

What influences the destination of disaster migrants? Evidence from Hurricane Katrina

AERE Conference Presentation

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Overview

Talk will cover:

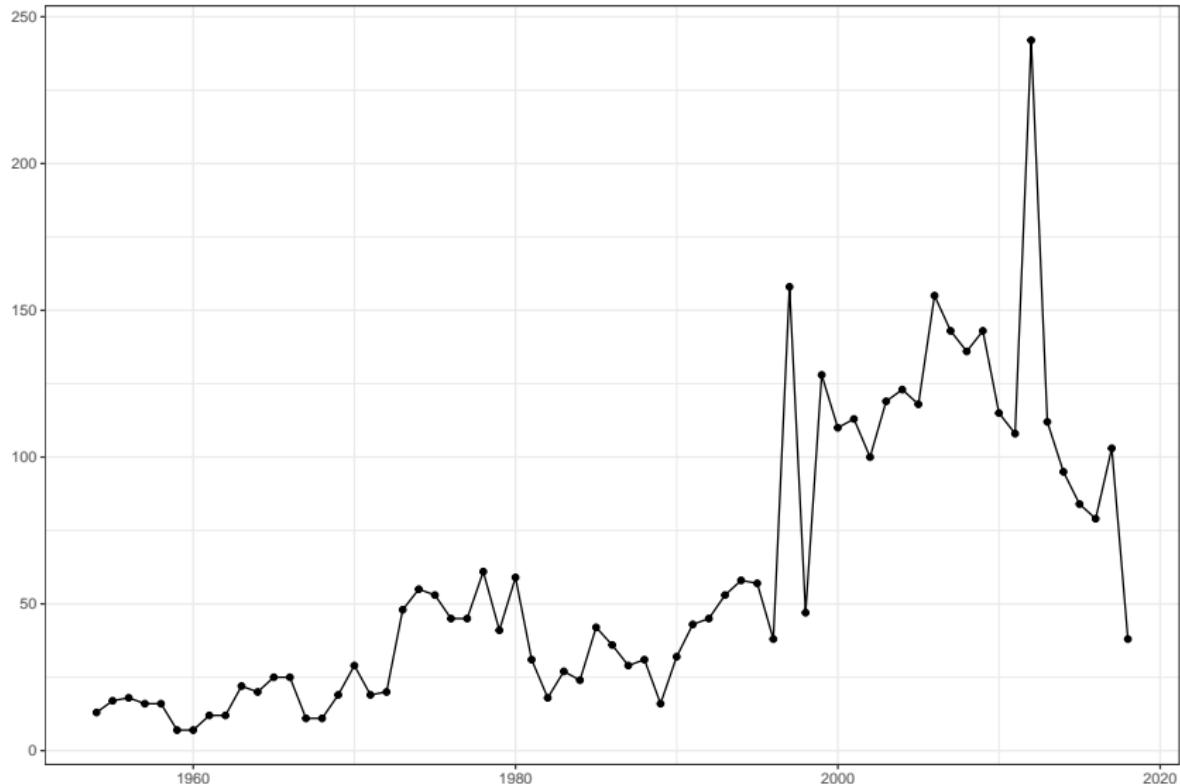
- ▶ Motivation and Research Question
- ▶ Data
- ▶ Empirical Strategy
- ▶ Results
- ▶ Economic Relevance

Motivation and Research Question

Growing Risks of Natural Disasters

- ▶ Climate change implies more frequent and more damaging disasters (Van Aalst 2006)
- ▶ Disasters do not discriminate with respect to wealth, but institutions and wealth can help mitigate deaths (Kahn 2005)
- ▶ Growing social costs within the United States
 - ▶ More frequent FEMA disaster declarations
 - ▶ Higher federal costs for declared disasters
 - ▶ Non-disaster government transfers increases may underestimate true cost (Deryugina 2016)

Annual FEMA Disaster Declarations



Out of the Frying Pan?

- ▶ Some evidence that people move after big disasters
 - ▶ Boustan et al. (2017)
 - ▶ Carleton and Hsiang (2016)
- ▶ Rational actors respond to disasters by moving to new locations
 - ▶ Because their homes are destroyed?
 - ▶ Because the local economy is harmed?
 - ▶ Because they have updated their priors about risks?
- ▶ Move people out of dangerous areas, but does this lower future disaster costs?
- ▶ All else equal, higher exposure areas should see lower migration rates

And Into the Fire?

- ▶ Disaster exposure is spatially correlated
- ▶ Disasters are negative income shocks and long moves are costly
- ▶ People tend to move relatively short distances
- ▶ If disasters induce shorter moves, migration may not lower future disaster costs
- ▶ **Shorter moves may not lower costs**
 - ▶ **Key question:** where do disaster migrants locate to?
 - ▶ And does migration mitigate impacts of disasters or simply rearranges the deck chairs?

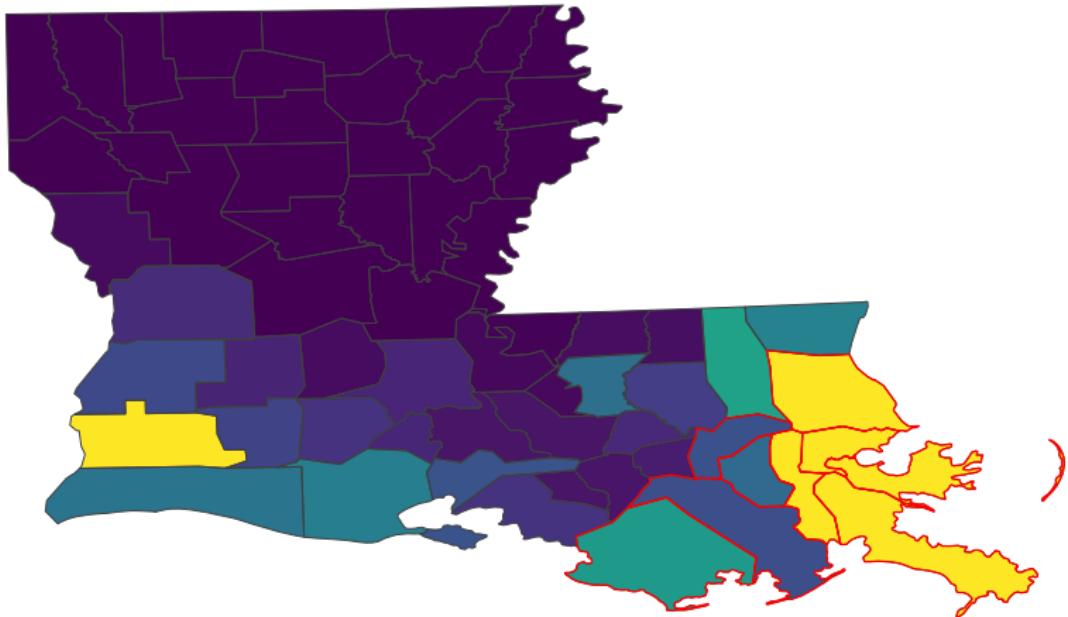
Hurricane Katrina

Impacts

- ▶ Category 3 Hurricane at landing (sustained winds of 100–140 miles per hour)
- ▶ Landed 25 August 2005 in Louisiana
- ▶ Total damage estimated at \$108 billion (Knobb, Rhome, and Brown 2005)
- ▶ Deaths appear to be at least 1,500 (Beven et al. 2008)
- ▶ Triggered response of over \$5.7 billion in FEMA disaster relief

Post-Katrina

FEMA Individuals and Households Program Assistance



How Did Katrina Affect New Orleans Migrants?

- ▶ Data from IRS county-to-county migration used, tracks filed tax returns at FIPS code from year to year
- ▶ Typical outmigration from New Orleans area from 2000 to 2010 excluding 2005 averaged 21,482 outmigrants per year (average population of 1,421,693)
 - ▶ Fairly stable spatial distribution - nearby and large metro regions
- ▶ In 2005, total of 181,854 outmigrants
 - ▶ Similar spatial pattern exists plus evident overflow

Outflow of Migrants in 2004
from the 9 counties most affected by Katrina

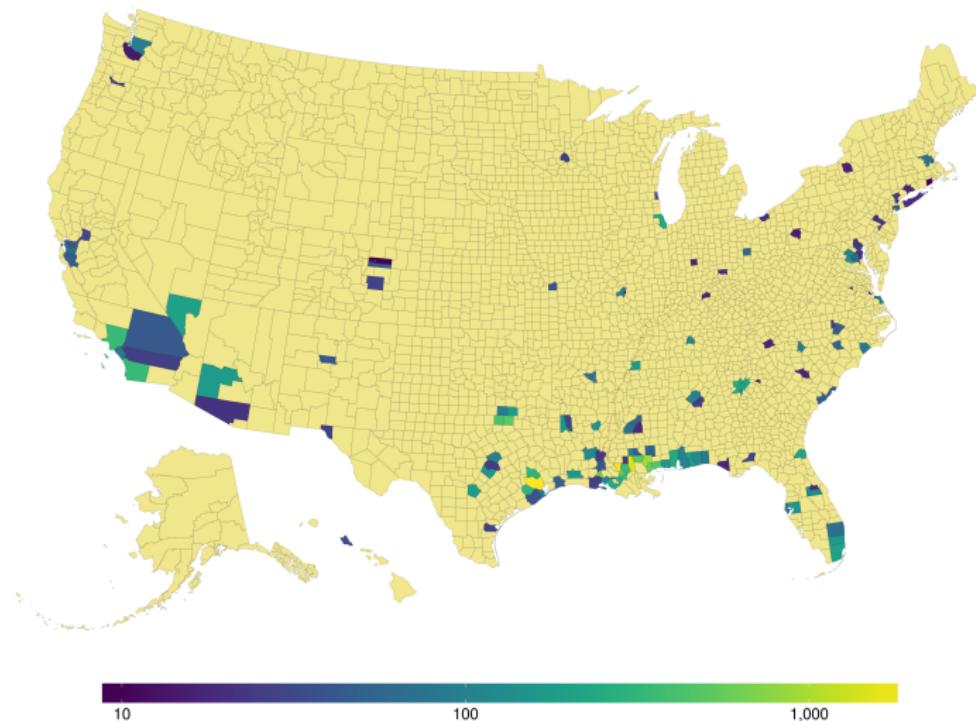


Figure 1:

Outflow of Migrants in 2005
from the 9 counties most affected by Katrina

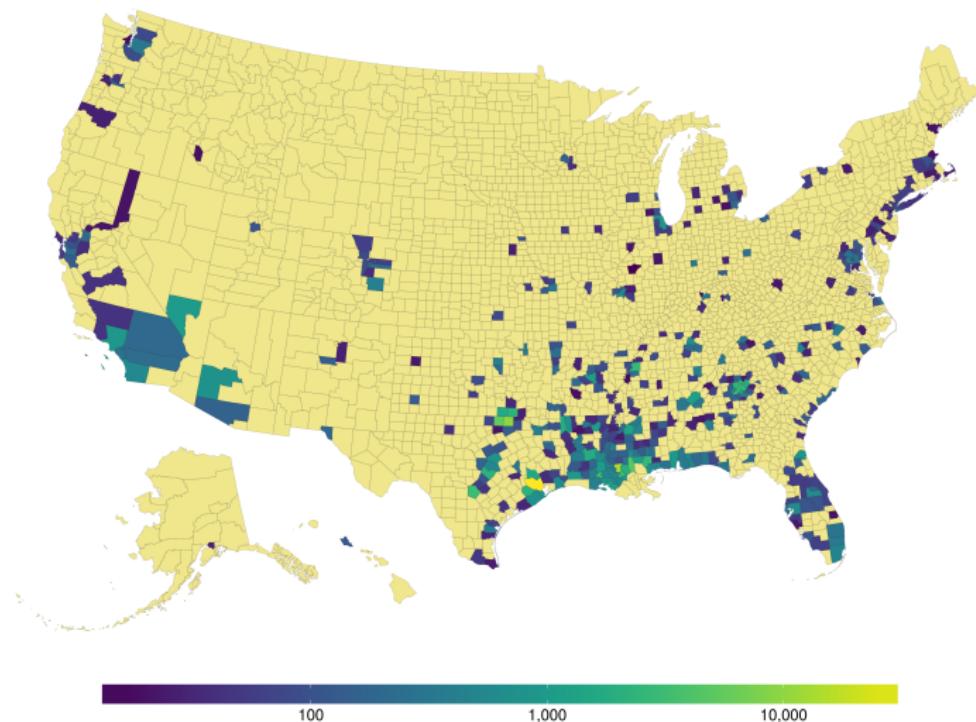


Figure 2:

Outflow of Migrants in 2006
from the 9 counties most affected by Katrina

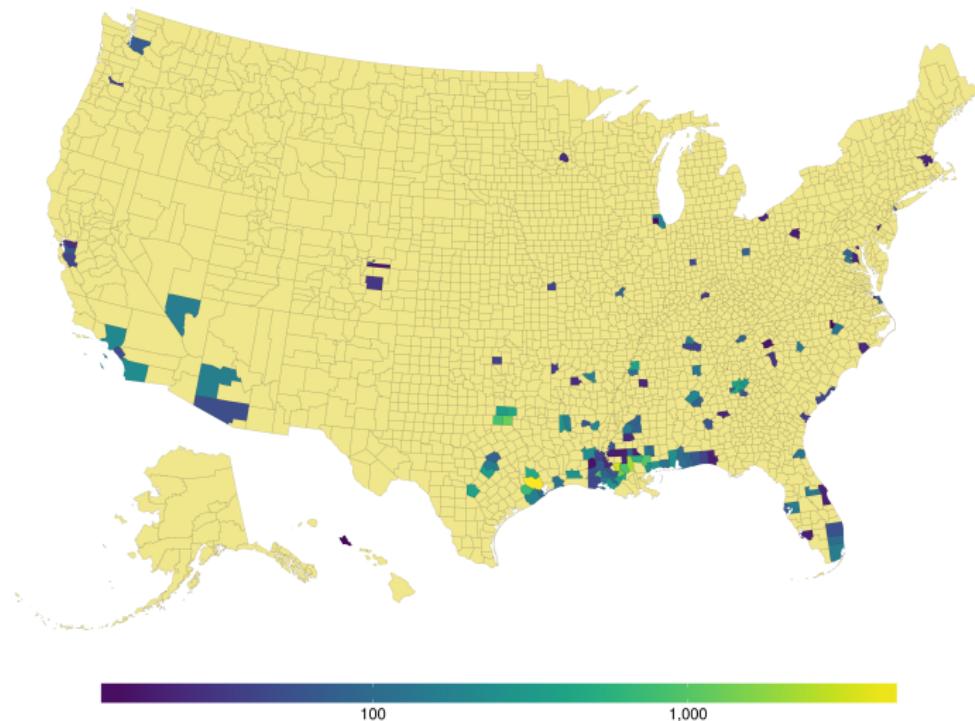


Figure 3:

Empirical Strategy

Gravity Model

Beginnings from Newtonian physics, which imply

$$F = G \frac{m_1 m_2}{r^2}$$

Princeton Astronomer James Q. Stewart observed the composition of students in his classroom (J. Q. Stewart 1941):

$$M_{ij} = k \frac{P_i^{\beta_1} P_j^{\beta_2}}{D_{ij}^{\gamma}}$$

Typical estimation involves taking logs of both sides to identify parameters.

Modified

For outmigration from Katrina affected areas:

$$m_{i,t} = \alpha + \gamma D_i + \beta_1 P_{i,t} + \beta_2 Katrina + \beta_3 \mathbf{X}_{i,t} + \varepsilon_{i,t}$$

- ▶ i indicates county destination and t indicates year
- ▶ m is migration measure
 - ▶ Raw flow, inverse hyperbolic sine, share of outflow, and indicator of positive migration
- ▶ D indicates distance from centroid of affected area
- ▶ P is the population for destination county
- ▶ *Katrina* is dummy variable for 2005
- ▶ $\mathbf{X}_{i,t}$ are economic characteristics: unemployment rate, median rent, average pay

Modified

Model entails destination's distance from New Orleans, its population, a Katrina indicator for 2005, and economic indicators.

- ▶ Panel of migration outflow from affected counties from 2000 to 2010
- ▶ Start with baseline model of New Orleans area destinations
- ▶ Interact explanatory variables with Katrina variable
- ▶ Attribute change in effects to the disaster response

Results

Baseline

	Flow	IHS	LP	Share
Distance (hundreds of km)	-1.8062*** (0.4165)	-0.0239*** (0.0027)	-0.0048*** (5e-04)	-0.005*** (0.0012)
Population (millions)	193.1327* (110.3825)	1.9915*** (0.463)	0.3992*** (0.1027)	0.474** (0.2188)
Katrina	51.6205*** (12.9152)	0.4618*** (0.0222)	0.092*** (0.005)	-1e-04 (0.0038)
Adjusted R-Squared	0.037	0.305	0.288	0.114
Note:			*p<0.1; **p<0.05; ***p<0.01	

Baseline Economic Characteristics

	Flow	IHS	LP	Share
Unemployment Rate	-12.6374 (29.0974)	-1.4173*** (0.3073)	-0.3361*** (0.0689)	-0.1494** (0.0688)
Average Annual Pay (in thousands)	0.7527* (0.4318)	0.0155*** (0.0042)	0.0036*** (9e-04)	0.002* (0.001)
Median Monthly Rent (in hundreds)	-3.9009 (3.7921)	0.0166 (0.0138)	0.0057* (0.0031)	-0.0071 (0.0076)
Adjusted R-Squared	0.037	0.305	0.288	0.114
<i>Note:</i>			*p<0.1; **p<0.05; ***p<0.01	

Katrina Interactions

term	Flow	IHS	LP	Share
Distance (hundreds of km)	-1.1153*** (0.2699)	-0.0197*** (0.0026)	-0.004*** (5e-04)	-0.005*** (0.0012)
Interaction	-7.2918*** (1.6765)	-0.0528*** (0.0035)	-0.0099*** (8e-04)	2e-04 (6e-04)
Population (millions)	101.5004** (45.2713)	1.9065*** (0.4314)	0.3929*** (0.0989)	0.4588** (0.1978)
Interaction	1054.9499 (772.432)	0.7248** (0.3459)	0.0198 (0.0428)	0.1771 (0.2535)
Katrina	95.5467 (216.3368)	-1.5462*** (0.2037)	-0.3372*** (0.0366)	-0.0042 (0.0861)
Adjusted R-Squared	0.112	0.336	0.309	0.115
Note:		*p<0.1; **p<0.05; ***p<0.01		

Katrina Economic Interactions

	Flow	IHS	LP	Share
Unemployment Rate	-55.4713*** (15.697)	-1.4865*** (0.2911)	-0.3467*** (0.0678)	-0.1844*** (0.0704)
Interaction	1030.2041*** (385.1283)	9.2898*** (1.4963)	1.8593*** (0.3017)	0.7037*** (0.2396)
Average Annual Pay (in thousands)	0.4678** (0.2186)	0.0138*** (0.004)	0.0033*** (9e-04)	0.002** (0.001)
Interaction	2.8474 (3.5034)	0.028*** (0.0058)	0.0053*** (0.0012)	0 (0.0013)
Median Monthly Rent (in hundreds)	-1.4195 (1.3117)	0.0023 (0.0132)	0.0024 (0.0031)	-0.0063 (0.0068)
Interaction	-29.4207 (36.7561)	0.246*** (0.0275)	0.056*** (0.0059)	-0.0091 (0.0132)
Adjusted R-Squared	0.112	0.336	0.309	0.115
Note:		*p<0.1; **p<0.05; ***p<0.01		

Conclusion

A role for policy

- ▶ Katrina's impact on outmigration increased the outflows in both volume and breadth, but the distribution of appears unaffected
- ▶ Katrina disaster migrants do not migrate as far from New Orleans than in non-disaster years and destination population became less important
- ▶ Economic variables indicate mixed results with respect to migration decision of Katrina migrants
- ▶ Migration decisions do not appear to mitigate risk as measured via distance
- ▶ Data limitations constrain the ability to determine the degree to which migrants return to New Orleans

Thank You

Questions or comments?

- ▶ email: dinterman.1@osu.edu

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