You Get What You Pay For? Additional Nursing Assistants and Resident Health in Nursing Homes

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Low staffing levels in the long-term care sector have been linked to myriad adverse health and safety outcomes for residents. Greater nursing care is associated with a lower prevalence of pressure ulcers, infections, emergency room admissions and mortality (see, e.g. Harrington et al. (2020) for an overview). However, while higher staffing levels are associated with better outcomes, the most robust evidence is for RN care, and weaker evidence is found for certified nursing assistant (CNA) care (National Academies of Sciences, Engineering, and Medicine, 2022).

In general, policymakers have relied on regulation (e.g. staffing minimums) to increase nursing home staffing. Staffing minimums have been challenged in courts, and can be hampered by lack of enforcement. In addition, facilities frequently cite worker shortages as a barrier to meeting staffing minimums. An alternative strategy is to provide financial incentives to well-staffed firms. As more than 60% of resident-bed days are covered by Medicaid, altering Medicaid reimbursement based on contemporaneous staffing is one potential approach to increase staffing. Despite the intuition behind such payment policies, such incentives have rarely been attempted at large-scale, and as such, there is limited empirical evidence on whether such policies could increase staffing or improve patient outcomes. Pre-

vious value-based payment programs in nursing homes have had mixed success, but most have amounted to only small incentives, and have generally targeted improvements in clinical outcomes, rather than in inputs such as staffing (Grabowski et al., 2023).

In order to examine whether increased care by CNAs — driven by changes in Medicaid reimbursement formula — affects resident health in the short-term, this paper examines a large policy reform in the state of Illinois (HB246). The largest component of this reform increased the Medicaid reimbursement rate as a function of a facility's staffing level (so-called "incentive payments"). Gandhi et al. (forthcoming) show that these incentive payments increased CNA staffing at facilities serving a high share of Medicaid residents by an average of 11%, and had no statistically significant effect on CNA staffing at low-Medicaid facilities or on RN or LPN staffing (Figure 1). This paper builds upon the existing work by using detailed assessment, Medicare enrollment, and claims data on nursing home patients from 2021 through 2023 to study how the increase in CNA hours affected resident health on multiple domains. We compare nursing home residents at facilities with high/low Medicaid baseline utilization at Illinois and non-Illinois facilities before and after the payment reform in a triple-differences set-up.[1]

Our preliminary results, using assessment data through 2022, shows no statistically or clinically significant changes across 35 measures of health health (Figure 2). These outcomes include claims-based measures such as hospitalization and ED visits, measures of mental/cognitive health, and adverse events associated with under-staffing. Event study analysis likewise show no differential trajectory for at least eight quarters after the reform was implemented (Figure 3).

In the coming months, we will extend this analysis by including assessment data for 2023 (9-12 quarters after the reform) in order to examine whether the lack of a short-term response masks longer-term effects. We anticipate these analyses will be complete by March 2025.

[1]The appendix shows results for a difference-in-differences design comparing residents in high-Medicaid facilities in Illinois to low-Medicaid facilities in Illinois.

There are at least three possible explanations for why a policy that dramatically increased CNA staffing did not affect patient health in the short-term. One explanation is that CNA staffing truly has few benefits to patients, in which case, policymakers might instead prioritize LPN or RN staffing. A second explanation is that assessment- and claims-based measures of care may not fully capture how CNAs affect patient wellbeing (National Academies of Sciences, Engineering, and Medicine, 2022). Third, it may be that improvements in patient health take time to materialize as new employees learn employer protocols and gain firm-specific expertise in order to enable them to provide high-quality care (Antill et al., 2022; Bartel et al., 2014). With the additional year of data (in progress) we will be able to provide more compelling evidence on the plausibility of this third explanation.

References

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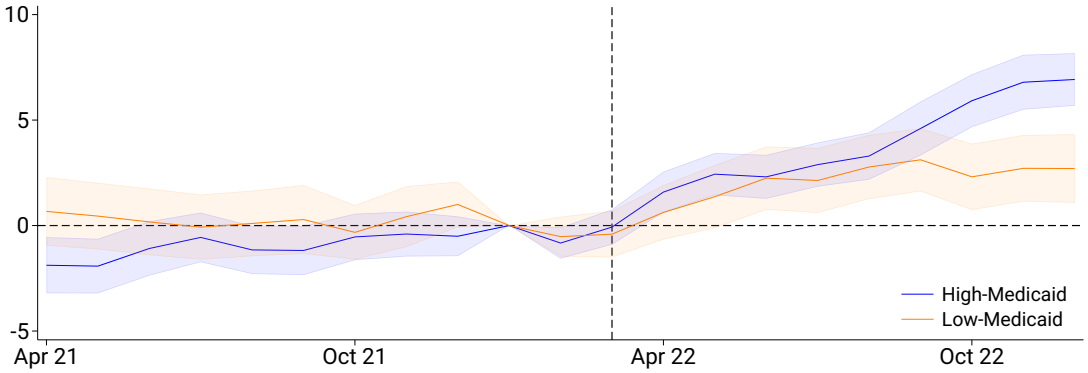
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Harrington, Charlene, Mary Ellen Dellefield, Elizabeth Halifax, Mary Louise Fleming, and Debra Bakerjian, "Appropriate nurse staffing levels for US nursing homes," *Health Services Insights*, 2020, *13.*

National Academies of Sciences, Engineering, and Medicine, *The national imperative to improve nursing home quality: Honoring our commitment to residents, families, and staff* 2022.

(a) Impact of Reform on CNA Staffing Level (% of STRIVE)



(b) Impact of Reform on RN+LPN Staffing Level (% of STRIVE)

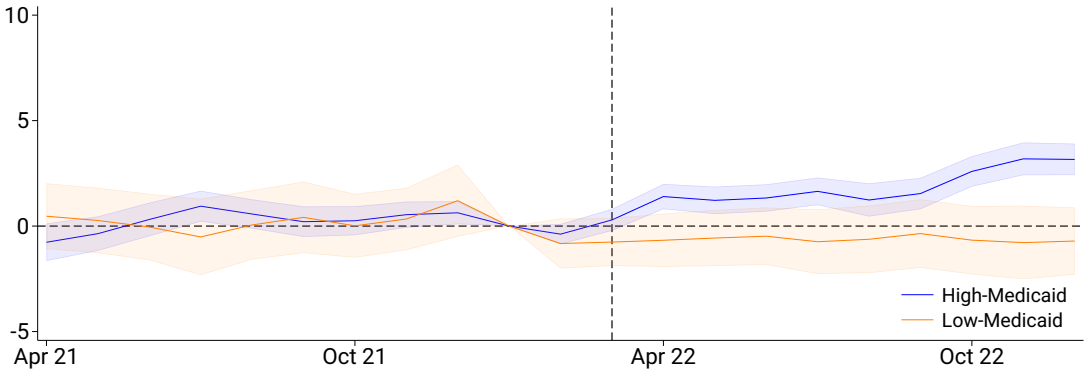


Figure 1: Staffing Effects: Difference-in-Differences Event Study

Notes: Figure presents results from difference-in-difference event study regressions. Sample partitioned by the median share of Medicaid residents in 2019. Staffing levels are expressed as % of target staffing level, based on resident case mix. Gray area denotes 95% confidence interval with robust standard errors clustered by facility.

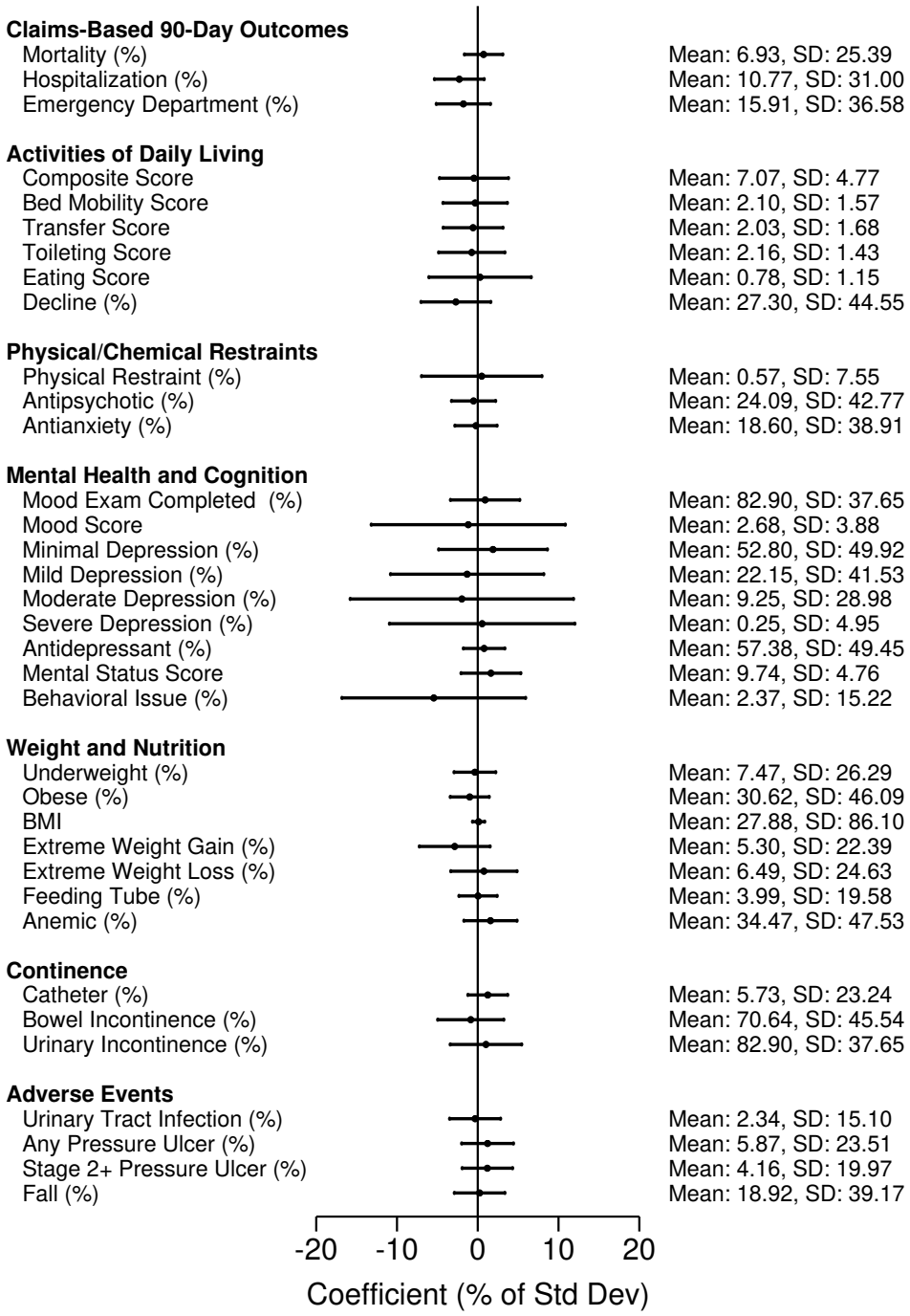
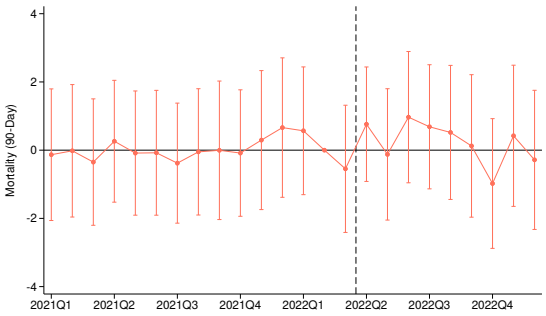


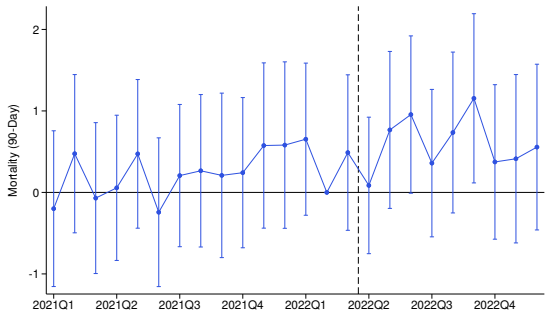
Figure 2: Impacts Across Health Measures: Triple Differences

Notes: Figure presents estimates from difference-in-differences-in-differences regressions of various health measures. We employ three levels of differences: (1) before versus after the reform was introduced, (2) patients in Illinois versus non-Illinois nursing homes, and (3) patients in facilities with high- versus low-Medicaid resident shares. Difference-in-differences results omitting the third difference are presented in Figure 2. Horizontal bars denote 95% confidence intervals, with standard errors clustered at the facility-level.

Mortality

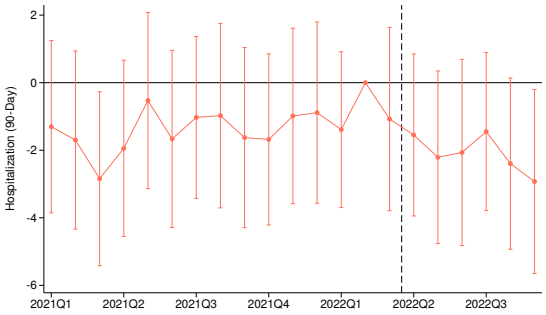


(a) Triple Differences

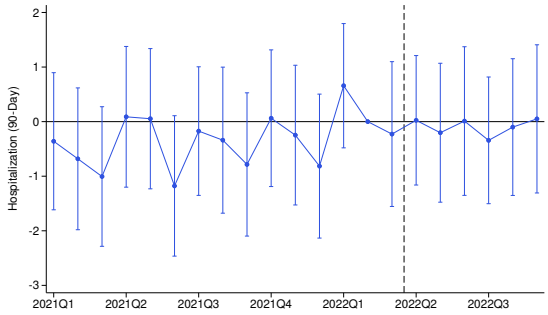


(b) Difference-in-Differences

Hospitalization



(a) Triple Differences

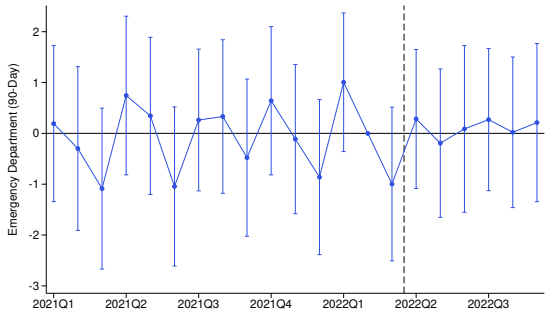


(b) Difference-in-Differences

Emergency Department

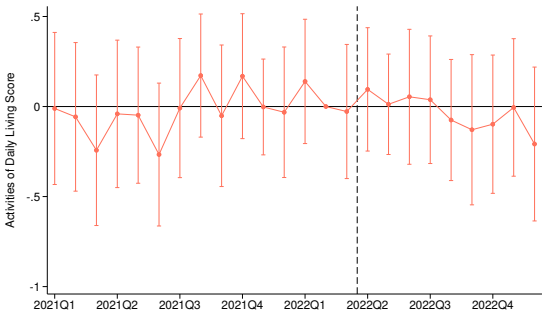


(a) Triple Differences

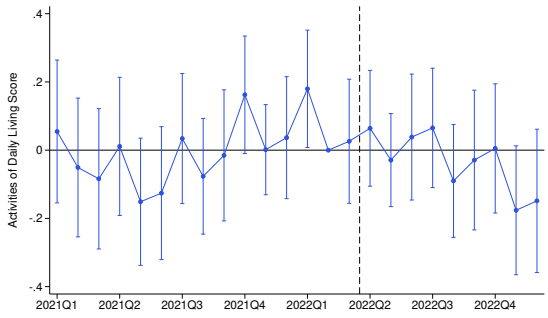


(b) Difference-in-Differences

Composite ADL Score

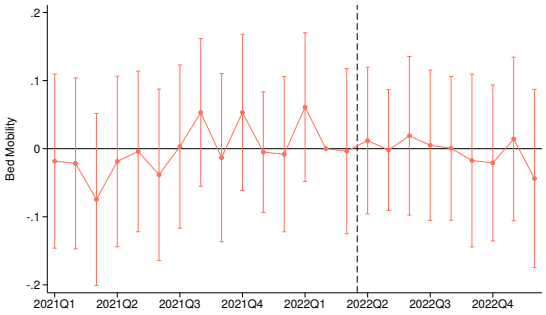


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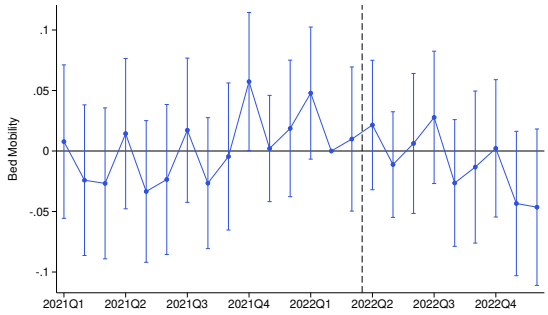


(b) Difference-in-Differences

Bed Mobility Score

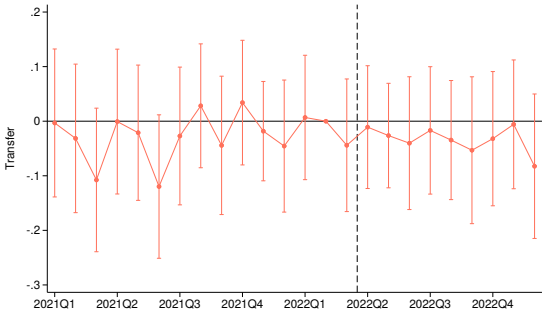


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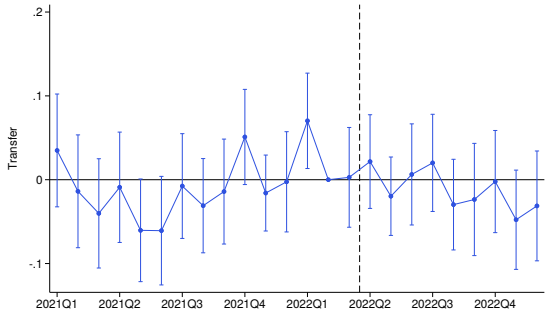


(b) Difference-in-Differences

Transfer Score

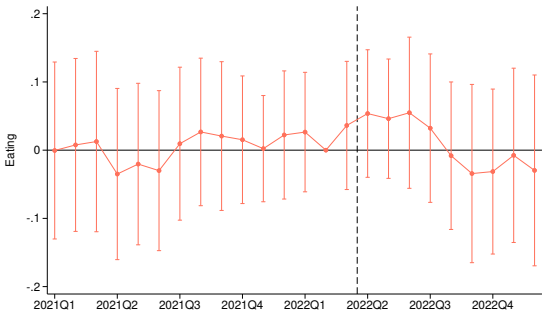


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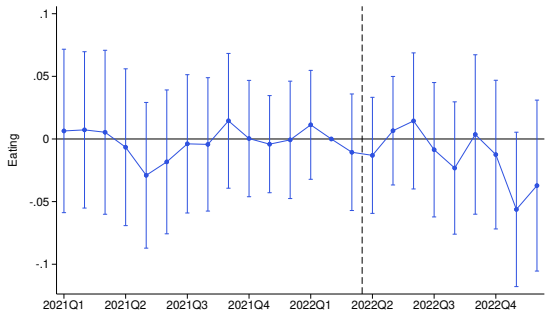


(b) Difference-in-Differences

Toileting Score

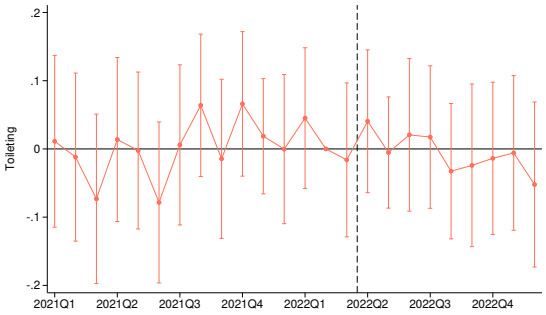


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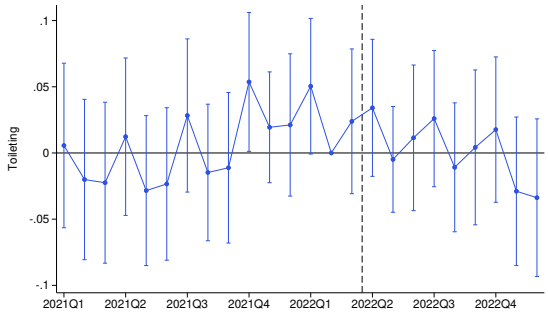


(b) Difference-in-Differences

Eating Score

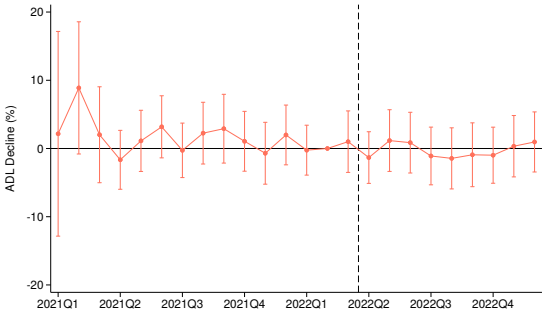


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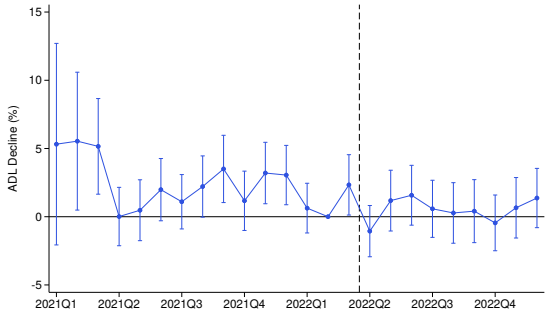


(b) Difference-in-Differences

ADL Decline

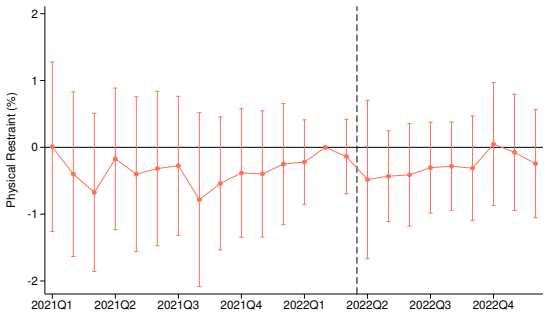


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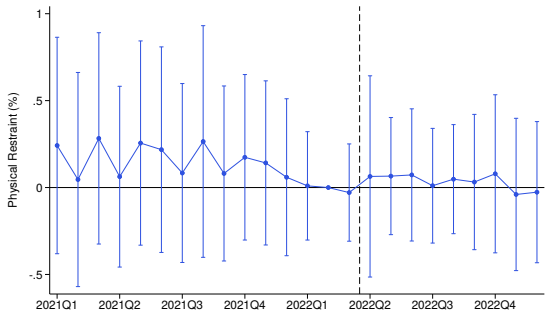


(b) Difference-in-Differences

Physical Restraint

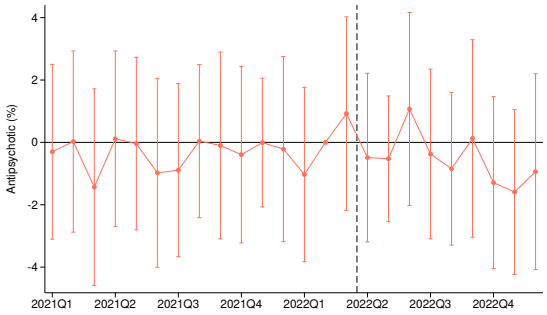


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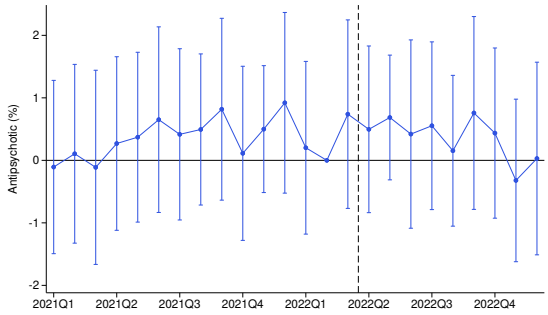


(b) Difference-in-Differences

Antipsychotic

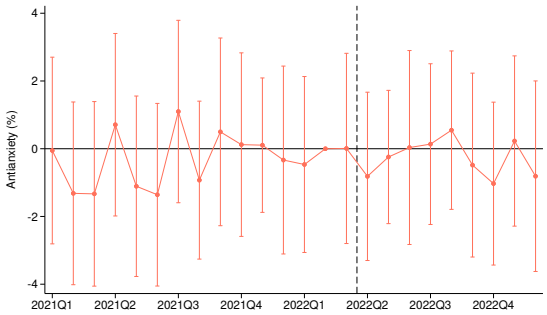


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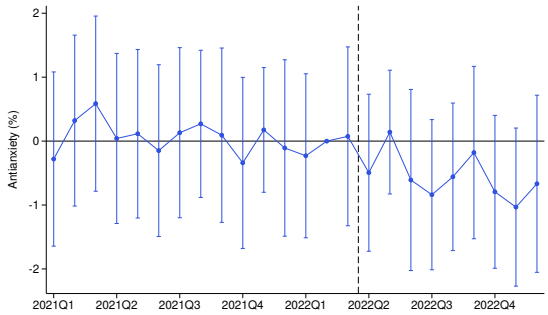


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Antianxiety

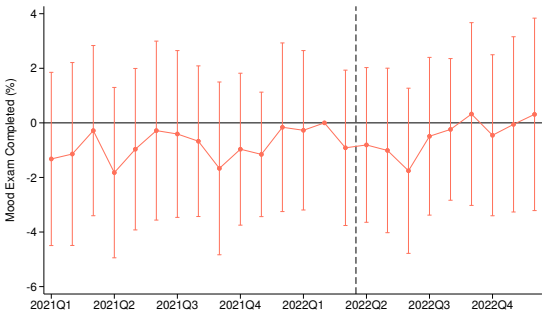


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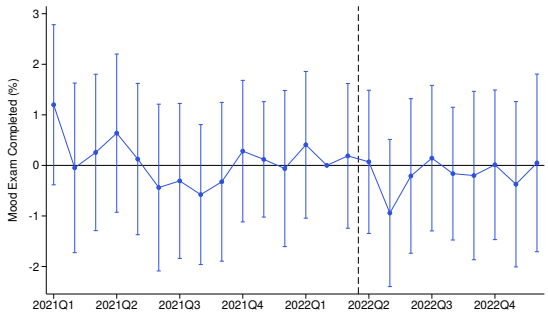


(b) Difference-in-Differences

Mood Exam Completed

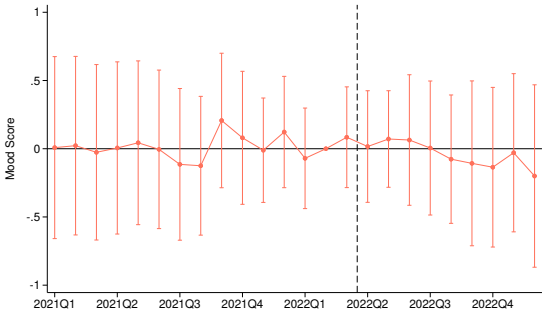


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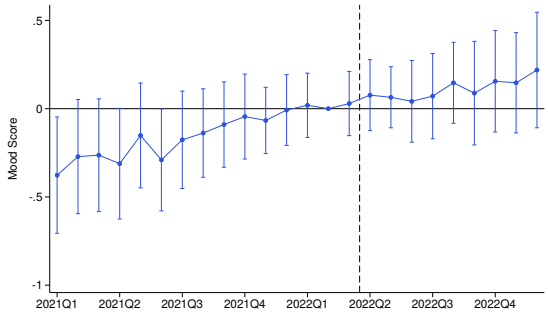


(b) Difference-in-Differences

Mood Score

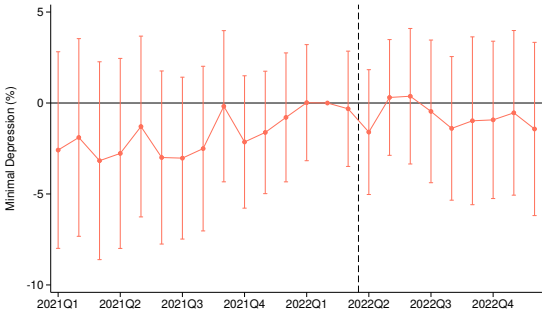


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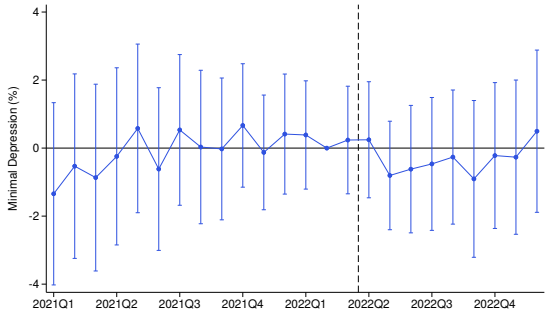


(b) Difference-in-Differences

Minimal Depression

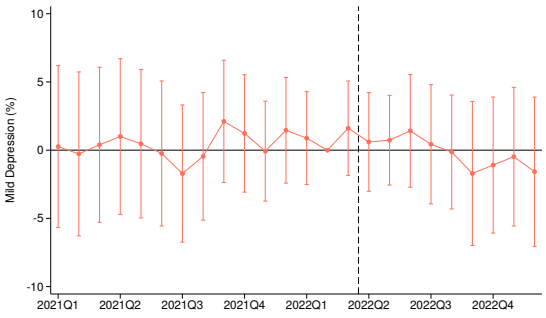


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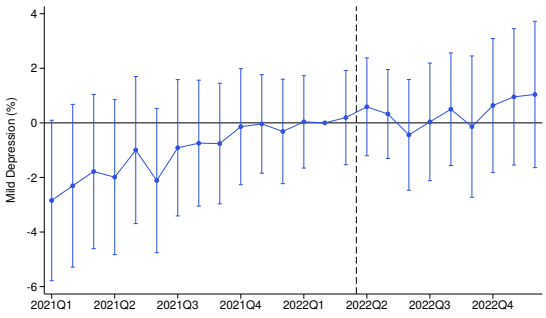


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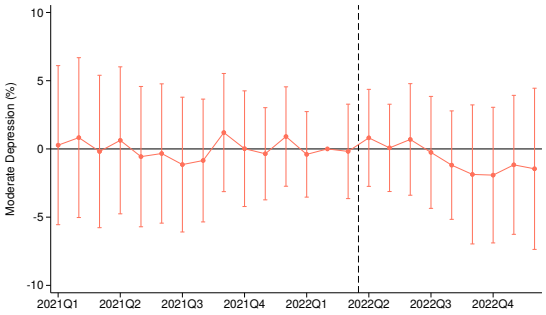


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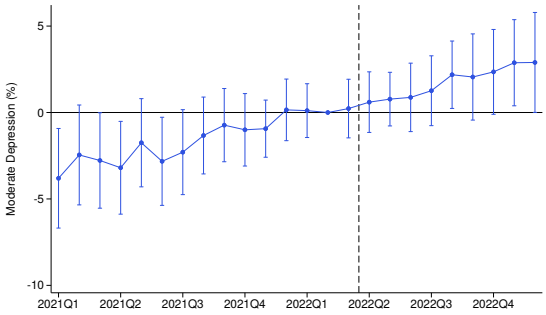


(b) Difference-in-Differences

Moderate Depression

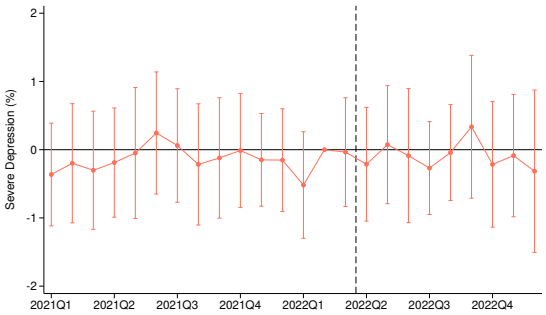


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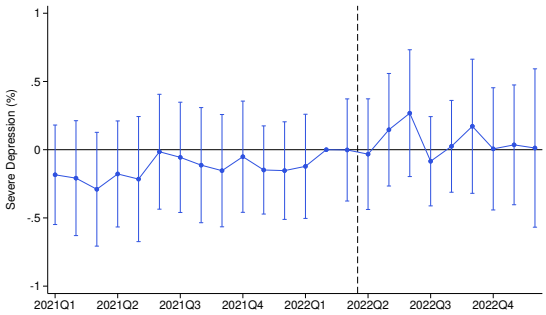


(b) Difference-in-Differences

Severe Depression

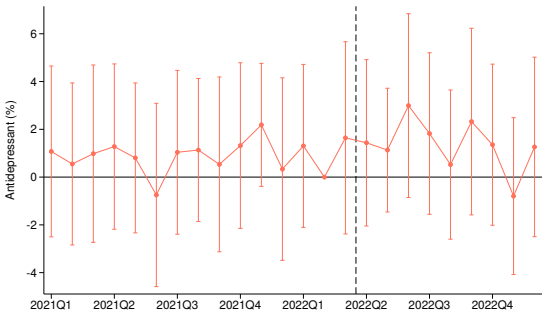


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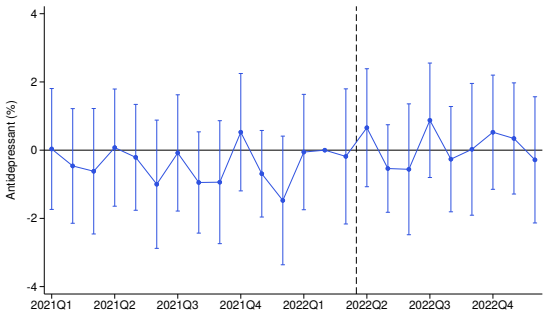


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Antidepressant

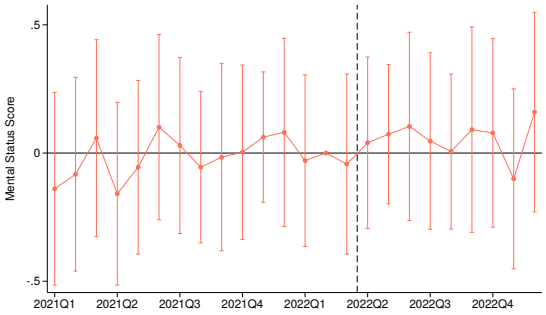


(a) Triple Differences

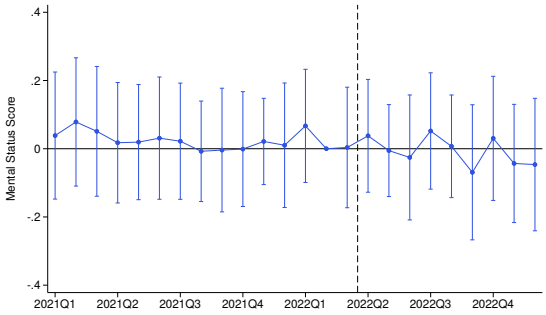


(b) Difference-in-Differences

Mental Status Score



(a) Triple Differences

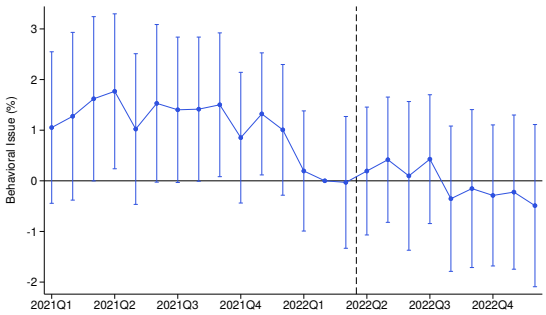


(b) Difference-in-Differences

Behavioral Issue

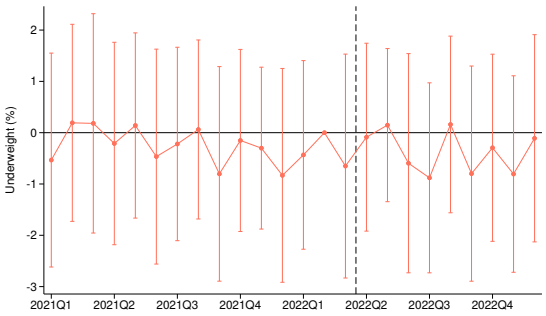


(a) Triple Differences

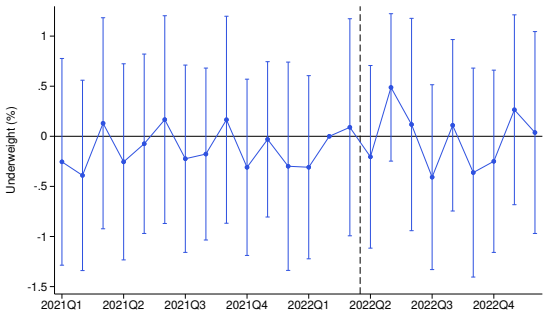


(b) Difference-in-Differences

Underweight

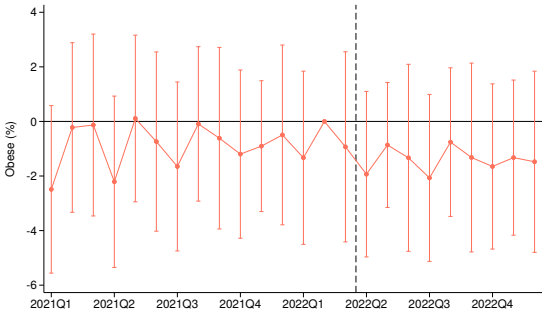


(a) Triple Differences

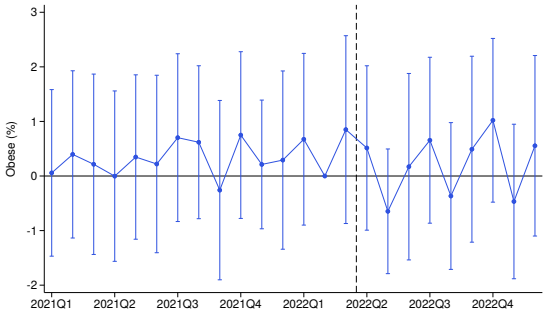


(b) Difference-in-Differences

Obese

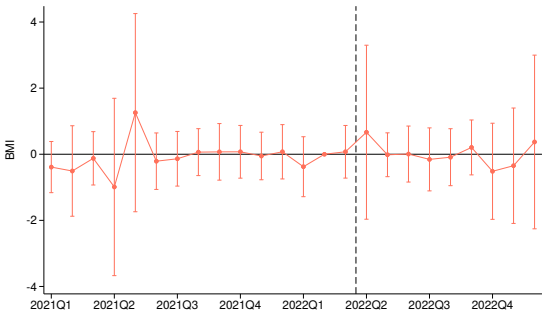


(a) Triple Differences

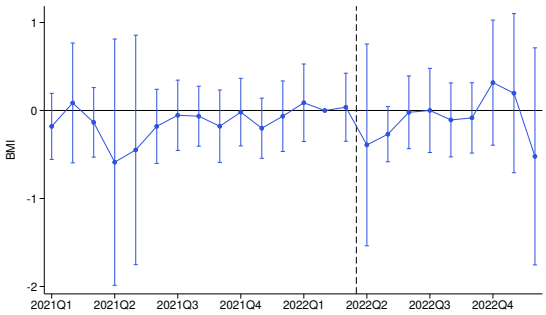


(b) Difference-in-Differences

BMI

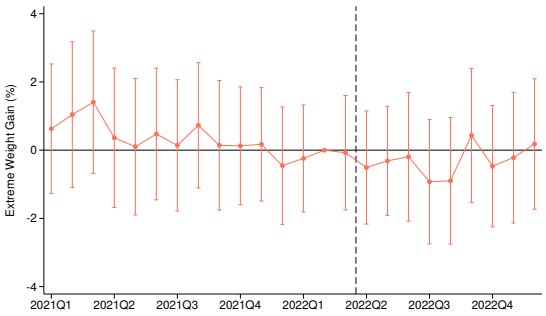


(a) Triple Differences

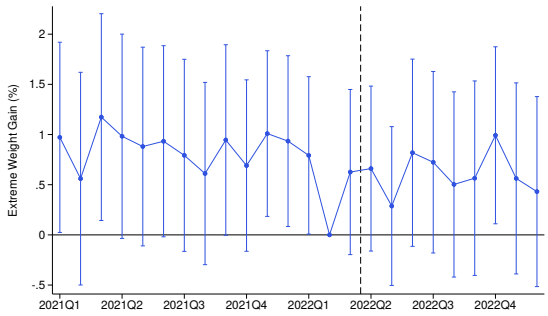


(b) Difference-in-Differences

Extreme Weight Gain



(a) Triple Differences

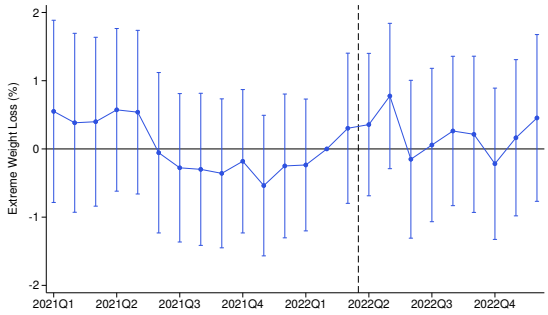


(b) Difference-in-Differences

Extreme Weight Loss

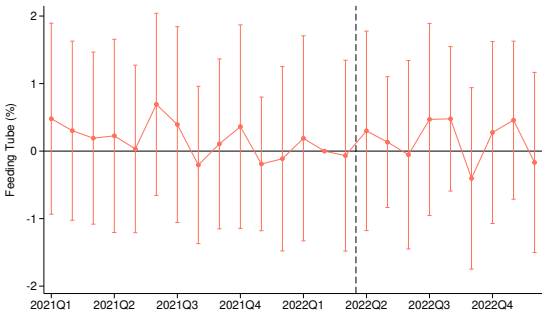


(a) Triple Differences

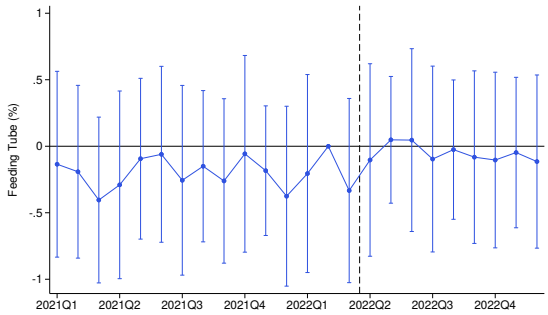


(b) Difference-in-Differences

Feeding Tube

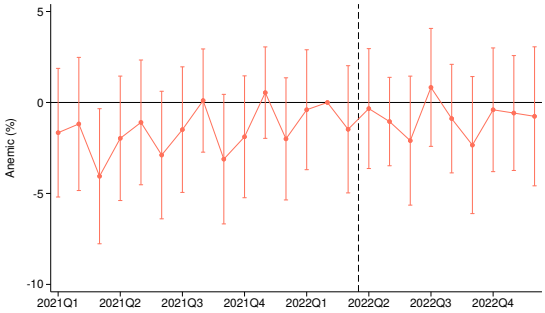


(a) Triple Differences

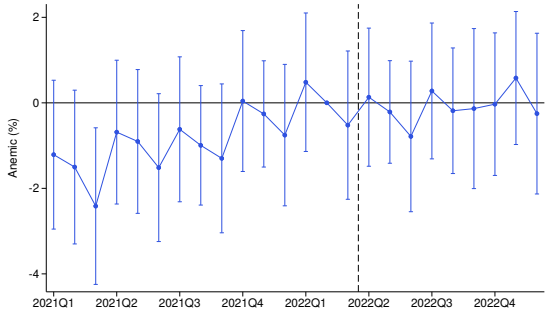


(b) Difference-in-Differences

Anemic

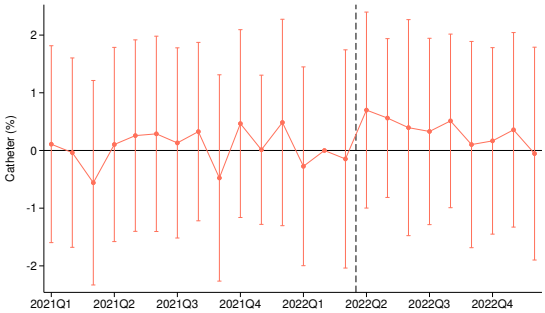


(a) Triple Differences

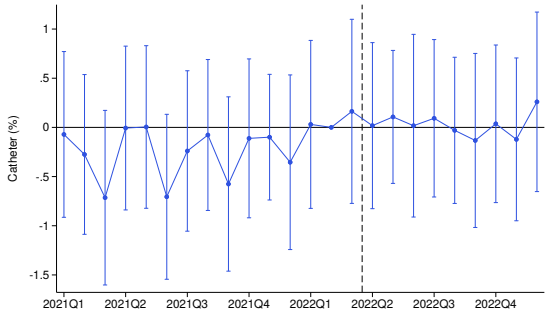


(b) Difference-in-Differences

Catheter

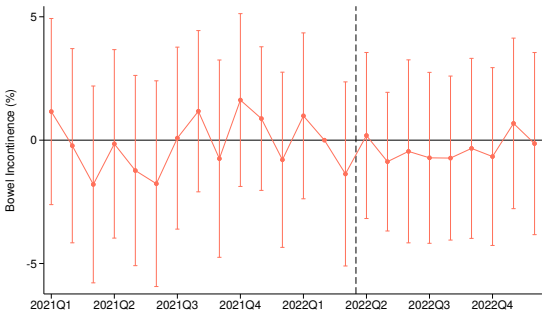


(a) Triple Differences

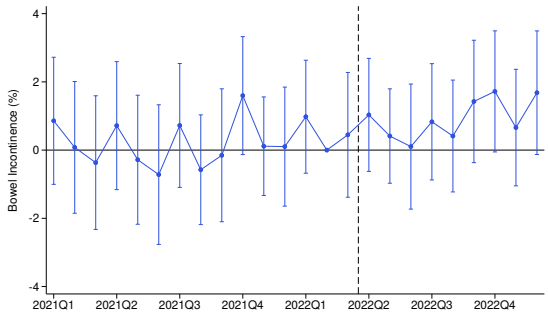


(b) Difference-in-Differences

Bowel Incontinence

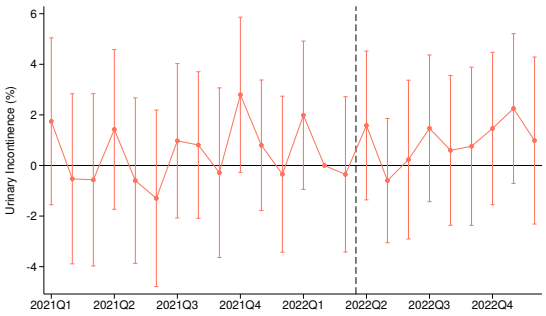


(a) Triple Differences

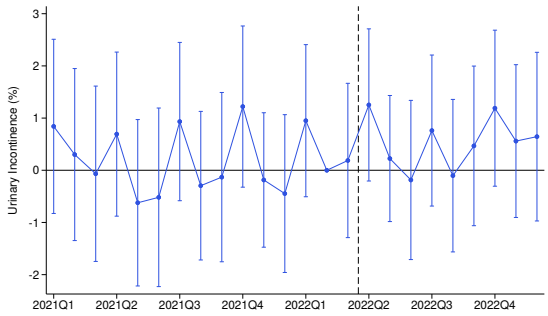


(b) Difference-in-Differences

Urinary Incontinence

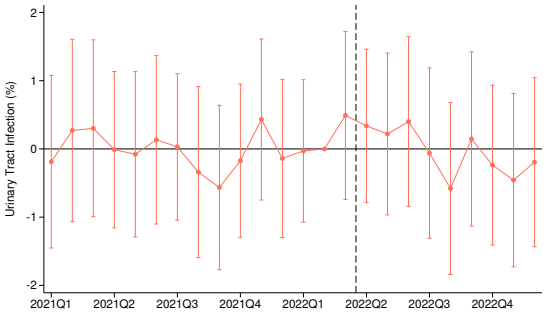


(a) Triple Differences

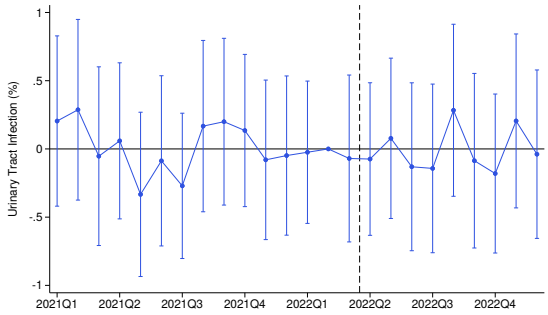


(b) Difference-in-Differences

Urinary Tract Infection

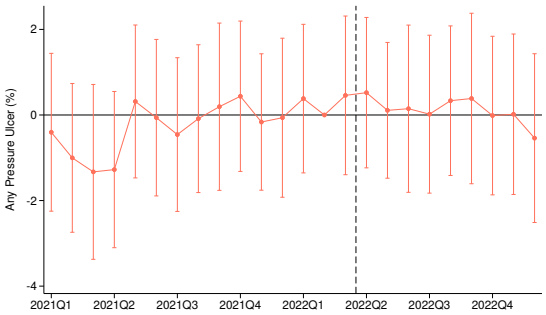


(a) Triple Differences

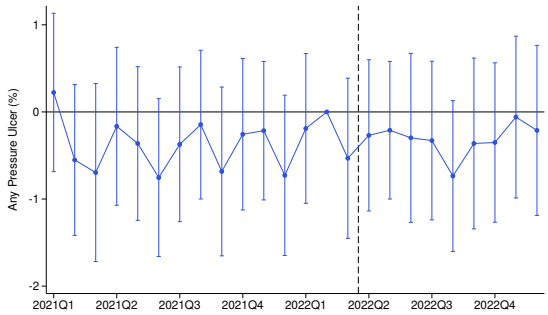


(b) Difference-in-Differences

Any Pressure Ulcer

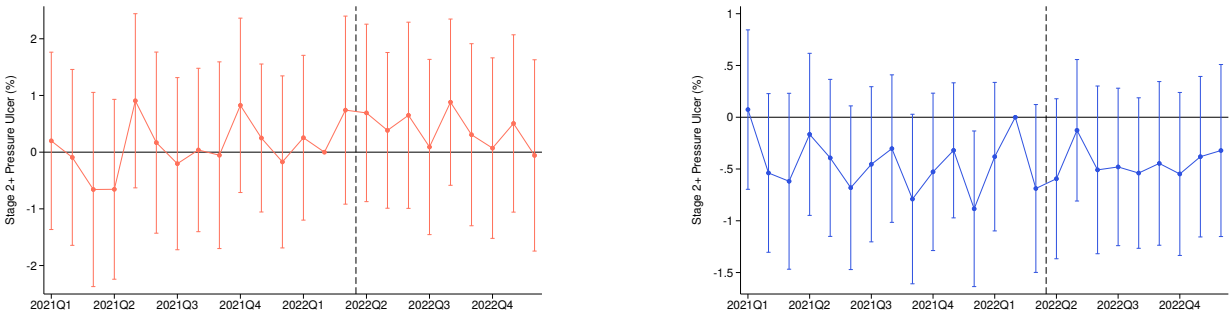


(a) Triple Differences



(b) Difference-in-Differences

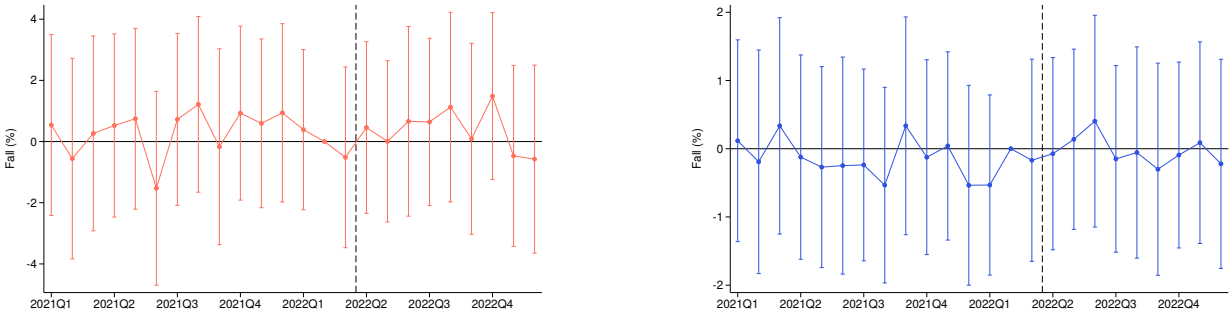
Stage 2+ Pressure Ulcer



(a) Triple Differences

(b) Difference-in-Differences

Fall



(a) Triple Differences

(b) Difference-in-Differences

Figure 3: Health Measures Event Studies

Notes: Figures present estimates for triple-differences and difference-in-differences regressions. Each point reflects an estimate for a calendar month, with February 2022 as the omitted period. 95% confidence intervals reflect standard errors clustered at the facility-level.

A Additional Tables and Figures

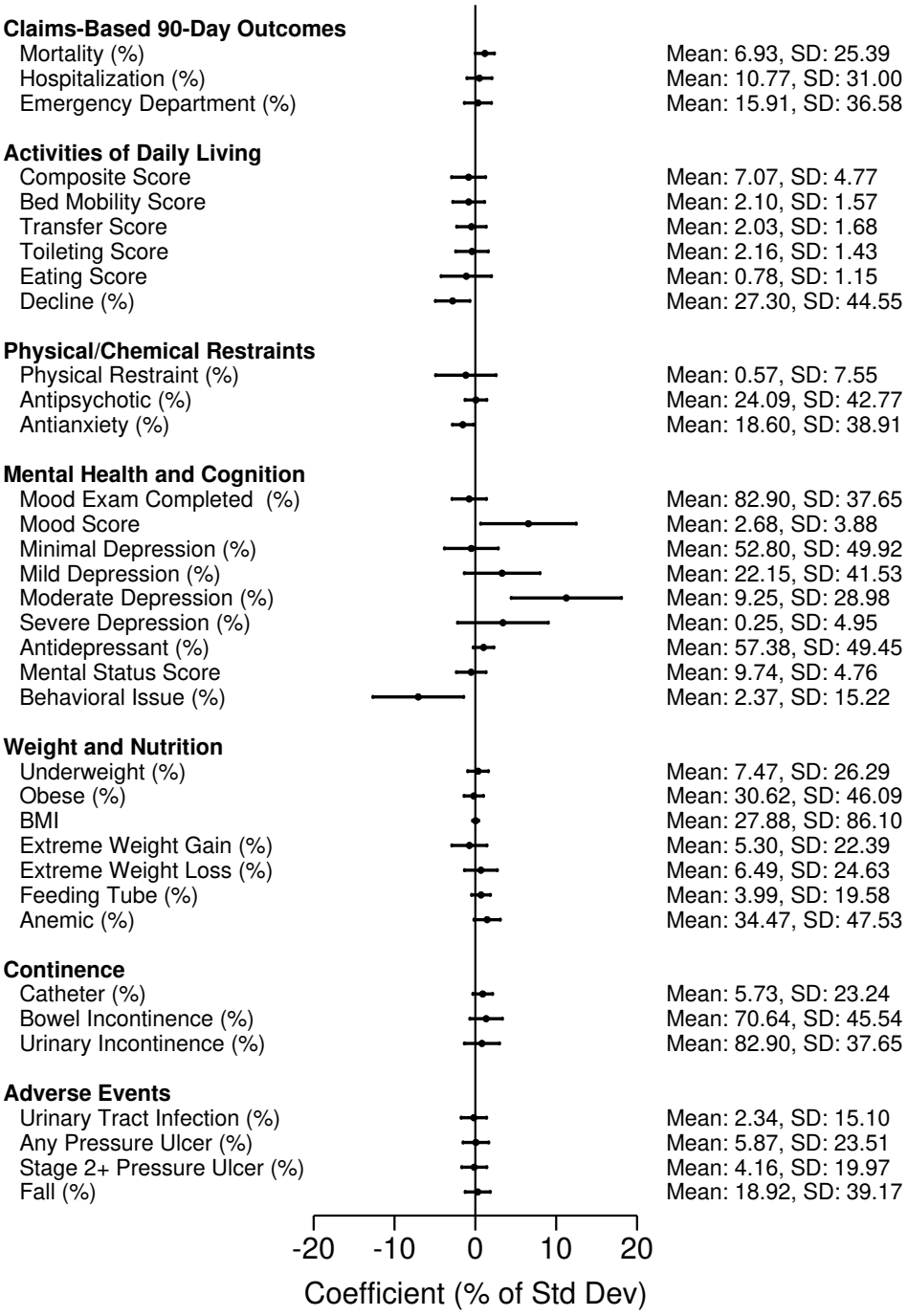


Figure A.1: Impacts Across Health Measures: Difference-in-Differences

Notes: Figure presents estimates from difference-in-differences regressions of various health measures, comparing their trends in Illinois nursing homes against those in all other states. Horizontal bars denote 95% confidence intervals, with standard errors clustered at the facility-level.

	Mean	SD	SD Coefficient (95% CI)	N
Claims-Based 90-Day Outcomes				
Mortality (%)	6.93	25.39	0.72 (-1.65, 3.10)	7,080,516
Hospitalization (%)	10.77	31	-2.28 (-5.36, 0.80)	6,163,754
Emergency Department (%)	15.91	36.58	-1.78 (-5.14, 1.58)	6,163,754
Activities of Daily Living				
Composite Score	7.07	4.77	-0.46 (-4.73, 3.81)	7,080,516
Bed Mobility Score	2.1	1.57	-0.32 (-4.30, 3.67)	7,080,516
Transfer Score	2.03	1.68	-0.58 (-4.28, 3.12)	7,080,516
Toileting Score	2.16	1.43	-0.74 (-4.85, 3.36)	7,080,516
Eating Score	0.78	1.15	0.29 (-6.05, 6.62)	7,080,516
Decline (%)	27.3	44.55	-2.71 (-7.03, 1.61)	5,498,747
Physical/Chemical Restraints				
Physical Restraint (%)	0.57	7.55	0.49 (-6.96, 7.95)	7,080,516
Antipsychotic (%)	24.09	42.77	-0.52 (-3.25, 2.21)	7,080,516
Antianxiety (%)	18.6	38.91	-0.22 (-2.83, 2.39)	7,080,516
Mental Health and Cognition				
Mood Exam Completed (%)	82.9	37.65	0.91 (-3.37, 5.20)	7,080,516
Mood Score	2.68	3.88	-1.17 (-13.19, 10.84)	5,866,082
Minimal Depression (%)	52.8	49.92	1.89 (-4.84, 8.62)	5,866,082
Mild Depression (%)	22.15	41.53	-1.31 (-10.80, 8.18)	5,866,082
Moderate Depression (%)	9.25	28.98	-1.97 (-15.79, 11.86)	5,866,082
Severe Depression (%)	0.25	4.95	0.55 (-10.93, 12.02)	5,866,082
Antidepressant (%)	57.38	49.45	0.78 (-1.78, 3.35)	7,080,516
Mental Status Score	9.74	4.76	1.63 (-2.07, 5.33)	6,026,227
Behavioral Issue (%)	2.37	15.22	-5.44 (-16.81, 5.93)	7,077,995
Weight and Nutrition				
Underweight (%)	7.47	26.29	-0.35 (-2.94, 2.23)	6,864,214
Obese (%)	30.62	46.09	-0.99 (-3.40, 1.42)	6,864,214
BMI	27.88	86.1	0.11 (-0.65, 0.86)	6,864,214
Extreme Weight Gain (%)	5.3	22.39	-2.85 (-7.23, 1.52)	7,032,405
Extreme Weight Loss (%)	6.49	24.63	0.76 (-3.34, 4.86)	7,032,843
Feeding Tube (%)	3.99	19.58	0.04 (-2.33, 2.40)	7,076,447
Anemic (%)	34.47	47.53	1.58 (-1.71, 4.86)	7,079,903
Continence				
Catheter (%)	5.73	23.24	1.24 (-1.22, 3.71)	7,080,007
Bowel Incontinence (%)	70.64	45.54	-0.86 (-4.96, 3.23)	6,942,167
Urinary Incontinence (%)	82.9	37.65	1.02 (-3.41, 5.44)	6,696,268
Adverse Events				
Urinary Tract Infection (%)	2.34	15.1	-0.33 (-3.48, 2.83)	7,079,631
Any Pressure Ulcer (%)	5.87	23.51	1.21 (-1.99, 4.42)	7,076,049
Stage 2+ Pressure Ulcer (%)	4.16	19.97	1.19 (-1.93, 4.32)	7,080,516
Fall (%)	18.92	39.17	0.23 (-2.90, 3.36)	7,079,878

Table A.1: Impacts across health measures: Difference-in-differences-in-differences

Notes: Table presents estimates from difference-in-differences-in-differences regressions of various health measures. We employ three levels of differences: (1) before versus after the reform was introduced, (2) patients in Illinois versus non-Illinois nursing homes, and (3) patients in facilities with high- versus low-Medicaid resident shares. Standard errors clustered at the facility-level.