Lecture 12:
Panel data II

PPHA 34600

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Recap

TL;DR:

1. We like the difference-in-differences approach a lot
2. We discussed estimation with fixed effects
3. And covered the event study version

An example: Cyclones and economic growth

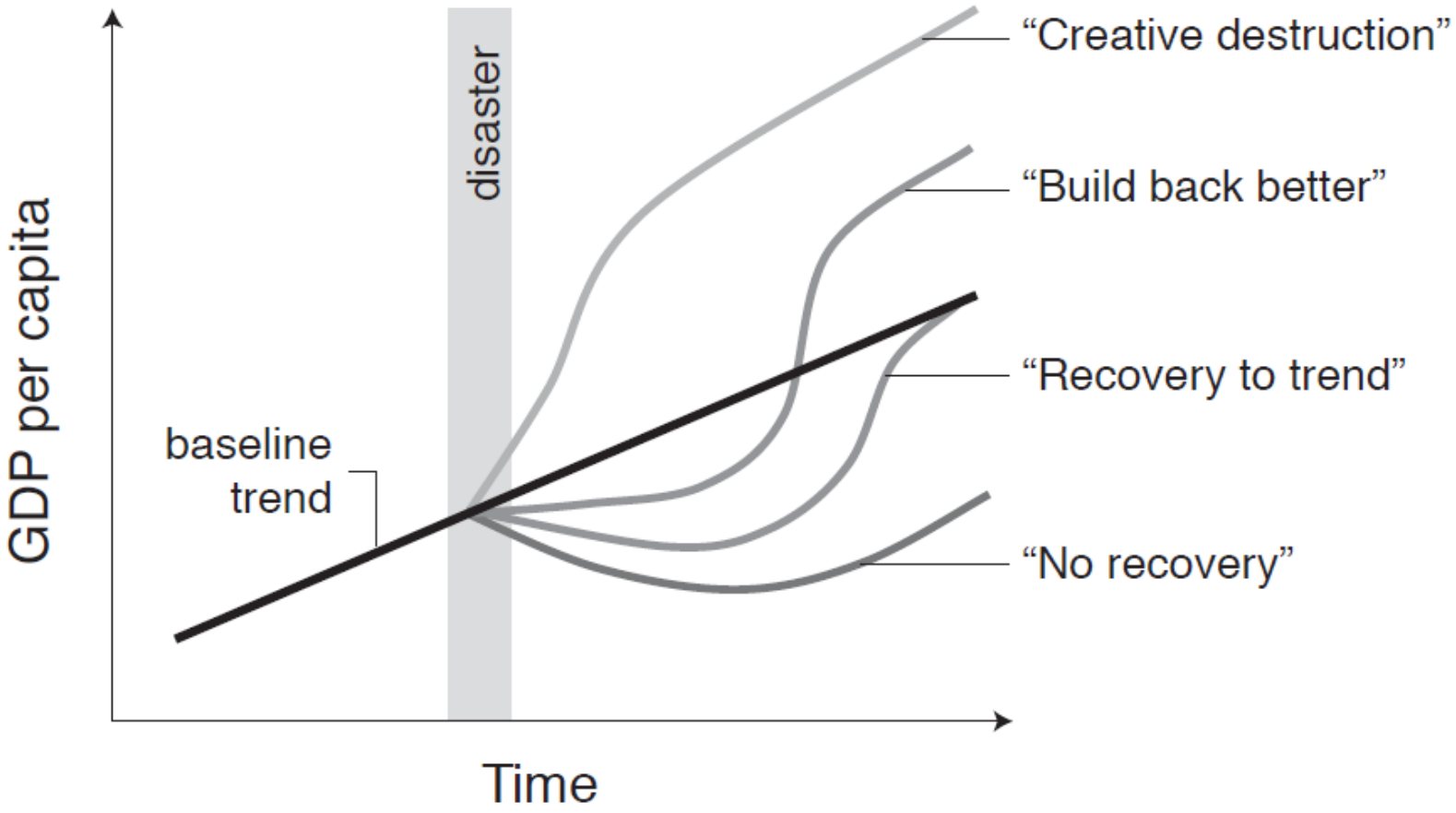
Policy issue:

- Climate change is projected to increase the intensity and number of cyclones
- What do cyclones actually do to an economy?
- How long do these effects last?

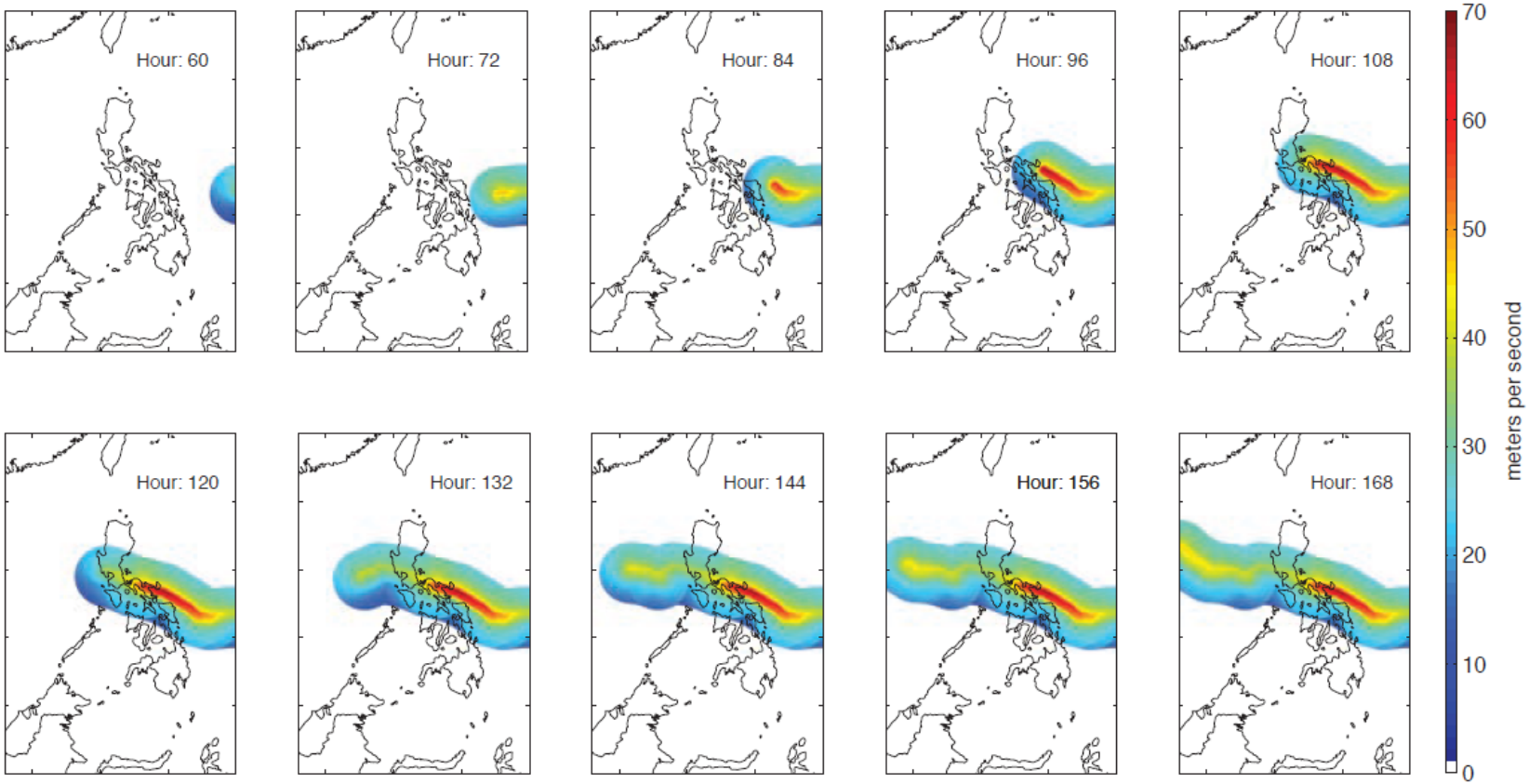
Approach:

- Construct a (cool, sciency) model of every hurricane 1950-2008
- Combine this with data on economic growth around the world
- Nobody randomized hurricanes
- ...but conditional on location and time FE, they are arguably exogenous
- Use a distributed lag model to compute cumulative effects

What are we trying to learn?



These hurricane data are so cool



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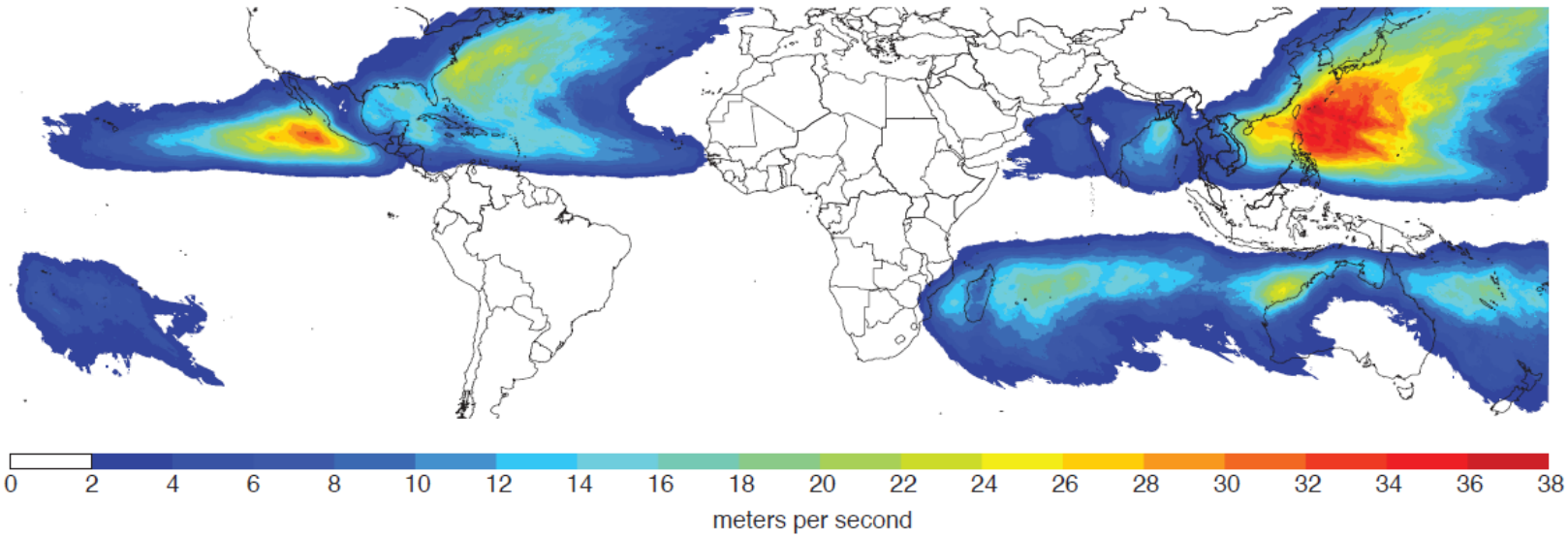


Estimating the effects of hurricanes on growth

The authors will run a version of:

$$Y_{it} = \sum_{s=0}^{S} \tau_s D_{i,t-s} + \alpha_i + \delta_t + \beta X_{it} + \varepsilon_{it}$$

where

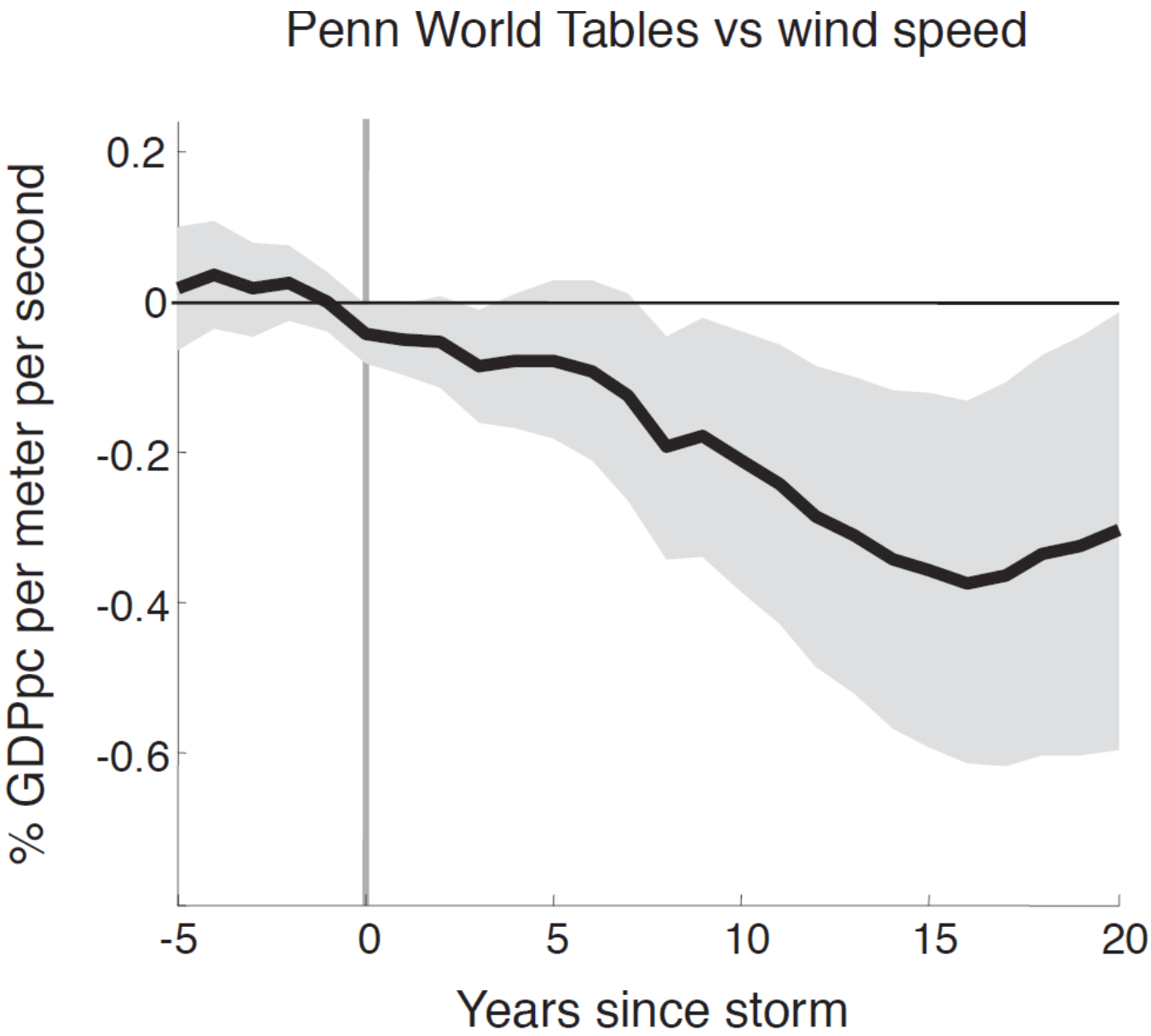
$Y_{it} = ln(GDP_{i,t}) - ln(GDP_{i,t-1})$ is the change in economic growth from $t-1$ to t

$D_{i,t}$ is the hurricane (scaled by windspeed)

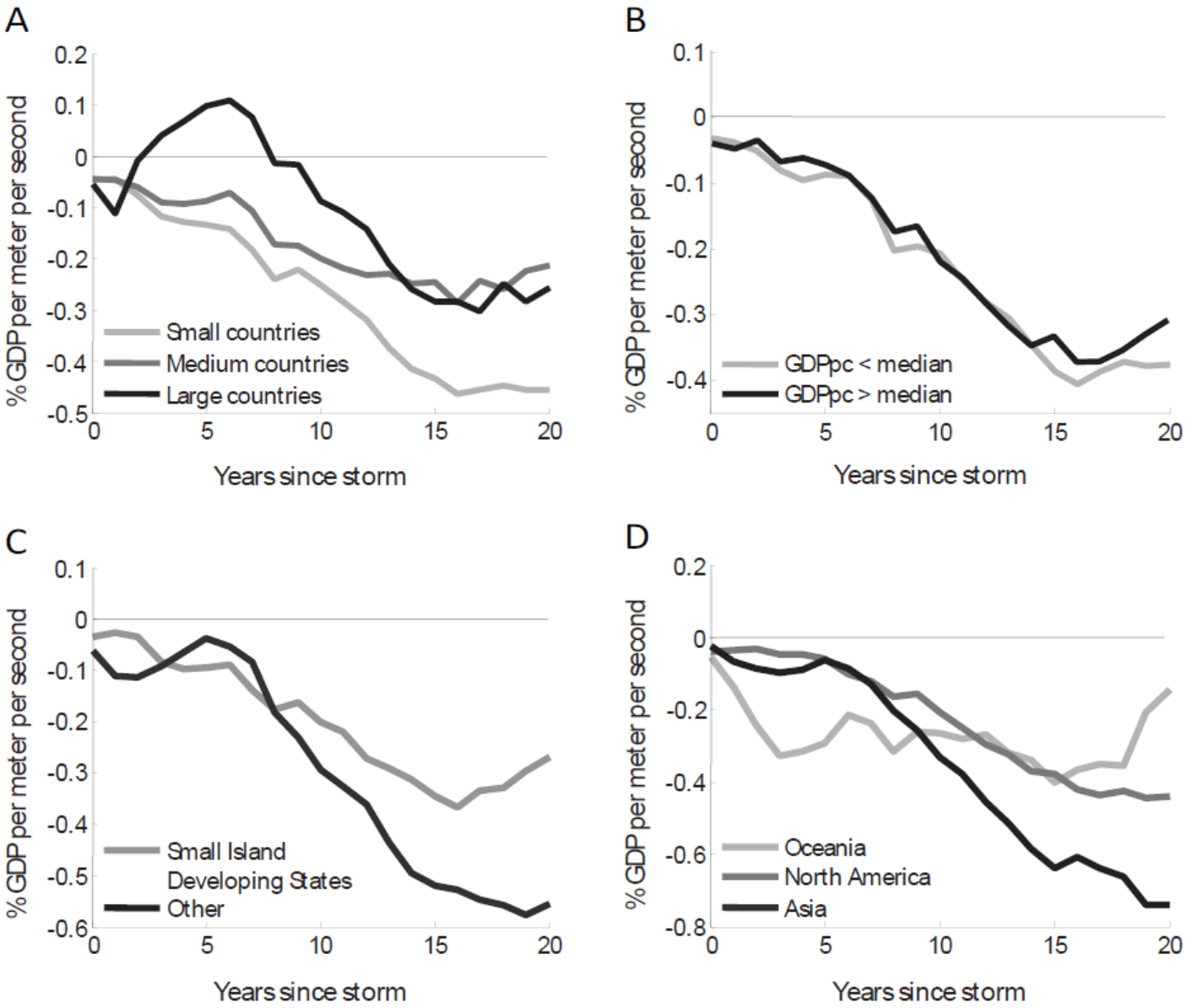
The unit of observation is the country-year

They then compute $T_q = \sum_{s=0}^{q} \tau_s$: the cumulative effects of a hurricane

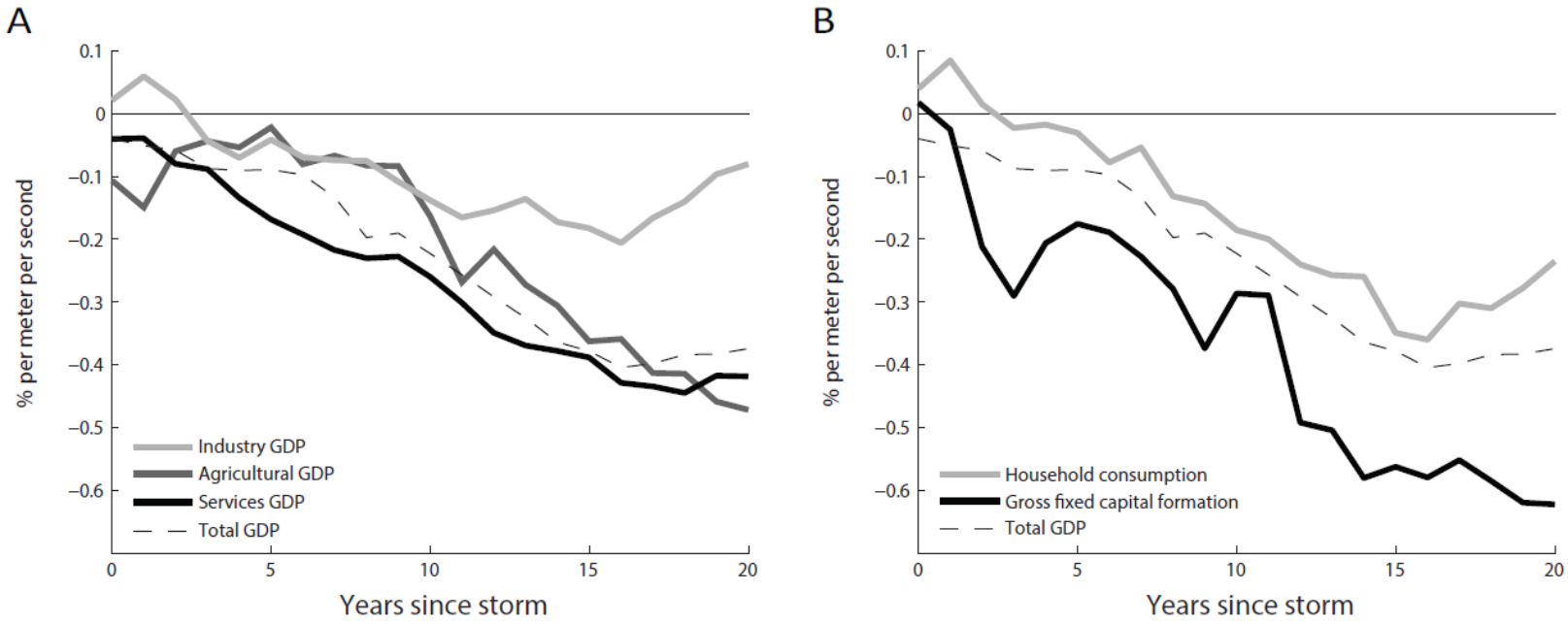
Main result


Penn World Tables vs wind speed
% GDPpc per meter per second
0.2
0
-0.2
-0.4
-0.6
-5
0
5
10
15
20
Years since storm

Results in different locations



Results for different sectors



How do these effects compare to other Bad Stuff?

Event Type	Effect on Income	Observed After	In-Sample Probability
Temperature increase (+1°C)*[1]	−1.0%	10 yrs	6.4%
Civil war[2]	−3.0%	10 yrs	6.3%
Tax increase (+1% GDP)**[3]	−3.1%	4 yrs	†16.8%
1 standard deviation cyclone	**−3.6%**	**20 yrs**	**14.4%**
Currency crisis[2]	−4.0%	10 yrs	34.7%
Weakening executive constraints [2]	−4.0%	10 yrs	3.7%
90th percentile cyclone	**−7.4%**	**20 yrs**	**5.8%**
Banking crisis[2]	−7.5%	10 yrs	15.7%
Financial crisis[4]	−9.0%	2 yrs	<0.1%
99th percentile cyclone	**−14.9%**	**20 yrs**	**0.6%**

*Poor countries only. **USA only. †Number of quarters with any tax change.

[1]Dell, Jones & Olken (AEJ: Macro, 2012), [2]Cerra & Saxena (AER, 2008), [3]Romer & Romer (AER, 2010), [4]Reinhart & Rogoff (AER, 2009)