

# **“Quantifying Aggregate Impacts in the Presence of Spillovers: An Application to the Costs of Environmental Disasters”**

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Discussion by Tomás Domínguez-Iino

Conference of the Yrjö Jahnsson Foundation  
on Climate change and inequality

# Overview

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- How to quantify aggregate effects when treated and untreated interact?
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  - Long micro literature on disentangling direct and indirect effects (e.g., peer effects)
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  - Recent work quantifies the aggregate effects (Baqaee and Fahri, 2020; Bachmann et. al, 2022)
- This paper—leverage network aggregation results to measure aggregate effects when spillovers exist
  - Great data + compelling natural experiment on which to apply the methodology
  - We need as many tools as possible to measure damages from climate-change induced disasters

# Main idea—inverting the model to back out unobservables

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- In efficient economies, only on sales shares  $\lambda_i$  (Hulten, 1978)

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- Usual critique: some sectors are more central than others, beyond what their GDP share suggests

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*“There’d be a set of economists who would sit around explaining that electricity was only 4% of the economy, so if you lost 80% of electricity you couldn’t possibly have lost more than 3% of the economy.... and there would be, you know, there’d be people in Minnesota and Chicago and stuff would be writing that paper....and we’d understand that, somehow, even if we didn’t exactly understand the model, that when there wasn’t any electricity there wasn’t really going to be much of an economy.” - Larry Summers (2013)*

-> Baqaee and Fahri (2019) address this comment with non-linearities (2nd order approximation), but this paper’s method currently relies on the 1st order one

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- Given exposure matrix  $E_{ij} = \frac{d \log \lambda_i}{d \log A_j} \implies \Delta \log A = E^{-1} \Delta \log \lambda$

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- $E$  is a function of **data** (sales share, factor, shares, I-O matrix) + **unobservables** (subs. elasticities, markups) that require estimation

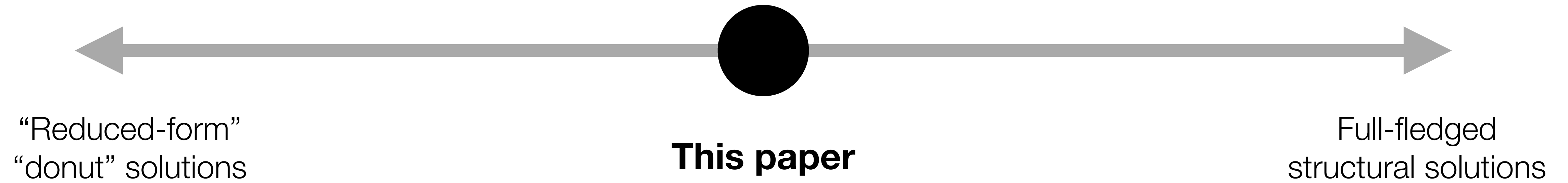
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$$E_{ij} = \frac{d \log \lambda_i}{d \log A_j} = \sum_{k \in C, N} \frac{\lambda_k}{\lambda_i} (\theta_k - 1) \text{Cov}_{\Omega(k)}(\Psi_{(i)}, \Psi_{(j)}) + \dots F(\mu_k)$$

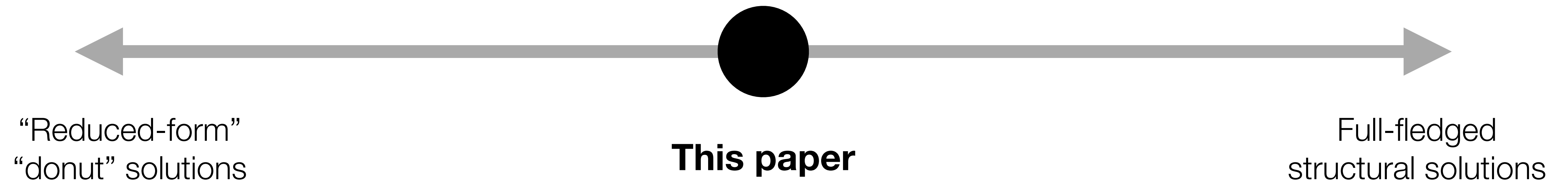
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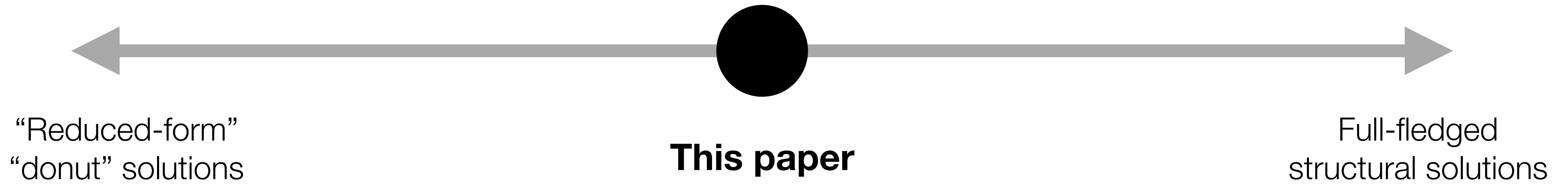
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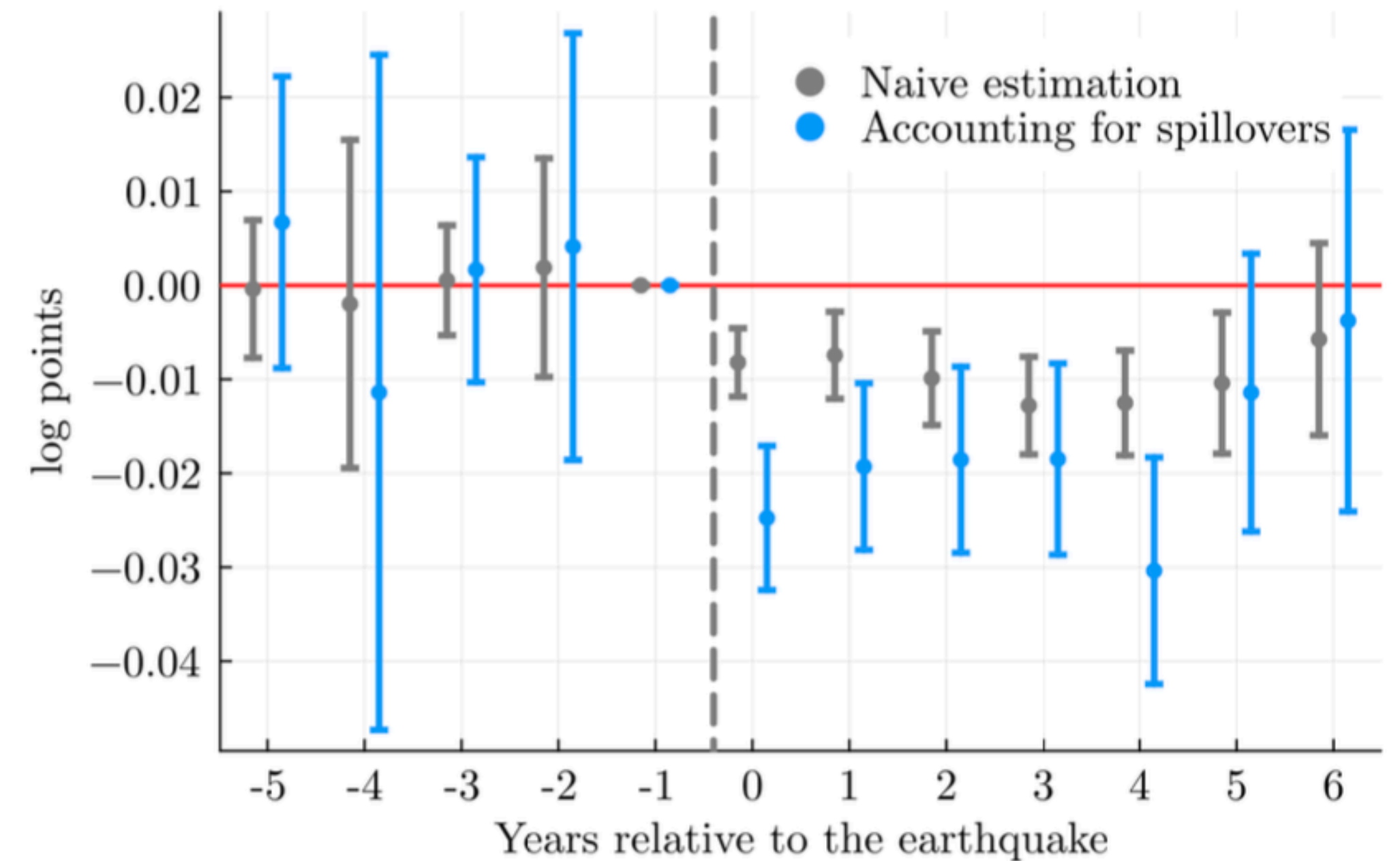


- The cost of modeling spillovers is we need to estimate auxiliary parameters (e.g., substitution parameters in both consumption and production)
  - As we leave the efficient version, we need to estimate even more of these parameters (e.g, markups)
- How confident are we in how these extra parameters are quantified, relative to how we chose “donuts”?
  - Value of the paper is in how it may dominate the existing solutions—not in every empirical setting of course—but for some subset of them. What features do such settings have?

## 2. Which benchmark to compare the methodology to?

- Comparison is to “naive estimation” — alternative comparison to a donut solution, given it is the competing alternative, might be more compelling

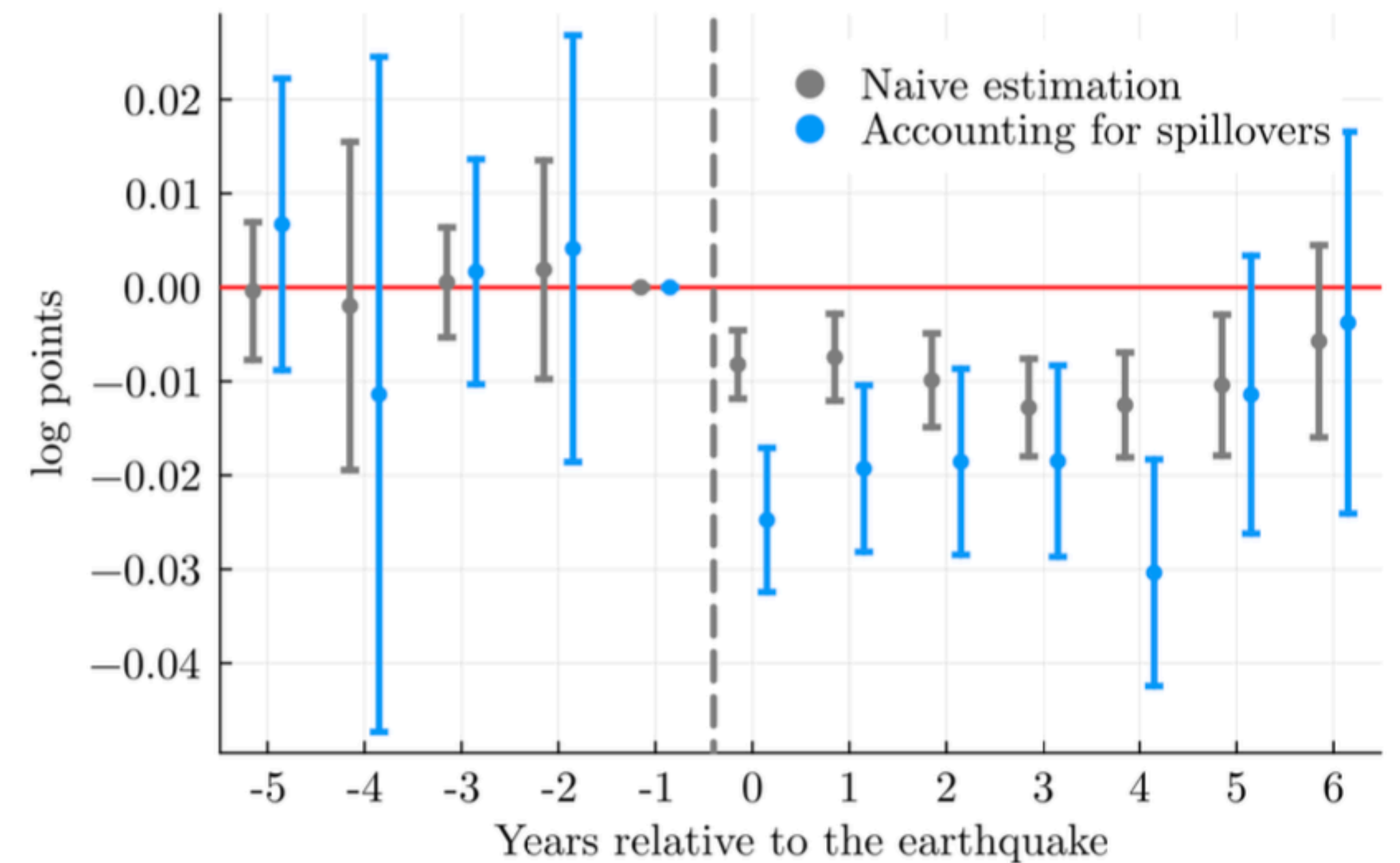
Figure 3: Estimated effect of the 2010 earthquake on Chilean GDP



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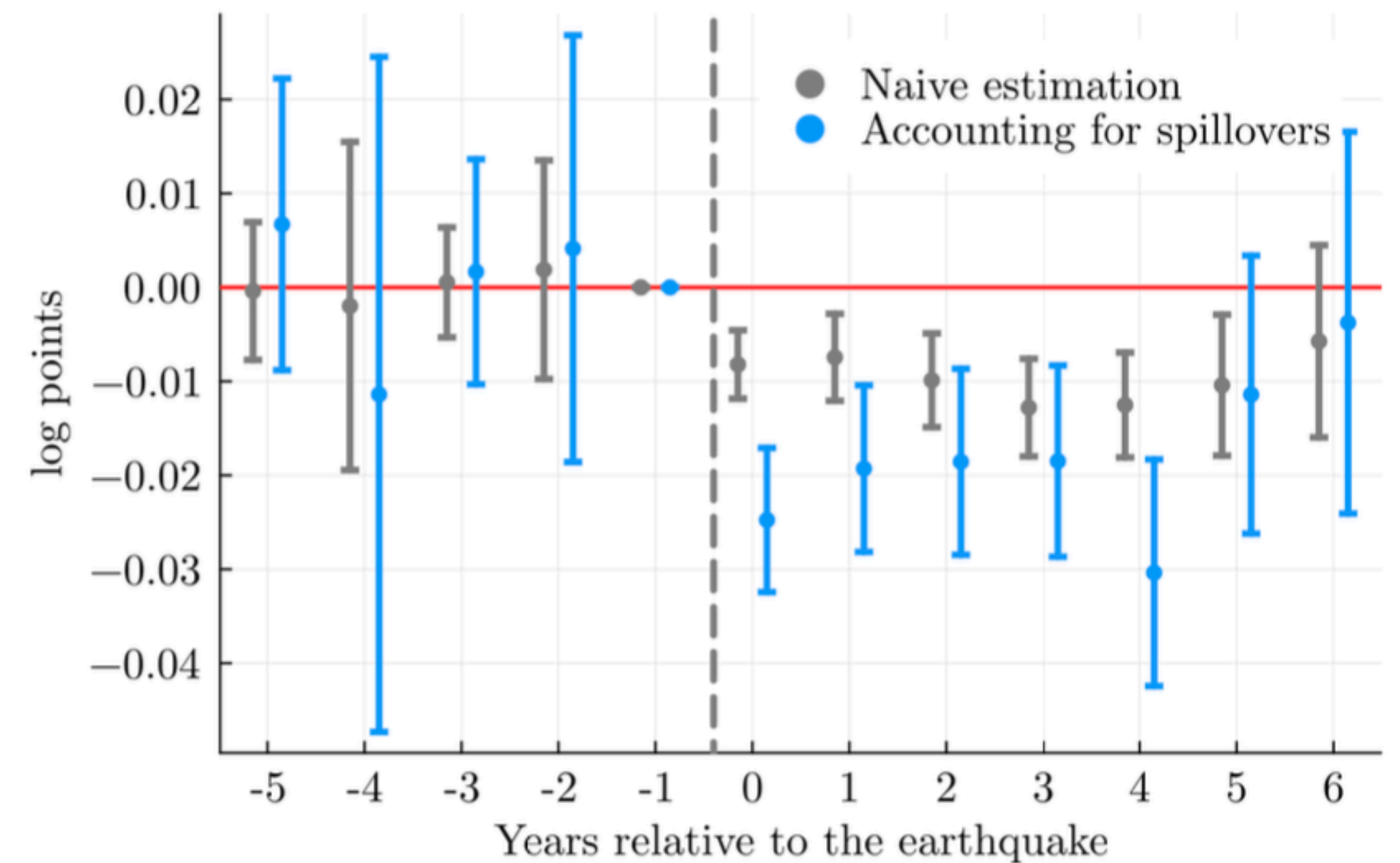




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- How would one implement a donut in this setting? Focus on non-tradables? Sectors whose inputs are mostly imported, outputs mostly exported?
- Monte-Carlo exercises might be useful to gauge when the method outperforms a donut solution

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### 3. Short versus long-run costs

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- The I-O matrix is an equilibrium object, but it seems to be kept fixed throughout the exercise
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  - Should we interpret the damages as short-run only, i.e., absent adaptation?

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- Does the method admit factor-biased productivity shocks?
  - Natural disasters may affect capital (e.g., housing) more than labor