

The Local Economic Impact of Natural Disasters

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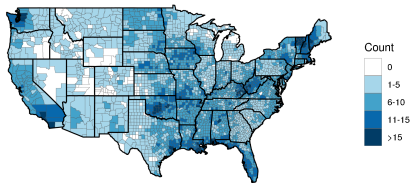
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¹Federal Reserve Board

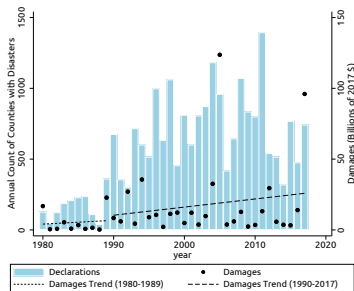
²Federal Reserve Bank of San Francisco

Natural disasters are widespread, with prevalence and costs having increased in recent decades

All Disaster Types

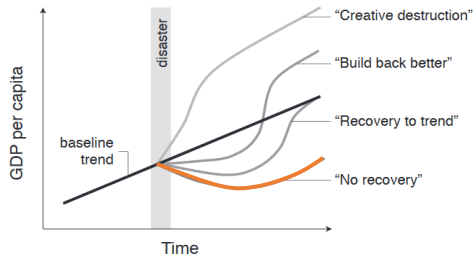


Source: FEMA, SHELDUS, Census



Understanding Economic Impact of Disasters is Critical

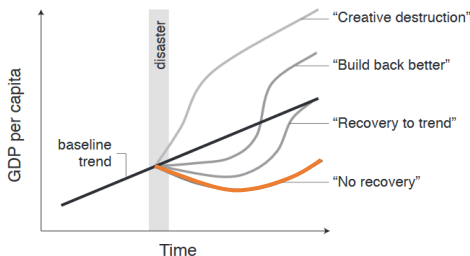
Potential Paths Considered in the Literature:



Source: Hsiang and Jina (2014)

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Key Prior Findings:

- Hsiang & Jina (2014): “No recovery” following cyclones in cross-country analysis
- Lackner (2019): “No recovery” following earthquakes for low/middle-income countries, but “Creative Destruction” for high-income countries
- Groen, et al. (2019): “Build back better” following Hurricanes Katrina and Rita in local earnings

Our approach

- Estimate **dynamic impact** of disasters on U.S. **counties** from 1980-2017 using panel data
- Consider **broad range** of economic outcomes on comprehensive set of disasters using **common methodology and data sample** → unified picture of economic impact of disasters
- Examine **heterogeneous** impacts by severity, disaster type, pre-disaster income, and historical experience
- Estimate **spatial spillover** effects
- Analysis does **not** examine welfare effects

Data

Disaster Indicator / "Treatment" Variable

- Disasters: FEMA major disasters, conditional on damages > 0
 - Damages: SHELDUS (ASU)

Outcomes / Dependent Variables (monthly, quarterly, annual)

- Personal Income Per Capita (BEA)
- Employment: Total Nonfarm, Construction (BLS QCEW)
- Average Weekly Wages (BLS QCEW)
- House Prices (CoreLogic)
- Population (Census)
- Government Aid (BEA, FEMA, SBA)

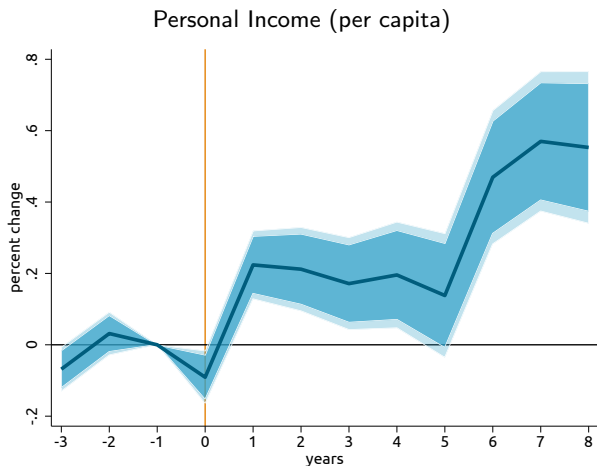
Methodology: panel version of local projections (Jordà 2005)

Estimate separately for each horizon h , from 0 to 8 years after disaster:

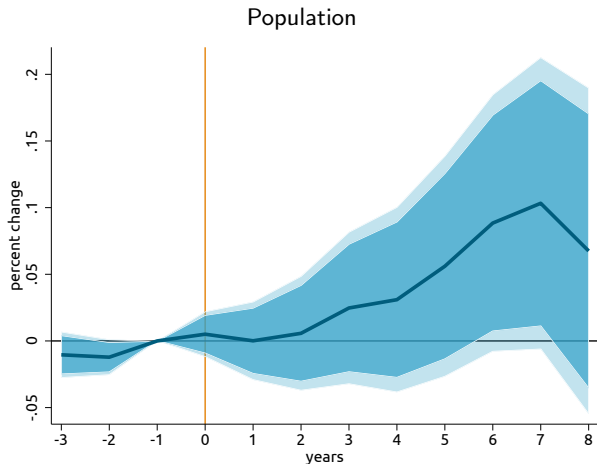
$$y_{c,t+h} - y_{c,t-1} = \beta^h D_{c,t} + \alpha_{r(c),t} + \alpha_{c,m(t)} + \mathbf{X}'_{ct} \gamma^h + \varepsilon_{c,t+h}$$

- county c , time t (month, quarter, or year)
- $y_{c,t+h} - y_{c,t-1}$: Cumulative change in dependent variable
- $D_{c,t}$: Disaster treatment
- Controls: time-by-region fixed effects, county-by-month (or quarter) fixed effects, control vector (\mathbf{X}'_{ct}) includes cumulative pretrend and intervening disasters

Per capita personal income response is consistent with “Build back better” scenario

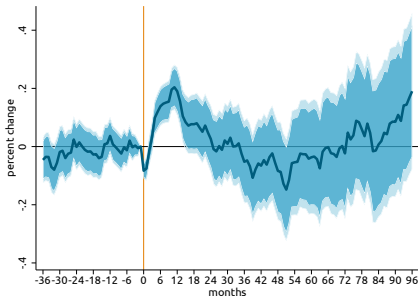


Higher Income per capita not due to population loss

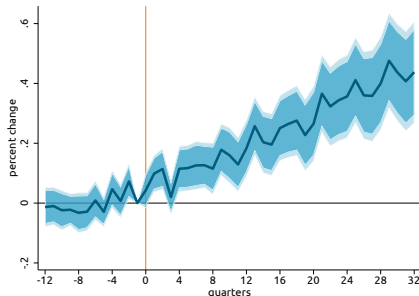


Short-run personal income increase due to employment, longer-run due to higher average wages

Total Nonfarm Employment

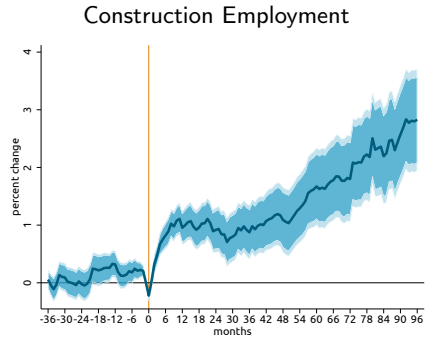
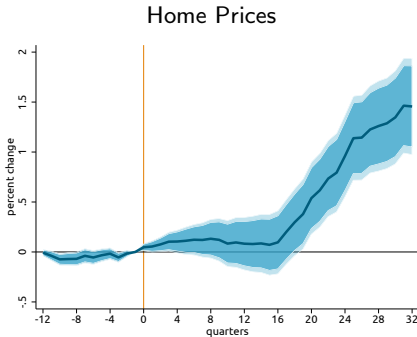


Average Weekly Wages



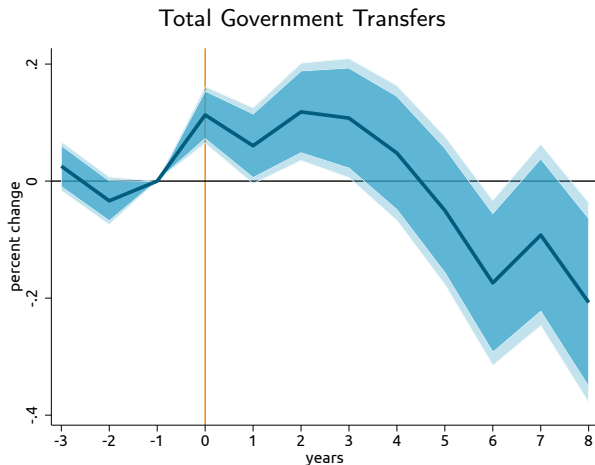
Source: BLS QCEW, FEMA, SHELDUS

Higher home prices and construction employment consistent with build back better model

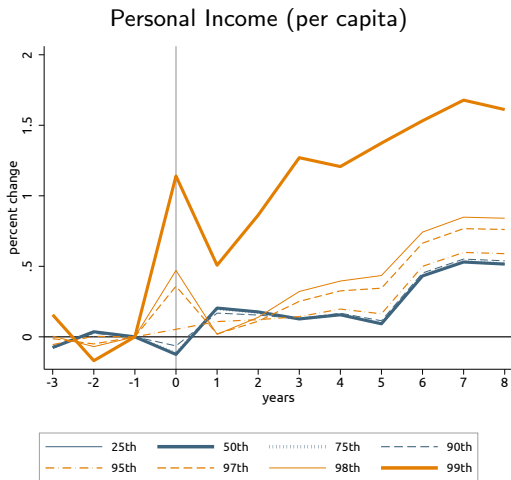


Source: Corelogic, BLS, FEMA, SHELUDS

Transfer income from federal, state, & local government increases in near-term but decreases over longer run



Most severe disasters: larger effects

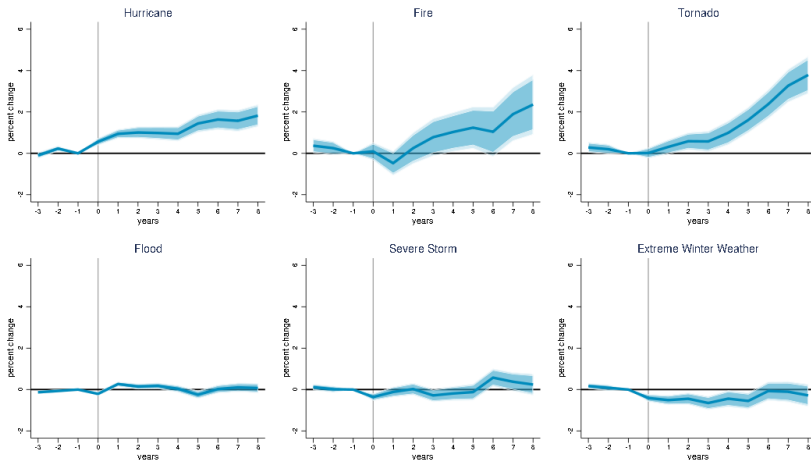


Most severe disasters \Rightarrow different equilibria as population & home prices fall in medium- to longer-run



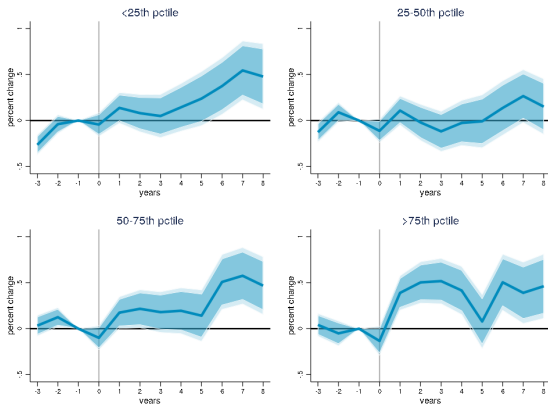
Not all disaster types yield above-baseline trend outcomes

Personal Income (Per Capita)



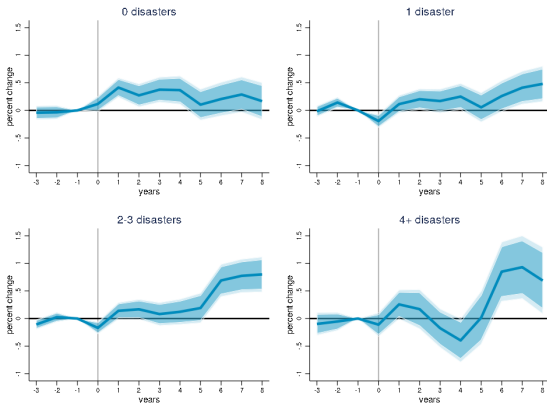
Longer run above-baseline trend personal income outcomes independent of pre-disaster income quartile

Personal Income (Per Capita)



Longer run above-baseline trend personal income outcome not significant for counties with no disasters in previous 10 years

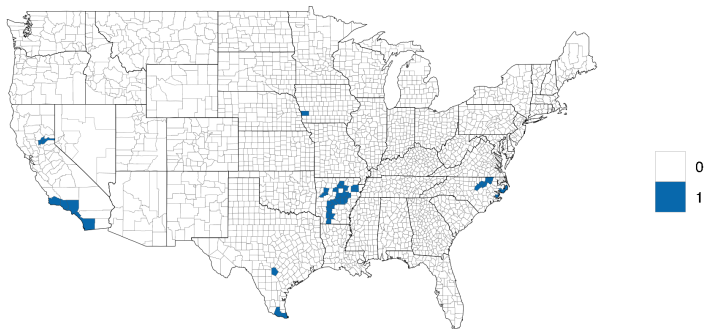
Personal Income (Per Capita)



Source: BLS QCEW, FEMA, SHELUDS

Spatial lag analysis: additional treatment is share of population in donuts surrounding a county that has been affected by disasters

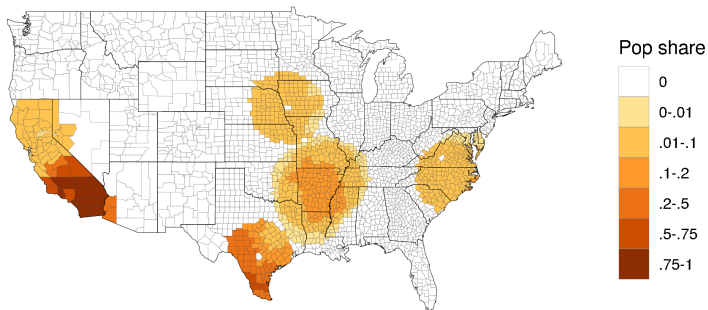
Counties with disasters in 1988



Source: FEMA, SHELUS, Census

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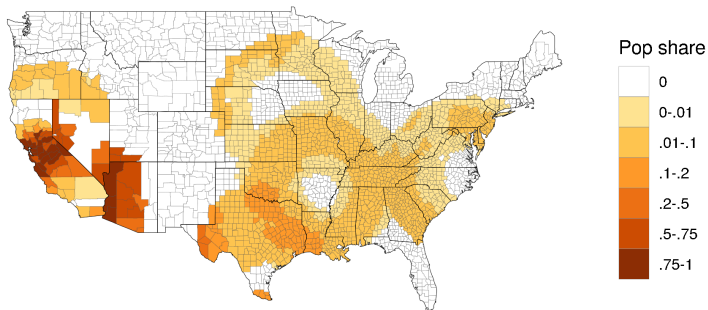
0 - 199 mile population share with disasters in 1988



Source: FEMA, SHELDUS, Census

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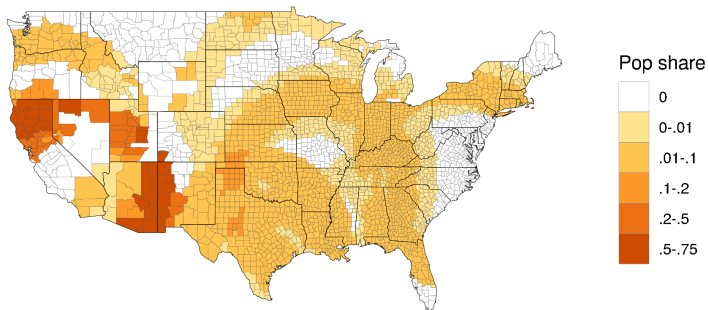
200 - 399 mile population share with disasters in 1988



Source: FEMA, SHELDUS, Census

Spatial lag analysis: additional treatment is share of population in donuts surrounding a county that has been affected by disasters

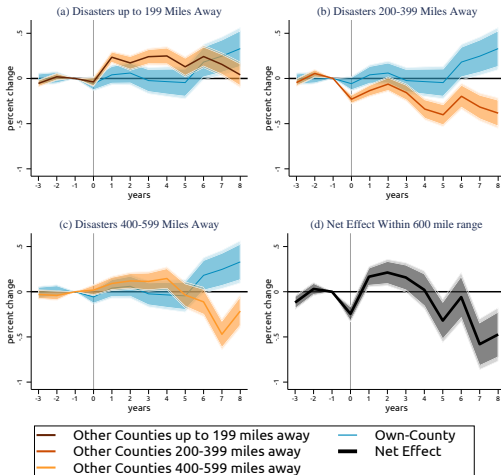
400 - 599 mile population share with disasters in 1988



Source: FEMA, SHELDUS, Census

Negative longer run personal income outcomes in counties over 200 miles away suggests net effect on region may be negative

Personal Income (Per Capita)



Potential Explanations

- Disasters typically a negative shock to productive capital stock and household wealth
 - similar to war destruction
- Long-lasting recovery and rebuilding process can lead to higher income p.c.
 - Possible productivity gains from improved local capital stock
 - This hypothesis supported by higher longer-run house price finding
- Composition shift to higher income individuals choosing to live in areas built back better after disasters
- Reallocation of resources from other counties in region

Summary of Results

In U.S. counties, after natural disasters...

- Local per capita personal income ↑
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- Responses are heterogeneous, requiring care in extrapolating results
 - Magnitude of income response increases with disaster severity
 - But most severe disasters \Rightarrow long-run declines in home prices & population
 - Income boost primarily due to Hurricanes, Fires, & Tornados
 - Longer run above-baseline trend personal income outcomes independent of pre-disaster income quartile
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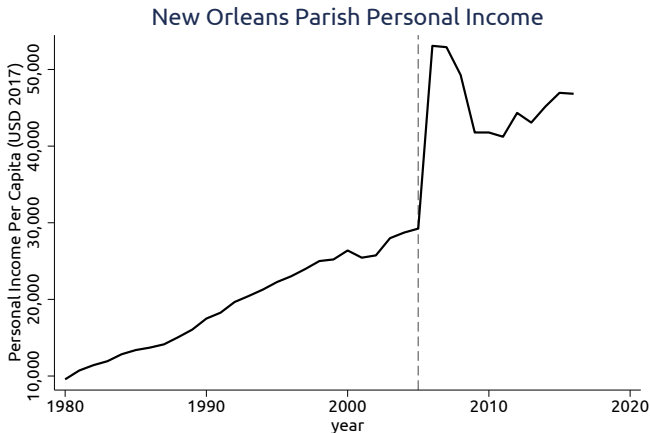
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 - Longer run above-baseline trend personal income outcomes independent of pre-disaster income quartile
 - Counties inexperienced w/ disasters \rightarrow no long-term increase in income
- Regional net longer-run personal income per capita effect may be negative due to spatial spillovers

Thank you!

@rothtran

Example of Hurricane Katrina



Source: BEA, Census.

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Note: Vertical red line indicates 2005, the year of Hurricane Katrina.