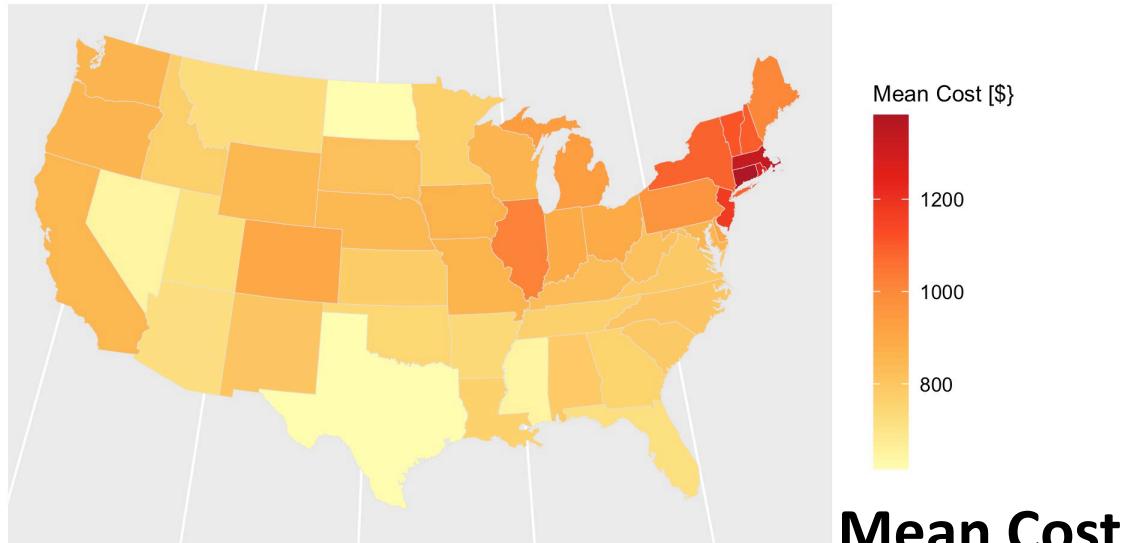
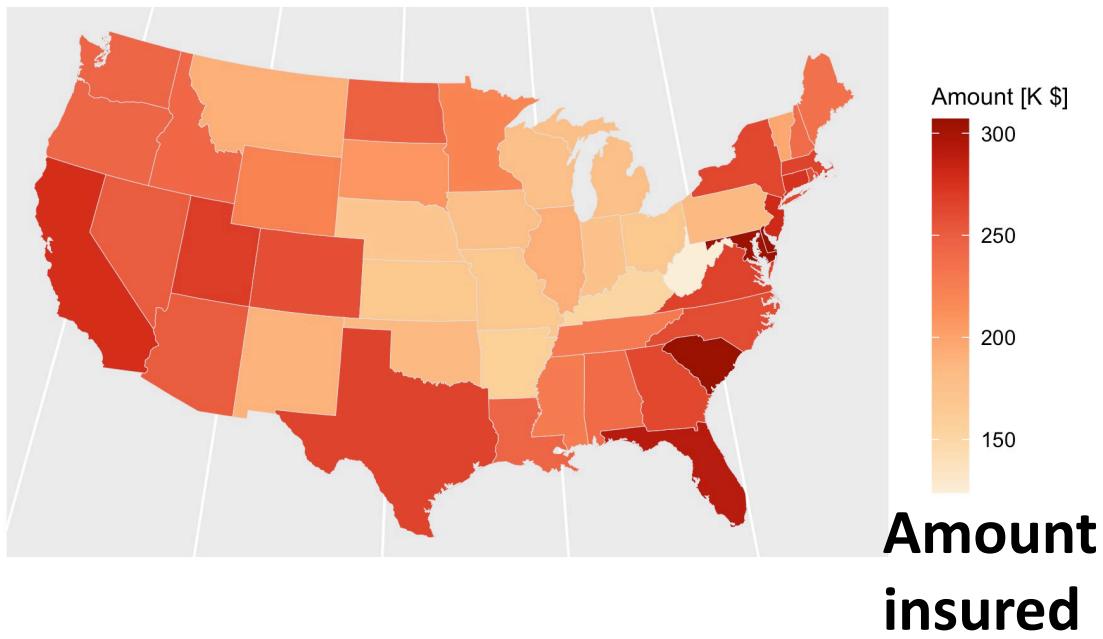
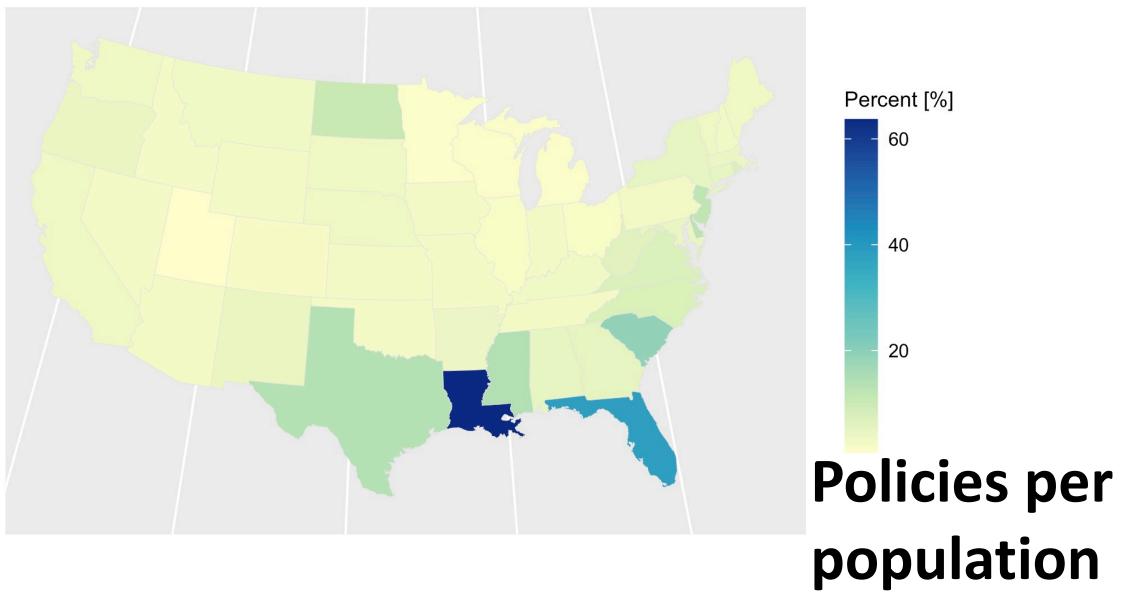
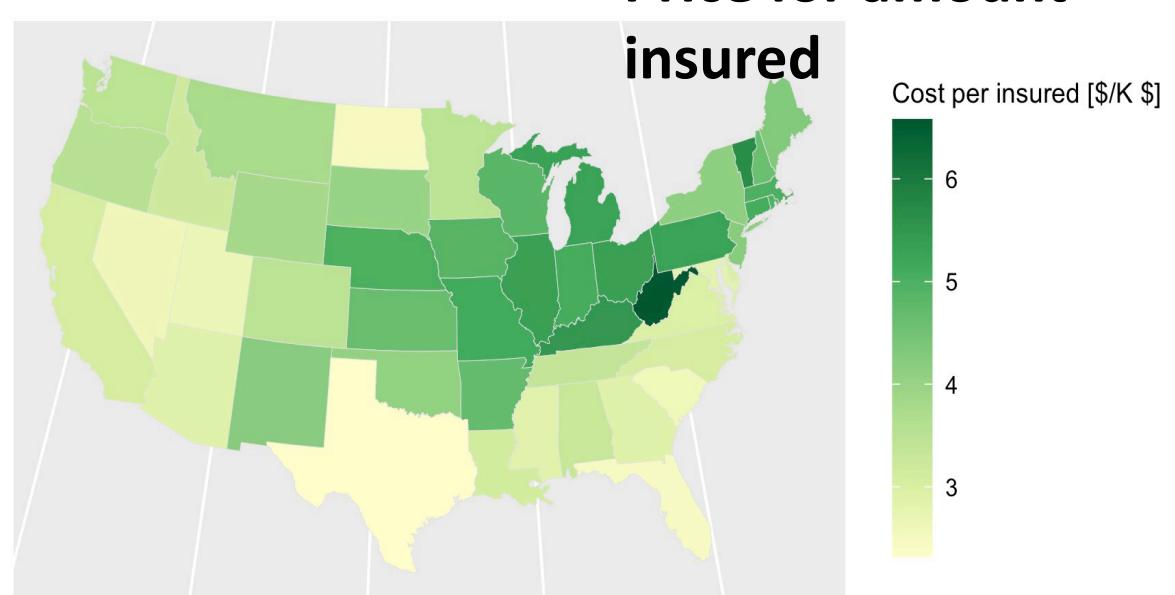


\$/1000\$ per insurance



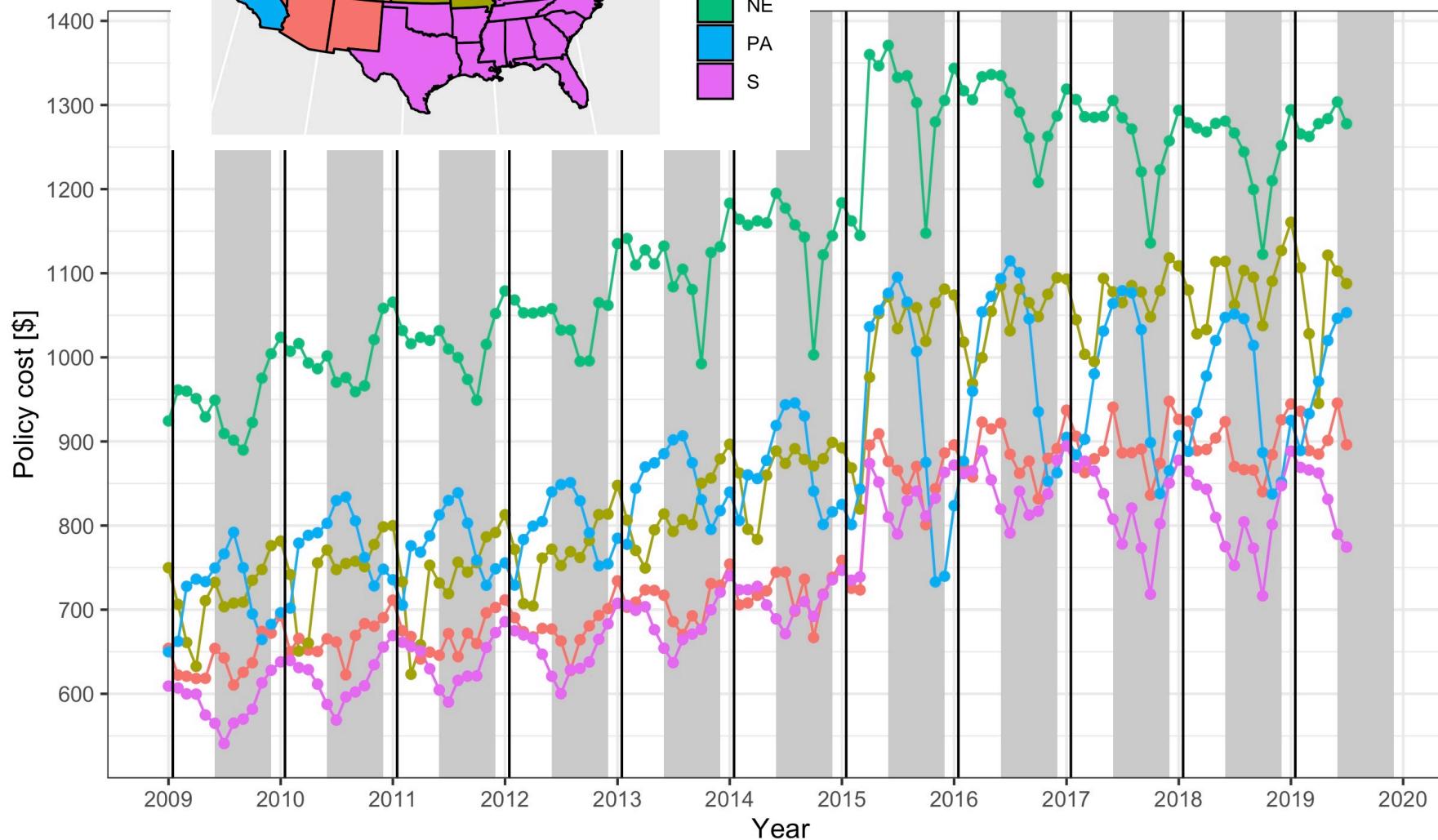
Clear standout: West Virginia is the most expensive
But also: States away from the coast







Changes over time



Strong seasonal cycle in all regions.

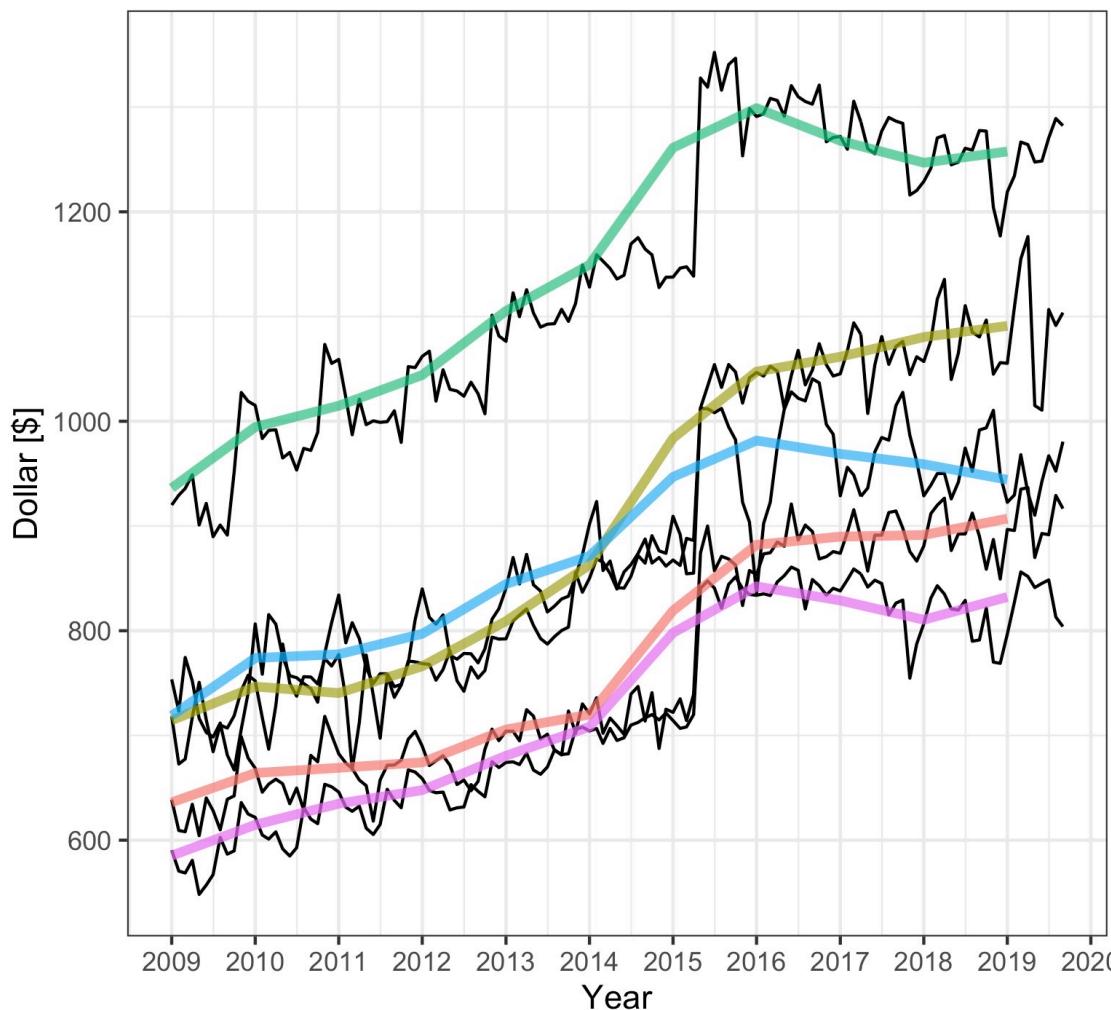
But also trend.

PA and S/NE are anti-correlated.

Remove seasonal cycle and analyze trend only.



Annual variability of insurance cost

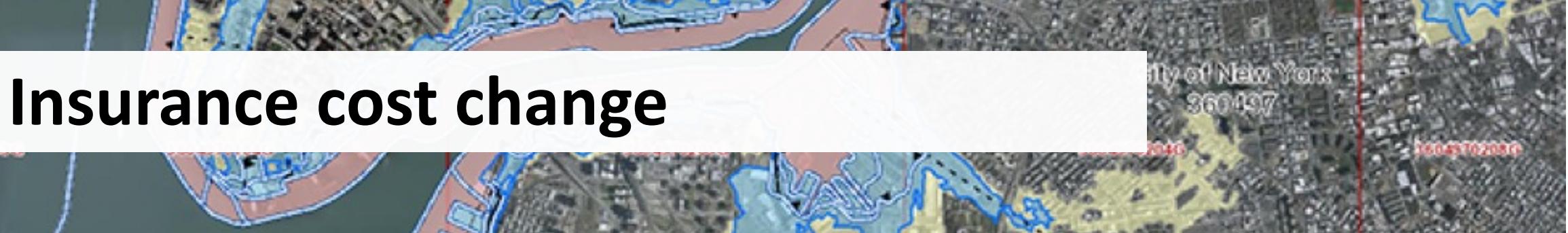


Black line: monthly cost
Colored line: Yearly trend

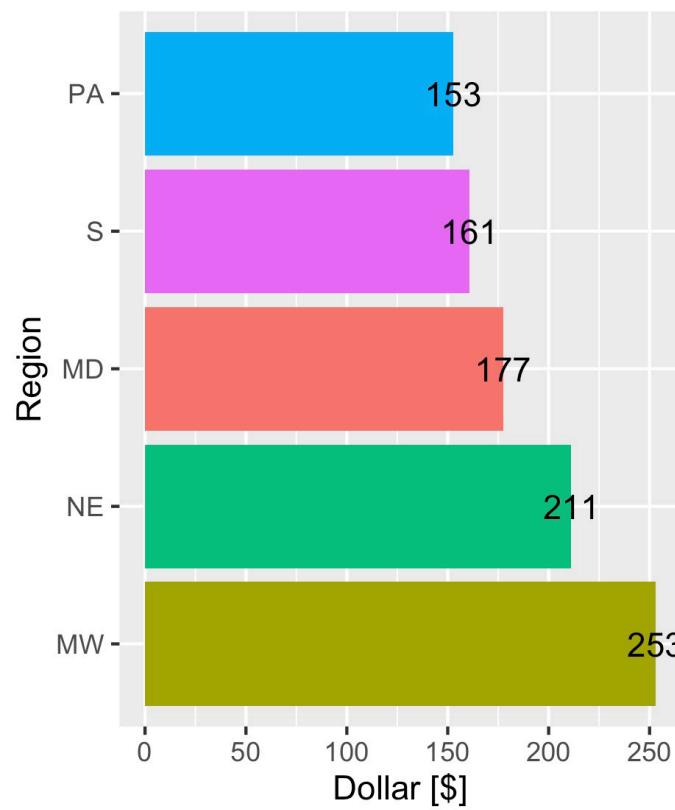
region

- MD
- MW
- NE
- PA
- S

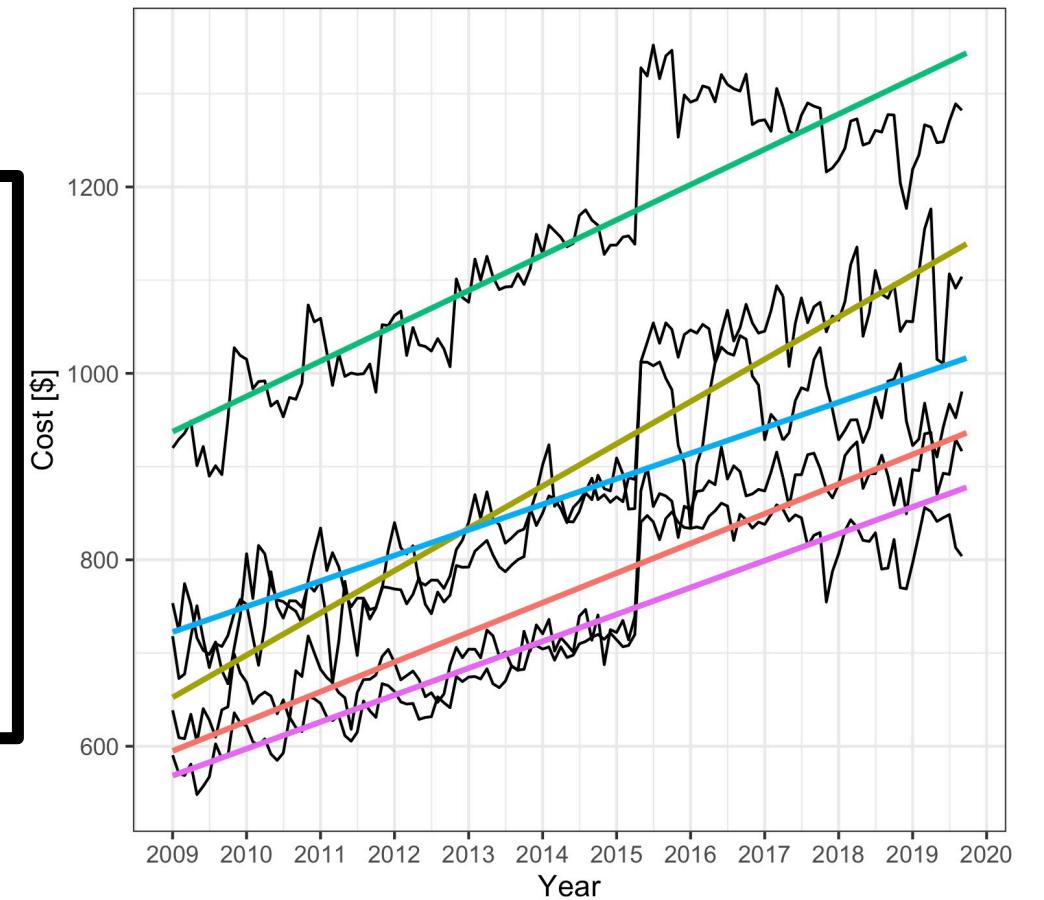
All regions show a general increase
Jump in 2015 → change in insurance policy
Fit line to calculate change in cost

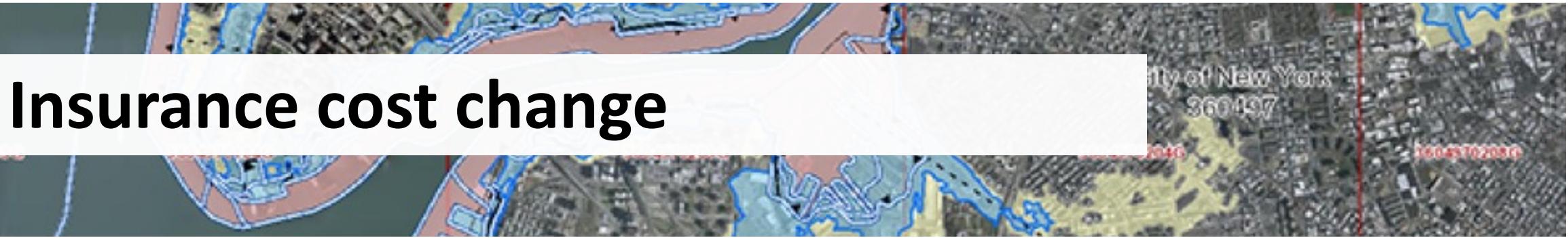


Insurance cost change

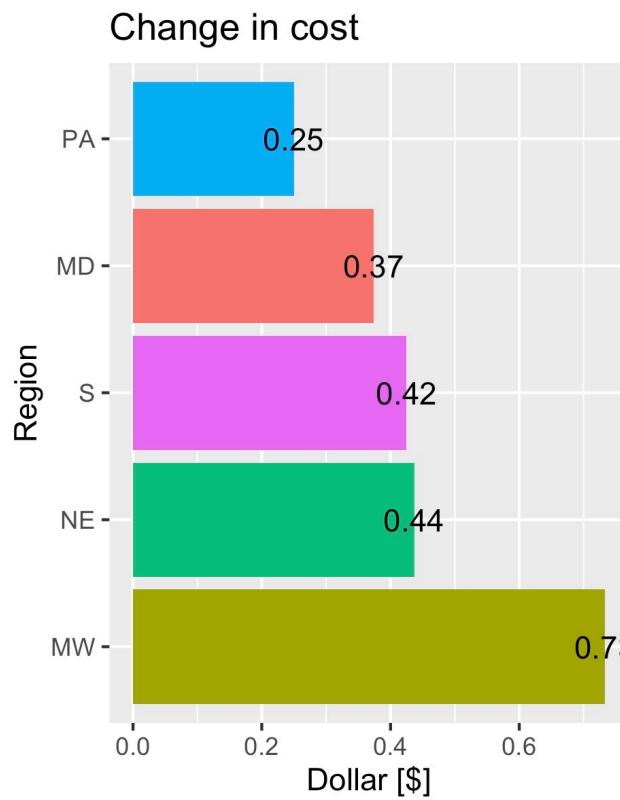


All regions show a general increase
Increase in MW is \$100 more than in PA



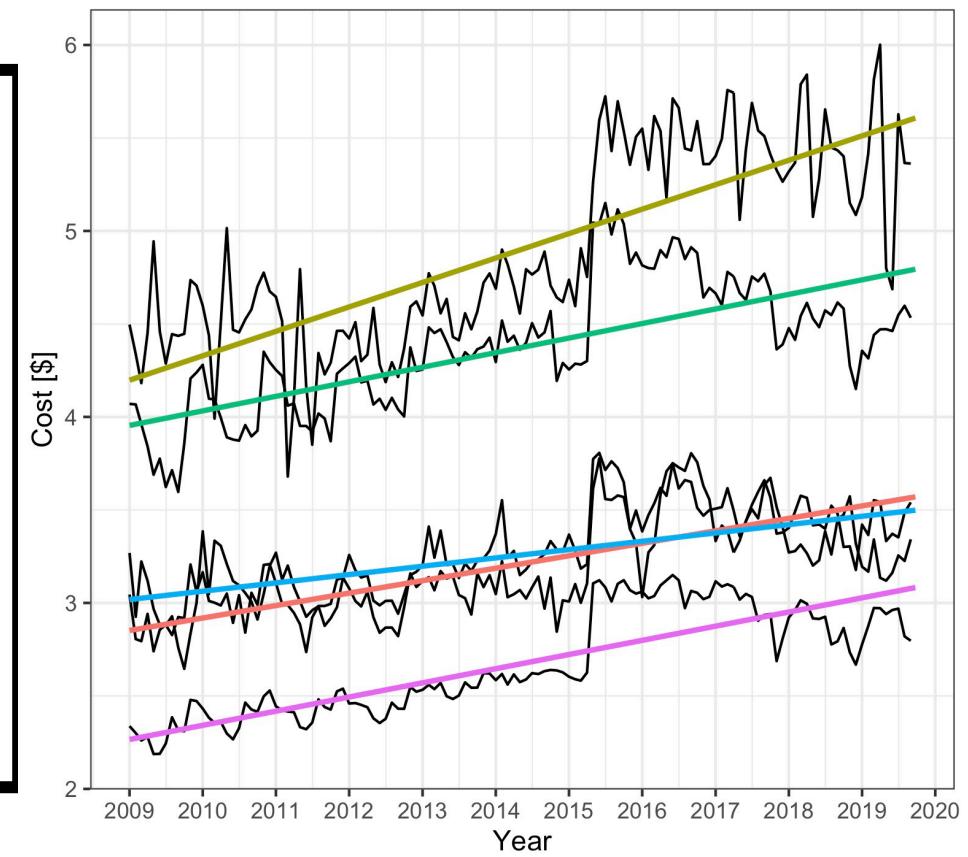


Insurance cost change



All regions show
an increase of how
much you have to
pay per 1000\$
insured

Increase in MW is
\$0.5 more than in
PA





Aerial map showing flood zones in a coastal area. The map includes a legend for flood zones and a scale bar.

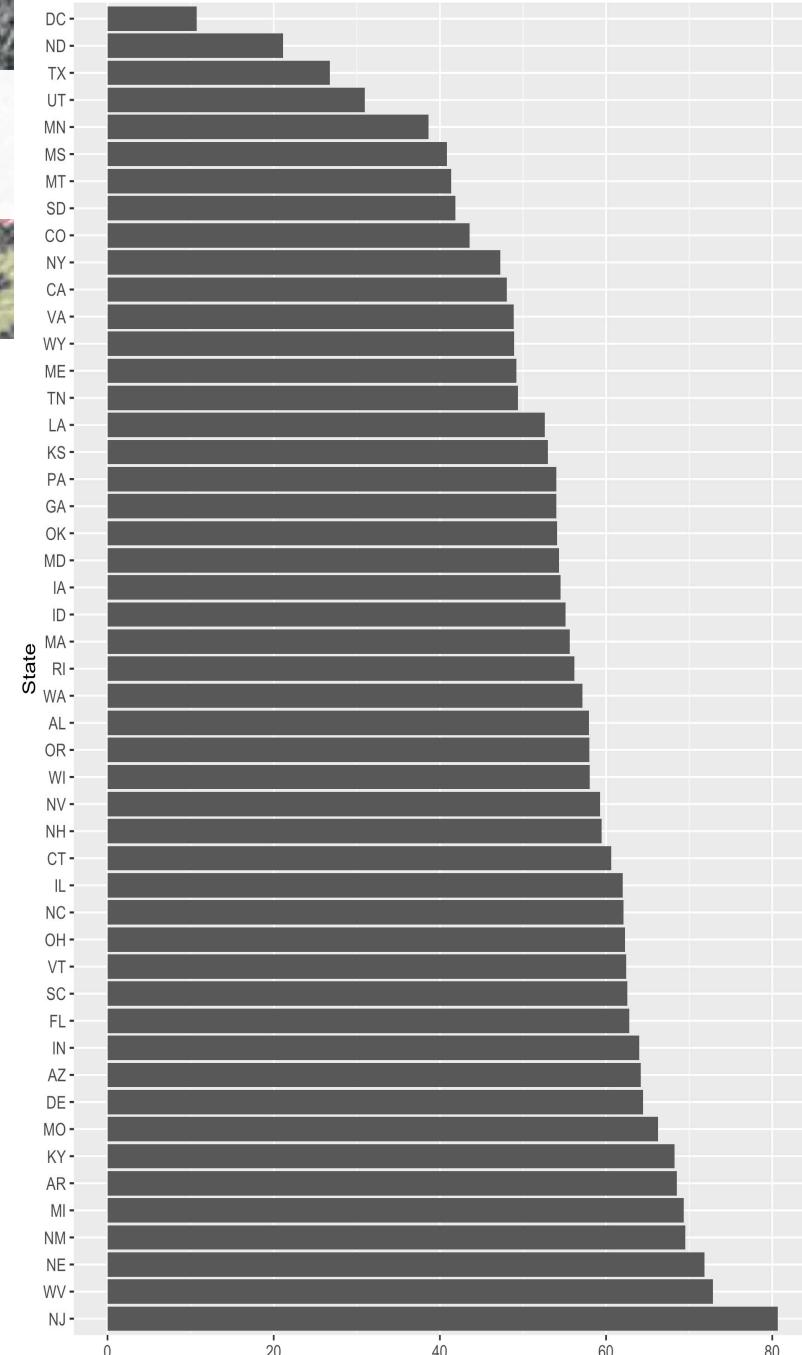
Floodzone vs. non-floodzone

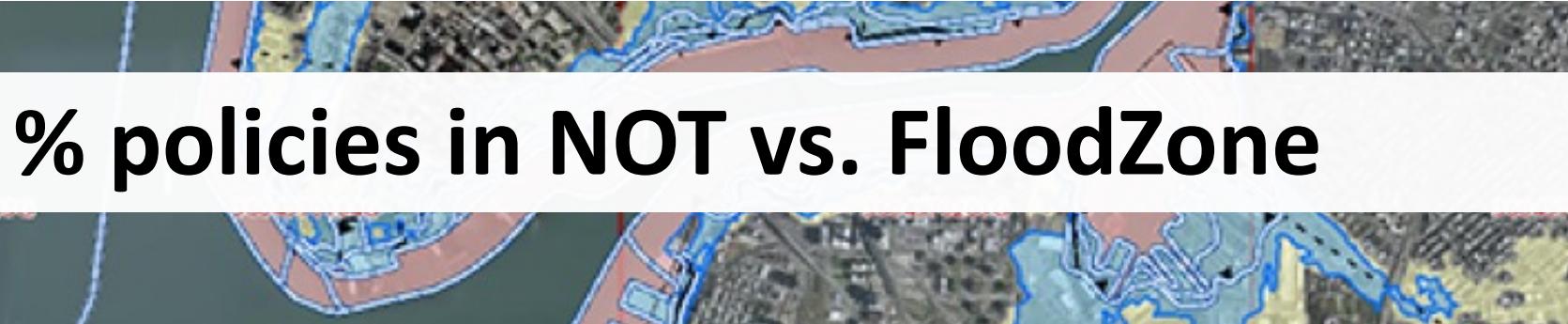


% policies in FloodZone

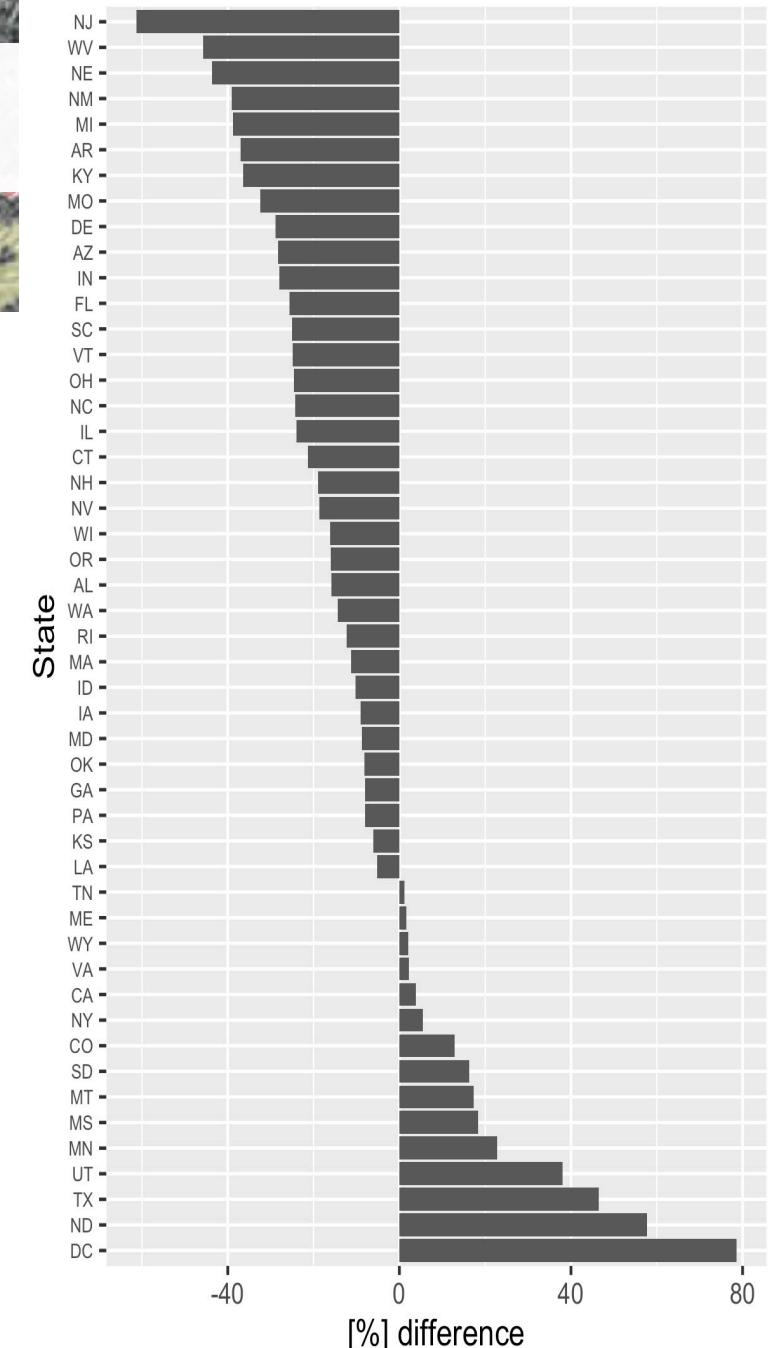
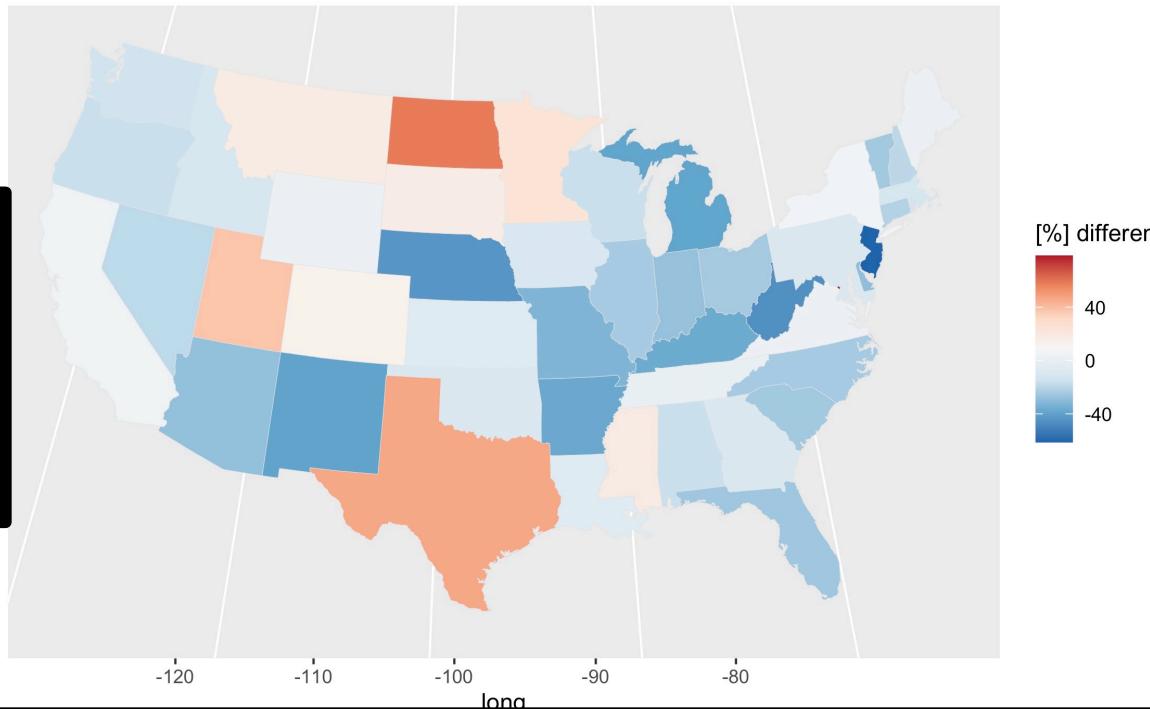
Clear standout: NJ has by far the largest percentage of coverage in Floodzones

Surprisingly: Texas has a much larger percentage that is NOT in a floodzone



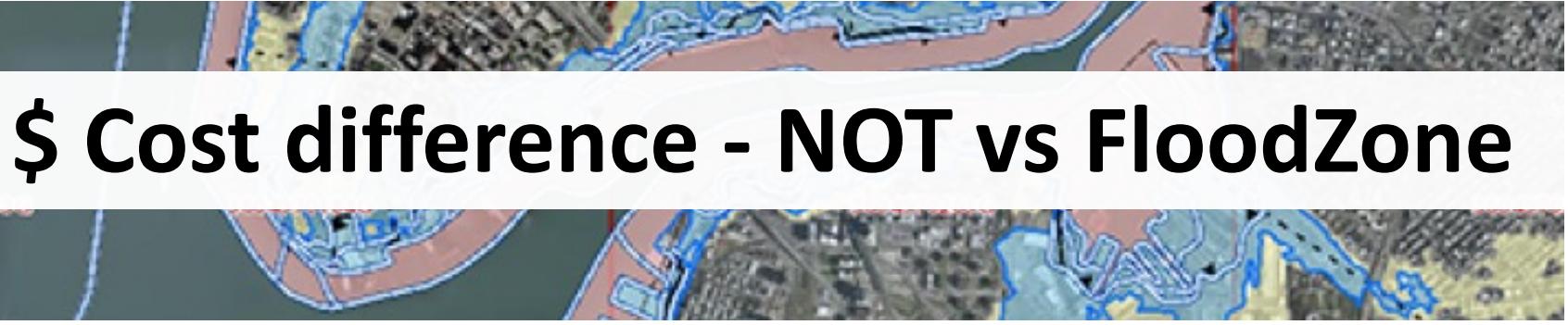


% policies in NOT vs. FloodZone

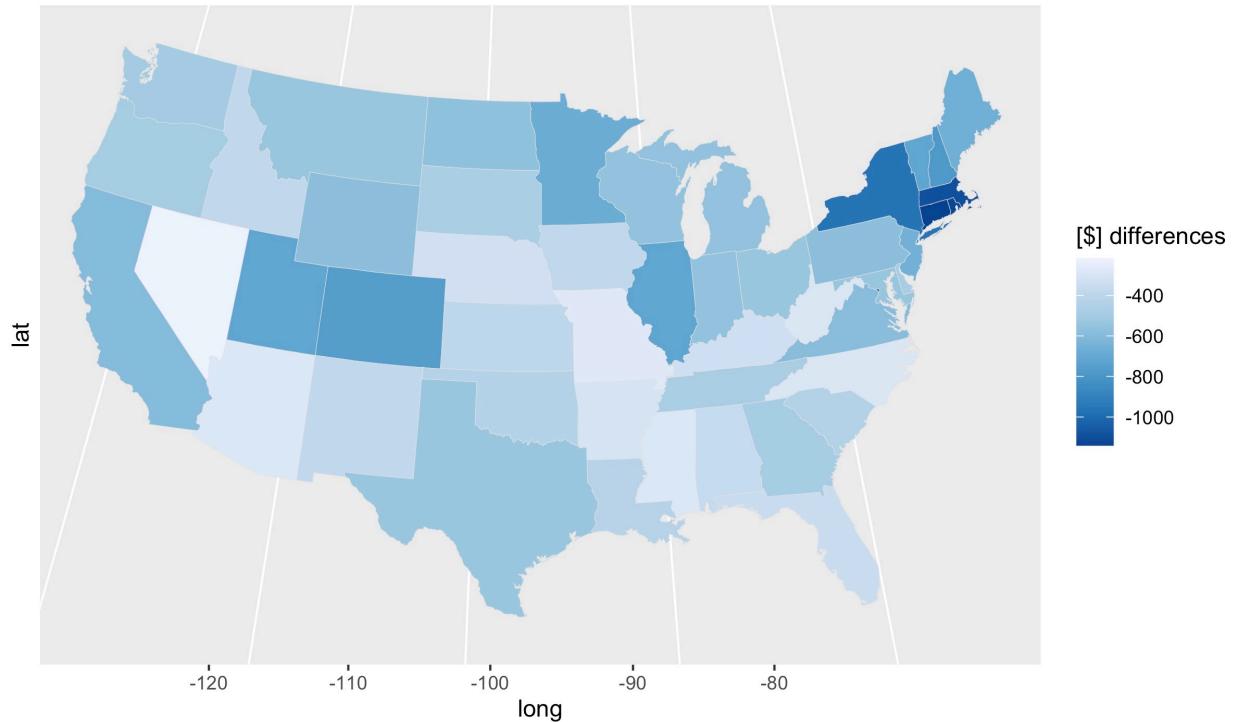


Clear standout: NJ has largest percentage of coverage in Floodzones

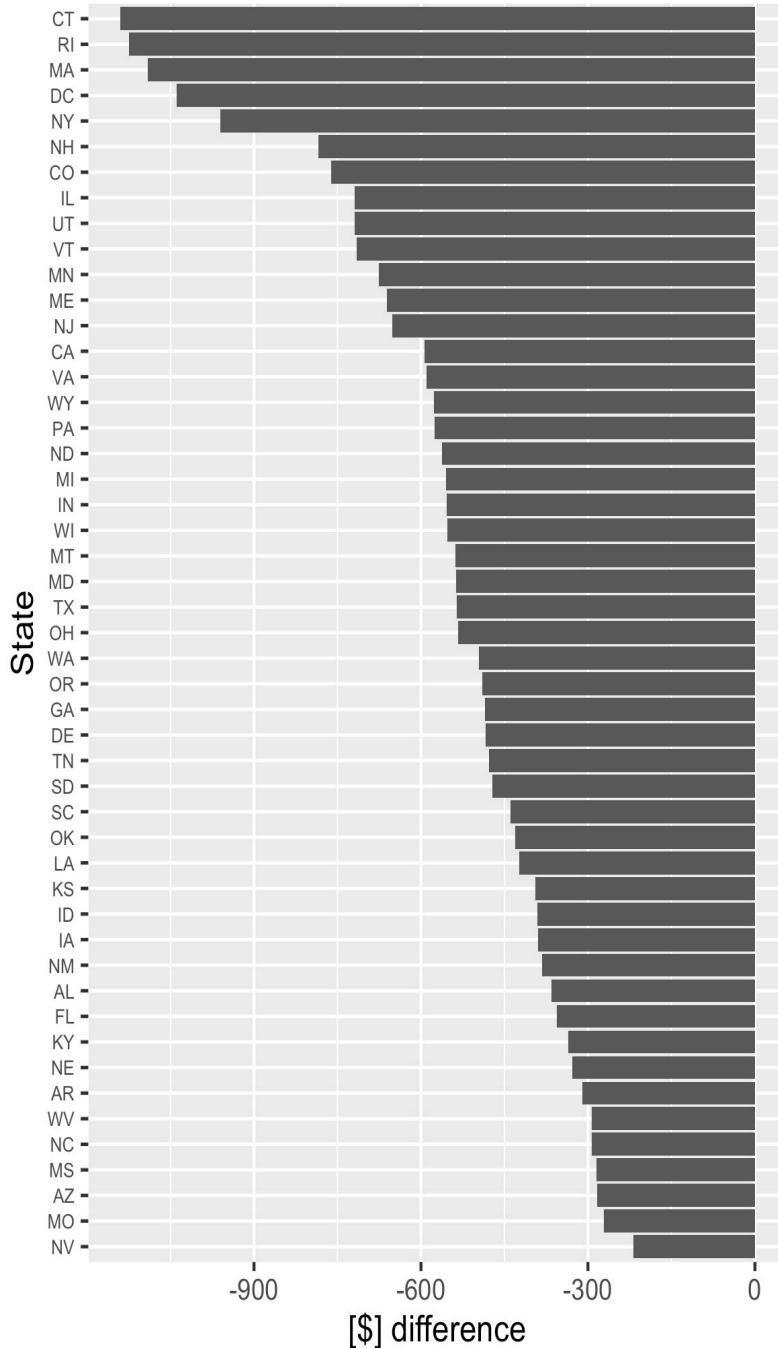
Surprisingly: Texas has a larger percentage that is NOT in a floodzone



-ve: more expensive in floodzone

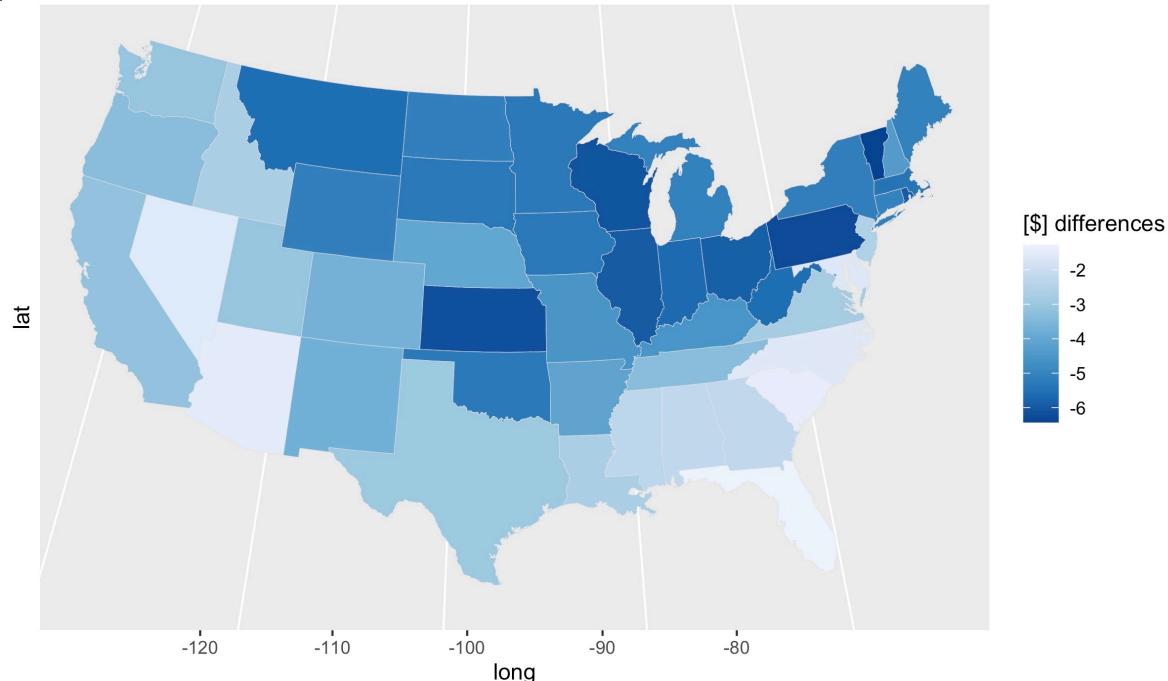


Largest difference: Northeast
Smallest difference: regions with little flooding
BUT also MS



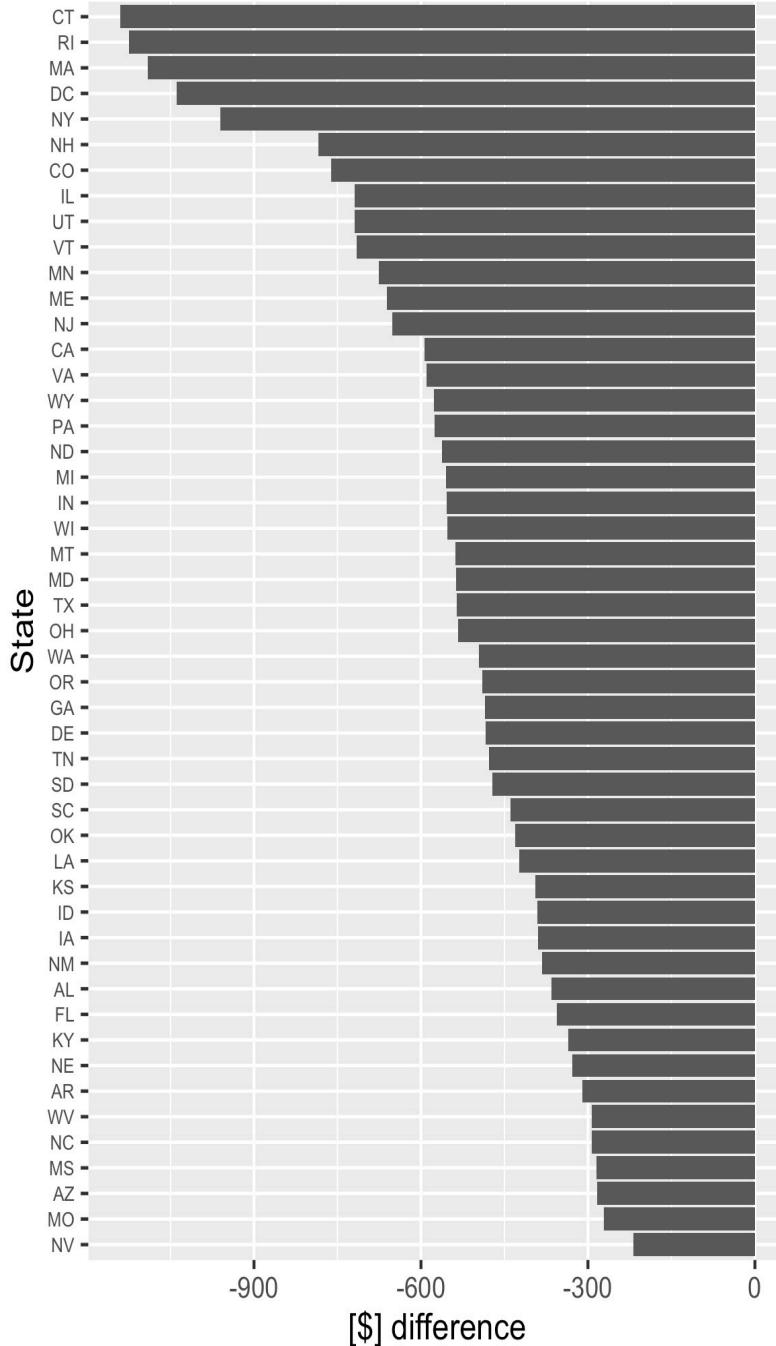
difference \$/1000\$ - NOT vs FloodZone

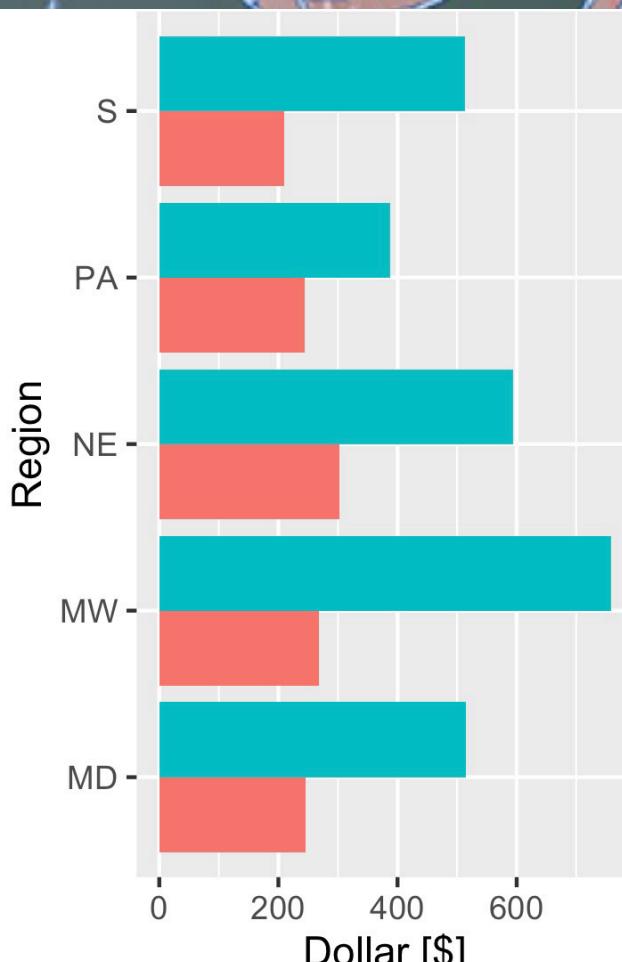
-ve: more
expensive
in
floodzone



Largest difference: Similar pattern to the cost per 1000K where states away from the coast were more expensive per 1000\$

Smallest difference: FL, SC

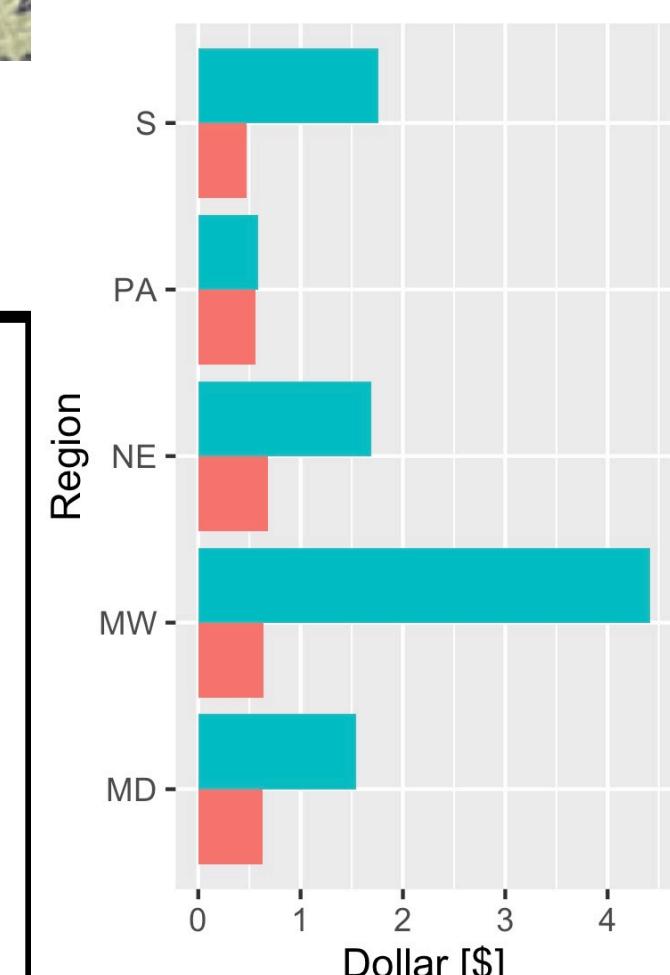


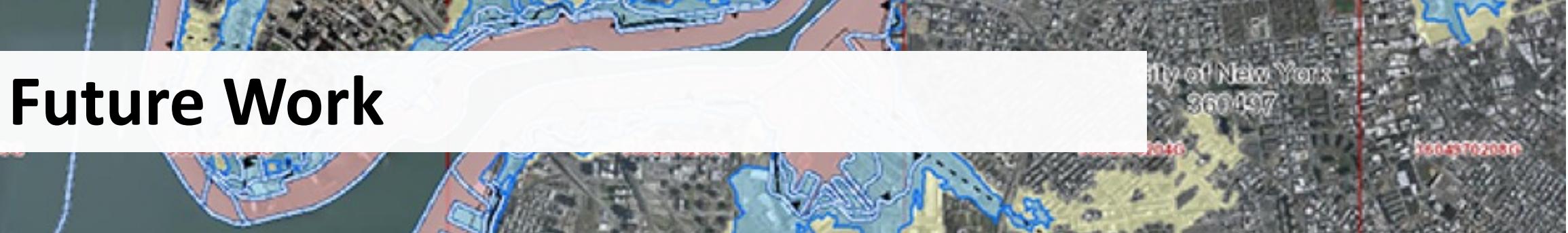


In all regions, the **increase in cost** and **coverage is larger in floodzones vs. non-floodzones**

Changes **in non-floodzones** are **similar** in all regions.

Changes **in floodzones** are **larges** in **MW** and **smallest** in **PA**





Future Work

Claims data:

- Claims per state, per coverage amount, per year, changes etc.

Private insurance:

- similarities? Differences?

Links to causes:

- Hurricanes, sea-level rise etc.

Links to other sectors:

- Housing market?