robustness

Shadi

2023-07-06

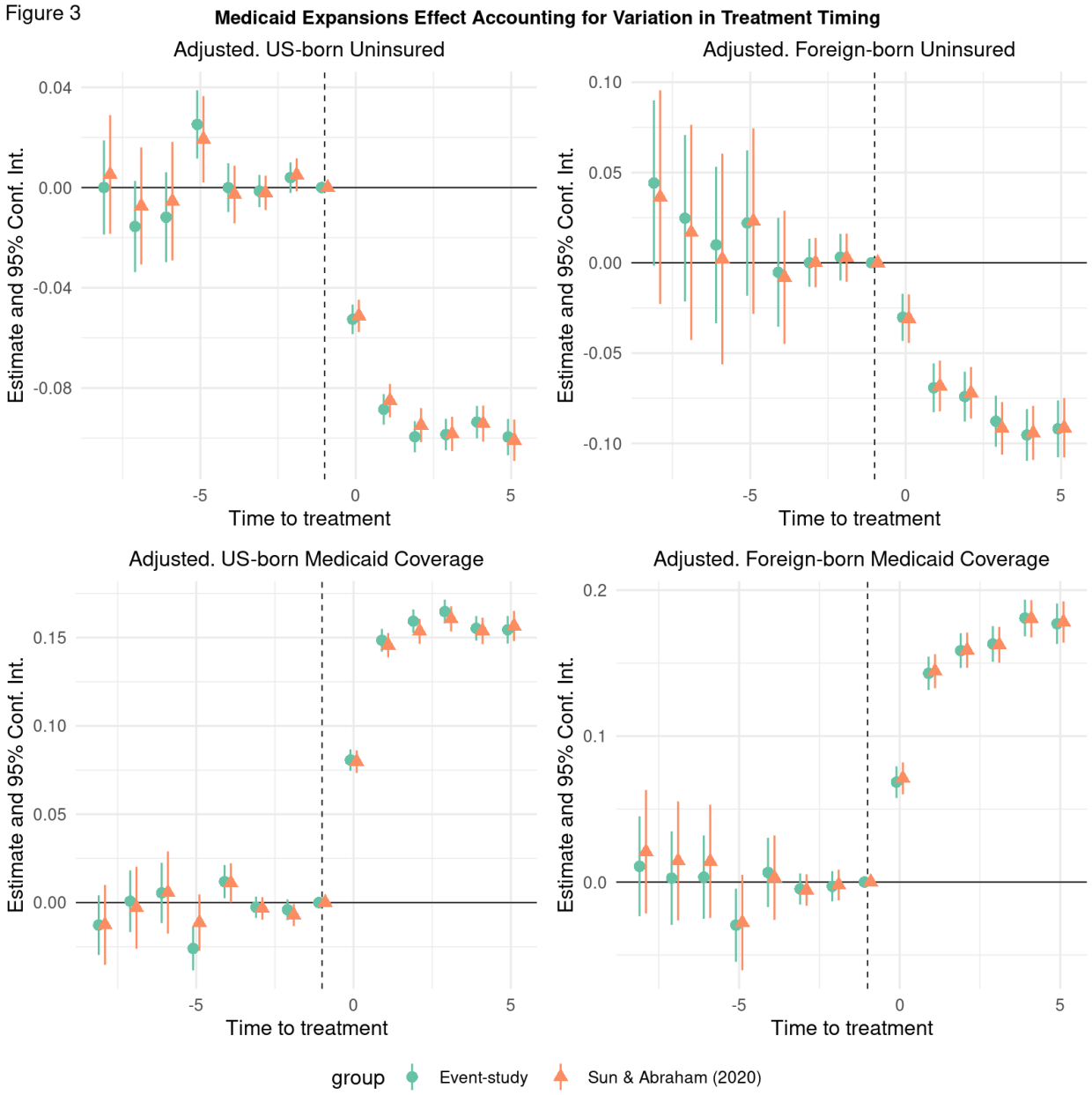
Heterogeneous Treatment Effects: Sun & Abraham (2020)

Since 2018, there has been a growing body of literature examining the validity of staggered Difference-in-Differences (DID) models and event study designs. Noteworthy studies in this field include Goodman-Bacon (2018), Callaway and Sant'anna (2020), de Chaisemartin and D'aualtfoeuille (2020), Deshpande and Li (2019), Imai and Kim (2021), and Baker et al. (2021). Sun and Abraham (2021) highlight the challenges that can arise when different treatment cohorts exhibit varying treatment effects over time.

To address these concerns and assess the sensitivity of our event study estimates to heterogeneous treatment effects, we adopt the interaction-weighted (IW) event study estimator proposed by Sun and Abraham (2021). This estimator is robust to variations in treatment effects across cohorts. We estimate event study coefficients separately for each group and outcome, and then aggregate these coefficients using the fraction of the treated sample in each group as weights for the relevant period. Importantly, the results of this analysis align with our main findings.

We find no evidence of differential pre-trends, leading us to conclude that our results are robust and not unduly influenced by variations in treatment profiles across different cohorts.

Figure 3



Difference-in-Differences Estimate: Bacon Decomposition theorem

Employing Goodman-Bacon's (2018) methodology, we performed a decomposition analysis utilizing two-way fixed effects Difference-in-Differences (DID) estimators. This analysis provides significant insights into the treatment effects and timing groups, as outlined in Table 9.

Table 1: Bacon Decomposition

Comparison	Coefficient	Weight
Uninsured		
Earlier vs Later Treated	-0.09309	0.11871
Later vs Earlier Treated	-0.05521	0.08771
Treated vs Untreated	-0.08462	0.79358
Medicaid		
Earlier vs Later Treated	0.14610	0.11871
Later vs Earlier Treated	0.08782	0.08771
Treated vs Untreated	0.14452	0.79358

The analysis involves comparing timing groups to units that never received treatment, allowing us to evaluate the relative treatment effects at different timings. Notably, a majority of the estimated treatment effect can be attributed to the comparisons between treated and untreated units, rather than comparisons between states with different treatment times.

Furthermore, when we exclude the variation arising from comparisons of states with different treatment times, the Difference-in-Differences (DD) estimate remains highly consistent with the main DD estimate. In simpler terms, the magnitude of the treatment effect produced by the 2014 wave is comparable to the effects observed in subsequent waves. This robustness analysis strengthens our findings and affirms the reliability of the estimated treatment effect.

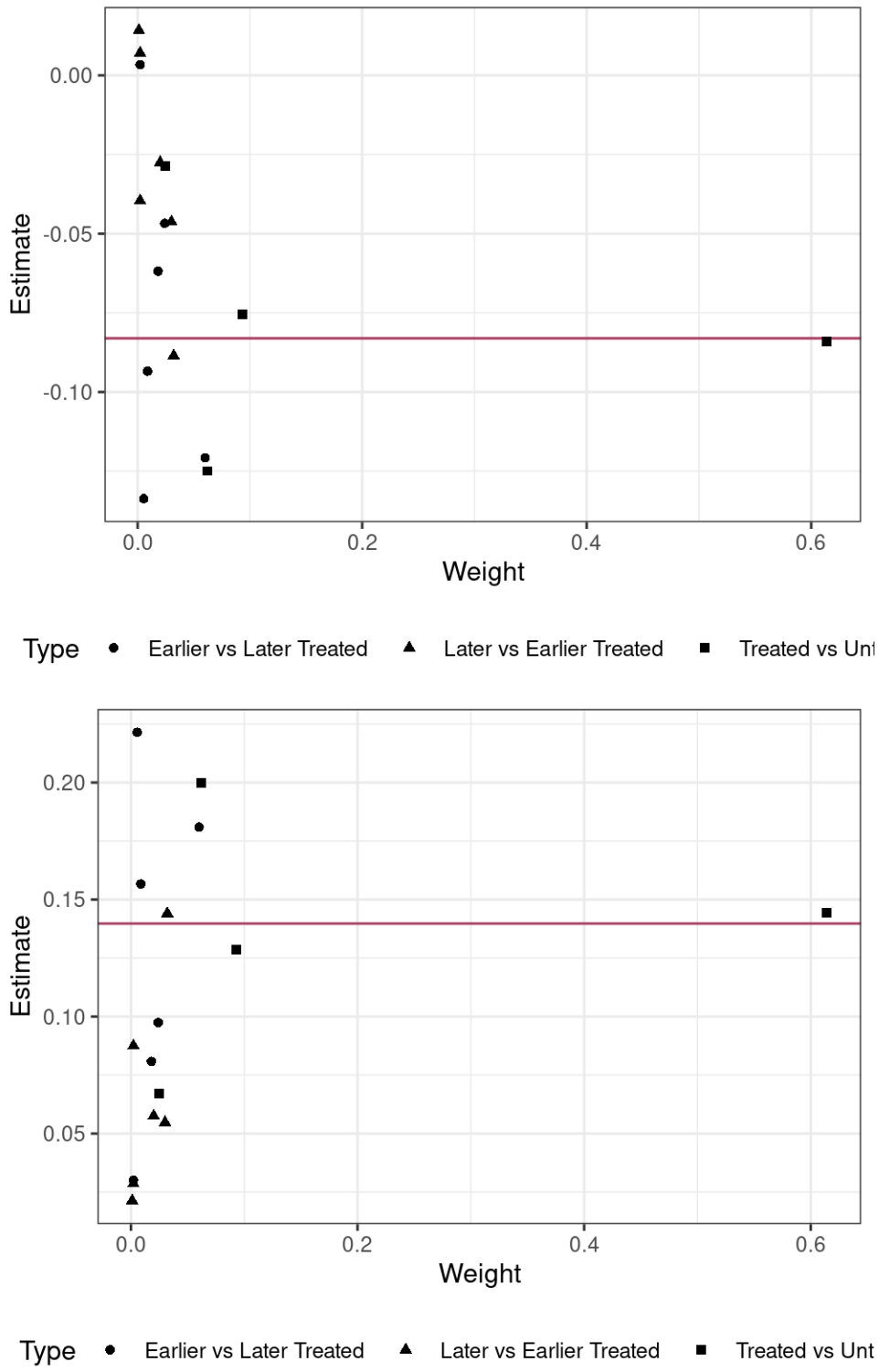


Figure 4 provides support for this finding by presenting the 2 × 2 DD estimates and associated weights derived from the conventional two-way fixed effect model. Panel (a) illustrates the estimates for the Uninsured group, while panel (b) exhibits the estimates for Medicaid coverage.