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# Impacts of Weather and Climate Disasters on Local Labor Markets



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## INTRODUCTION

In this paper, we examine the impacts of weather and climate disasters on local labor markets using county-level data from 1990 to 2012 for U.S. We find that it is important to include climatic variables in the analysis in order to mitigate missing variable bias. We also find that this affects the estimated disaster impacts both statistically and economically. In addition, this study also extends the existing analyses from a single disaster type to multiple types of weather and climate disaster and from regional to national scale. Results from this paper suggest that (1) understanding the different regional economic responses to these shocks provides a perspective on the investigation of regional economic resilience; and (2) better knowledge about the economic impacts of natural disasters helps to inform policy discussion on disaster preparedness and assistance programs.

## ECONOMETRIC MODEL

$$Y_{it} = \alpha_1 D_{it} + \alpha_2 N_{it} + \alpha_3 PD_{it} + \alpha_4 PN_{it} + \alpha_5 C_{it} + \lambda_i + \gamma_{st} + \epsilon_{it}$$

$i$  and  $t$  are county and year indices  
 $Y_{it}$ : employment rate and log(wage rate)  
 $D_{it}$ : dummy for disaster incidence in a county  
 $N_{it}$ : disaster incidence in neighboring counties  
 $PD_{it}$ : disaster incidence in preceding five years  
 $PN_{it}$ : disaster incidence in neighboring counties in preceding five years  
 $C_{it}$ : weather/climatic variables (linear and nonlinear terms)  
 $\lambda_i$ : county-fixed effects  
 $\gamma_{st}$ : state level time-fixed effects  
 $\epsilon_{it}$ : error term

## RESULTS: LABOR MARKET IMPACTS

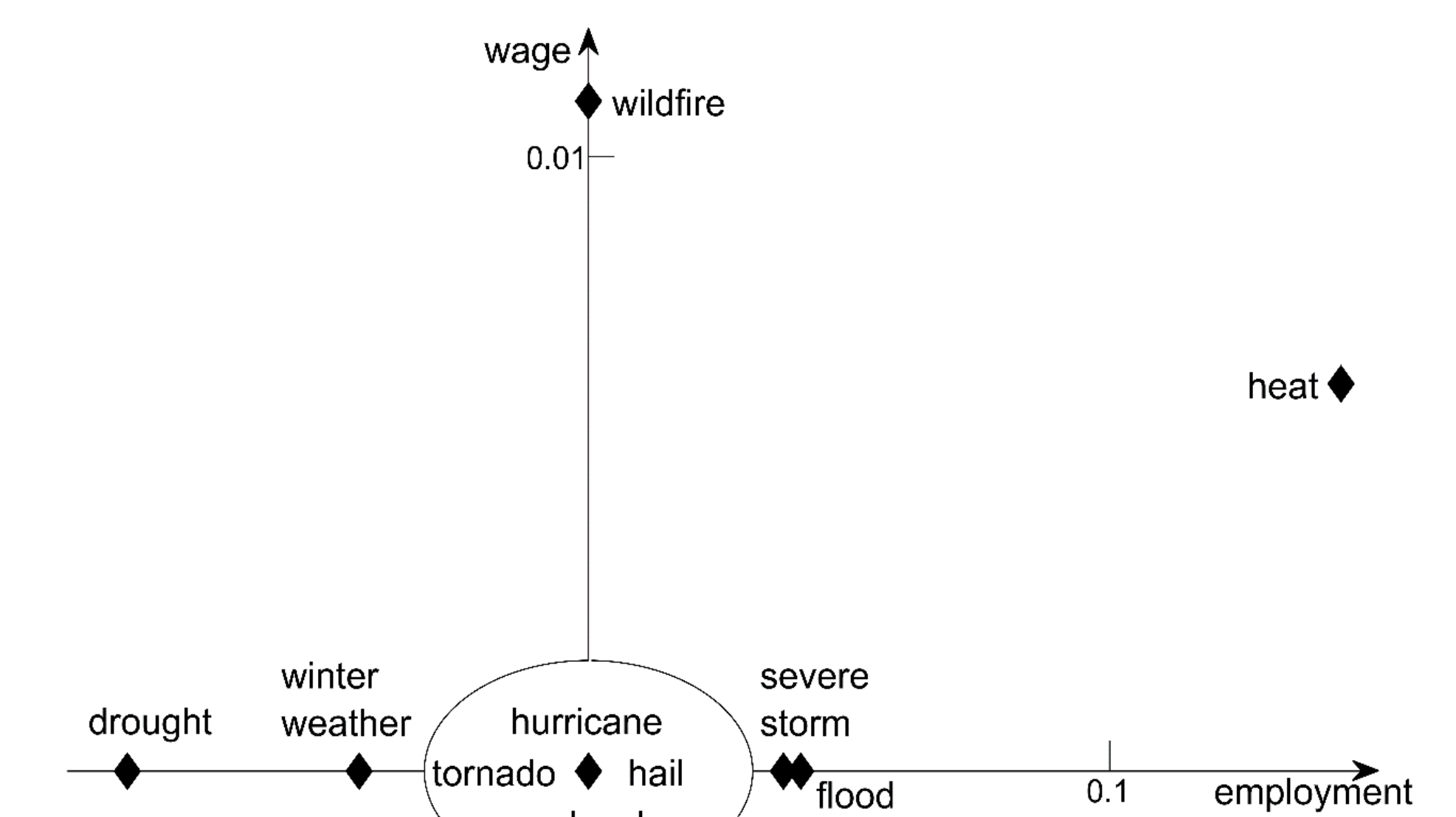


Figure 1 Impacts on labor market

## LITERATURE REVIEW

- Focus on one specific type
  - Flooding (Leiter, et al., 2009; Xiao, 2011; Xiao, et al., 2013)
  - Hurricanes (Belasen and Polachek, 2008, 2009; Ewing, et al., 2005a; McIntosh, 2008; Rodriguez-Oreggia, 2013)
  - Tornadoes (Ewing, et al.; 2003, 2004, 2005b, 2009)
  - Wildfires (Davis et al 2014; Nielsen-Pincus et al 2013, 2014)
  - Winter weather (Bloesch and Gourio, 2015; Boldin and Wright, 2015)
- Focus on one specific region
  - Flooding in Midwest
  - Hurricanes in Florida
  - Wildfires in the western states
- Weather and climatic variables are excluded

## RESULTS: CLIMATIC VARIABLES

	Without Climatic Effects		With Climatic Effects		Percent Changes (%)	
	Employment	Wage	Employment	Wage	Employment	Wage
<b>Avalanches</b>	-0.010	0.010	-0.030	0.010	210	-4
<b>Drought</b>	-0.097**	-0.005	-0.089**	-0.003	-9	-40
<b>Flooding</b>	0.043***	0.002	0.041**	0.002	-5	-21
<b>Hail</b>	-0.011	0.002	-0.009	0.002	-22	29
<b>Heat</b>	0.141***	0.005*	0.144***	0.006**	3	29
<b>Hurricane/Tropical Storm</b>	0.010	0.003	0.007	0.003	-23	-18
<b>Severe/Thunder Storm</b>	0.038*	0.001	0.037*	0.001	-1	0
<b>Tornado</b>	0.007	0.0001	0.011	0.0001	47	0
<b>Wildfire</b>	-0.030	0.009*	-0.035	0.011**	16	16
<b>Winter Weather</b>	-0.037**	0.001	-0.044***	0.001	20	-25
<b>R<sup>2</sup></b>	0.66	0.47	0.66	0.47		
<b>N</b>	71447	70276	71411	70240		

## CONCLUSIONS

- The impacts vary across disaster types
  - Heat, wildfire and drought seem to have the biggest impact on labor market outcomes (employment or wage rate)
  - Winter weather, severe storm and flooding have more moderate impacts
  - Hurricane, tornado, avalanche and hail have no statistically significant impact on labor market outcomes
- Weather/climatic variables should be included
- Spatial and temporal spillover effects need to be controlled

## DATA

- Weather and climate disaster data: the Spatial Hazard Events and Losses Database for the U.S. (SHELDUS™ Version 12.0), maintained by the Hazards and Vulnerability Research Institute (HVRI)
- Employment and wage data: BEA.
- Labor force data: the Bureau of Labor Statistics
- Weather/climatic data: Global Historical Climatology Network (GHCN) database at the National Climatic Data Center (NCDC)
  - Data include mean, maximum and minimum temperature and precipitation
  - Quarterly county-level data are constructed from daily weather station data

## RESULTS: SPATIAL AND TEMPORAL MATTERS

	Temporal effects		Spatial spillover effects	
	Employment	Wage	Employment	Wage
<b>Avalanches</b>	0.009	0.008	-0.003	-0.009*
<b>Drought</b>	-0.216***	-0.009**	-0.044	-0.002
<b>Flooding</b>	0.054**	0.002	0.036**	-0.0004
<b>Hail</b>	-0.0004	0.001	0.0002	-0.001
<b>Heat</b>	0.008	0.006*	0.100***	0.002
<b>Hurricane/Tropical Storm</b>	-0.063	-0.004	0.036	0.003
<b>Severe/Thunder Storm</b>	-0.007	0.004	0.040*	0.000
<b>Tornado</b>	0.041**	-0.0004	-0.005	0.001
<b>Wildfire</b>	-0.046	0.010*	0.042	0.006**
<b>Winter Weather</b>	-0.134***	-0.004*	-0.002	-0.002

## KEY REFERENCES

- Belasen, A.R., and S.W. Polachek. 2009. "How Disasters Affect Local Labor Markets The Effects of Hurricanes in Florida." *Journal of Human Resources* 44:251-276.
- Ewing, B.T., J.B. Kruse, and M.A. Thompson. 2003. "A comparison of employment growth and stability before and after the Fort Worth tornado." *Global Environmental Change Part B: Environmental Hazards* 5:83-91.
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