The Local Economic Impact of Natural Disasters

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FRB Richmond Climate Change Workshop
November 20, 2020

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

Source: FEMA, SHELDUS, Census
Understanding Economic Impact of Disasters is Critical

Potential Paths Considered in the Literature:

![Diagram showing potential paths of GDP per capita over time](source: Hsiang and Jina (2014))
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Key Prior Findings:
- Hsiang & Jina (2014): “No recovery” following cyclones in cross-country analysis
Understanding Economic Impact of Disasters is Critical

Potential Paths Considered in the Literature:

- **“Creative destruction”**
- **“Build back better”**
- **“Recovery to trend”**
- **“No recovery”**

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
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Potential Paths Considered in the Literature:

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- 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:

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

- 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 $(X_{ct}')$ includes cumulative pretrend and intervening disasters
Per capita personal income response is consistent with “Build back better” scenario

Source: BEA, FEMA, SHELDUS
Higher Income per capita not due to population loss

Source: Census, FEMA, SHELDUS
Short-run personal income increase due to employment, longer-run due to higher average wages

Source: BLS QCEW, FEMA, SHELDUS
Higher home prices and construction employment consistent with build back better model.

Source: Corelogic, BLS, FEMA, SHELDUS
Transfer income from federal, state, & local government increases in near-term but decreases over longer run

Total Government Transfers

Source: BEA, FEMA, SHELDUS
Most severe disasters: larger effects

Source: BEA, FEMA, SHELDUS
Most severe disasters ⇒ different equilibria as population & home prices fall in medium- to longer-run

Source: Corelogic, Census, FEMA, SHELDUS
Not all disaster types yield above-baseline trend outcomes

Source: BLS QCEW, FEMA, SHELDUS
Longer run above-baseline trend personal income outcomes independent of pre-disaster income quartile

Source: BLS QCEW, FEMA, SHELDUS
Longer run above-baseline trend personal income outcome not significant for counties with no disasters in previous 10 years

Source: BLS QCEW, FEMA, SHELDUS
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, SHELDUS, Census
Spatial lag analysis: additional treatment is share of population in donuts surrounding a county that has been affected by disasters

0 - 199 mile population share with disasters in 1988

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

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)

(a) Disasters up to 199 Miles Away
(b) Disasters 200-399 Miles Away
(c) Disasters 400-599 Miles Away
(d) Net Effect Within 600 mile range

Other Counties up to 199 miles away
Own-County
Other Counties 200-399 miles away
Net Effect
Other Counties 400-599 miles away

Source: BLS QCEW, FEMA, SHELDUS
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 ⇒ 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
  - Counties inexperienced w/ disasters → no long-term increase in income
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- Regional net longer-run personal income per capita effect may be negative due to spatial spillovers
Thank you!

@rothtran
Example of Hurricane Katrina

New Orleans Parish Personal Income

Source: BEA, Census.

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