Higher Order Impacts of Hurricanes:
evidence from county level analysis using synthetic
control methodology of comparative case studies

Meri Davlsheridze
PhD Candidate & Research Assistant
Agricultural, Environmental and Regional Economics
Department of Agricultural Economics, Sociology and Education
The Pennsylvania State University
E-mail: mzd169@psu.edu

Karen Fisher-Vanden
Associate Professor of Environmental and Resource Economics
Department of Agricultural Economics, Sociology and Education
The Pennsylvania State University
kaf26@psu.edu

Allen H. Klaiber
Assistant Professor
Department of Agricultural, Environmental and Development Economics
The Ohio State University
E-mail: klaiber.16@osu.edu

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The Higher Order Impacts of Hurricane: Evidence from County Level Analysis

Meri Davlashidze, the Pennsylvania State University; Karen Fisher-Vanden, the Pennsylvania State University and Allen Klaiber, the Ohio State University

**MOTIVATION**
- Continued rise in tolls from disasters
- Increased burden to taxpayers to provide relief to disaster victims
- Inherent difficulty to generate empirical estimates of indirect impacts of disaster
- Underrepresented area of research: local labor market response to disasters
- "The United States has been – and still is – creating for itself increasingly catastrophic future disasters" (Mileti, 1999)

**RESEARCH QUESTION**
How flexible the local markets are and how quickly they adjust to hurricane disaster shocks
- Employment and per worker earning impacts of hurricanes
- Sectoral distribution of impacts: Tradable vs. Local Sector
- Effectiveness of public adaptation measures in terms of mitigating employment impacts of hurricane disaster
- Sector spillover effects of hurricane disaster

**METHODOLOGY: Synthetic Control Method (Abadie et al, 2010)**

\[ i = 1 \text{ : affected county; Remaining counties serve as potential controls: } j = 2, \ldots, J + 1 \]

1. \[ Y_t^N = Y_t^L \]

Pre-hurricane period

2. \[ Y_t^H = Y_t^N + g_{it}D_{it} \]

Post-hurricane period

\[ D_{it} = \begin{cases} 1 & \text{if } i = 1 \text{ and } t > T_0 \\ 0 & \text{otherwise} \end{cases} \]

\[ g_{it} = Y_{it}^H - Y_{it}^N = Y_{it}^H - Y_{it}^N \text{ for } t > T_0 \]

Aim to estimate: \( \{g_{1t}, g_{2t}, \ldots, g_{Jt}\} \)

Implementation:
1) Select weights such that \( \sum_{j=2}^{J+1} w_j^* Y_{jt}^L = Y_{jt}^L \) and \( \sum_{j=2}^{J+1} w_j^* Z_{jt}^L = Z_{jt} \) for \( \forall t \in (1, \ldots, T_0) \)
2) Apply weights to controls in the post hurricane period to generate gaps:

\[ \tilde{g}_{it} = Y_{it}^L - \sum_{j=2}^{J+1} w_j^* Y_{jt}^L \text{ for } t \in (T_0, \ldots, T) \]

**EMPLOYMENT GAP**

\[ \tilde{g}_{it} = \beta_0 + \beta_1[\ln GDP_{it}^L] - \beta_2[\ln GDP_{it}]^2 + \beta_3[\# MDE&M]_{it} - \beta_4[\# in poverty]_{it} - \beta_5[\# with college degree & wp]_{it} + \beta_6[\text{FEMA MIT}]_{it} + \beta_7[\text{FEMA PA}]_{it} + \beta_8[\text{CRS points}]_{it-5} + \beta_9[\text{UI}]_{it} + \gamma \text{Quarterly Dummies} + e_{it} \]

**RESULTS**

**SAMPLE**

Sample of Affected and Control Counties

**LOCAL MULTIPLIERS**

**MAJOR FINDINGS & POLICY IMPLICATIONS**
- Persistent employment impacts for an average of 90th percentile of damaged county
  - 7% employment loss relative to no hurricane scenario
  - No sign of recovery 7 years after the 2005 hurricanes
  - Similar pattern observed for tradable and local services sector employment
  - Construction sector booms aftermath of disasters & impact dissipates in 5.5 years
  - Large local multipliers: 1 job lost in tradable sector implies 7.131 additional jobs lost in the local services sector
  - FEMA Mitigation & Local Adaptation (CRS) projects are very effective
  - Two sources of moral hazard problem:
    - FEMA PA: 1% increase in cumulative spending → 1.65% increase in employment loss
    - UI Benefits: 1% increase in per capita UI spending → 1.58% increase in employment loss

**SELECTED REFERENCES**