Contract Design and the Targeting of Care: Evidence from Skilled Nursing Facilities*

Tal Gross† Adam Sacarny‡ David Silver§ Maggie Shi¶

July 2026

Short Abstract: The design of public contracts is a topic of intense debate, particularly in healthcare. We study how healthcare providers respond to fixed-price contracts. In 2019, Medicare transformed how it reimbursed skilled nursing facilities (SNFs). The payment reform ended marginal incentives for a key input: therapy. We compare SNFs with differing practice styles, because SNFs with therapy-intensive delivery styles faced more pressure to cut care. We show that those SNFs reduced therapy more than their less-intensive peers. We detect, however, minimal harm across a host of rich health outcomes. Results are similar across patient subgroups, even for patients with the highest need for therapy and the greatest risk of adverse outcomes. These findings suggest that SNFs can target their reductions in care and minimize patient harm as they respond to incentives.

*We thank Brian McGarry and seminar participants at Stanford University, USC, and ASHEcon for helpful feedback. We gratefully acknowledge support from the National Institute on Aging P01AG005842. Chris Dunphy provided outstanding research analyst support.

†Boston University and NBER. talgross@bu.edu

‡Columbia University and NBER. ajs2102@columbia.edu

§University of California, Santa Barbara and NBER. dsilver@ucsb.edu

¶University of Chicago and NBER. m.shi@uchicago.edu

Extended Abstract

Governments often rely on private firms to provide public services. How governments ought to contract with those firms is a longstanding topic of inquiry (Laffont and Tirole, 1993). Researchers have studied the design of public procurement contracts in a variety of industries: defense (Rogerson, 1994), education (Lavy, 2002; Rockoff and Turner, 2010), transportation (Lewis and Bajari, 2011, 2014), and healthcare (Cutler, 1995; Clemens and Gottlieb, 2014).

In healthcare, in particular, the structure of these contracts remains a topic of intense policy debate. Healthcare payment has generally shifted away from cost-plus reimbursement and towards fixed-price reimbursement. The case for this shift rests on the assumption that healthcare providers will react to fixed-price incentives by cutting care in a targeted fashion, retaining inputs that have high value at the margin.

This paper studies that hypothesis in the context of one of the largest recent changes in healthcare provider incentives in the United States. In 2019, Medicare stopped paying nursing homes at the margin for their most important care input, therapy.[1] Previously, Medicare paid nursing homes a daily rate that rose with the amount of therapy they provided the Medicare beneficiary. After the reform, Medicare paid nursing homes a daily rate irrespective of the quantity of therapy they provided. The reform thus exposed nursing homes to a sudden end to marginal incentives.

Nursing homes offer a useful setting in which to study how incentives shape the provision of healthcare. First, patients in nursing homes are closely monitored, as nursing homes are required to conduct regular assessments of patients' health status and abilities. These granular measures of health allow us to dive deeper into the effects of payment changes on patient welfare than what is typically possible using claims data alone. Nursing homes also report a key care input, labor, in a separate, audited system, allowing us to validate our findings with secondary datasets. Second, we study a recent reform that represents a further step toward prospective payment. As policymakers continue moving away from cost-based reimbursement, understanding the consequences of these incremental changes has become increasingly important. Third, nursing homes are crucial sources of care. There exist over 14,000 nursing homes around the United States, roughly 5 for every acute-care hospital, and they account for 6.5% of Medicare spending.

[1]Nursing homes provide three types of therapy: physical therapy, occupational therapy, and speech language pathology therapy.

Using this reform, we assess how ending payment at the margin for inputs can affect care delivery and health outcomes. To do so, we employ a research design that leverages pre-reform differences across nursing homes in their practice styles. Prior to the reform, some nursing homes delivered therapy conservatively. Those nursing homes were better aligned with the coming incentives. In contrast, other nursing homes delivered therapy intensively. The key intuition of this empirical strategy is that higher-therapy nursing homes faced greater pressure to cut back on therapy than their conservative counterparts. We then implement a differences-in-differences comparison to assess whether and how the behavior of these two types of nursing homes diverged after the reform.

We find that high-therapy nursing homes cut back more on therapy than their low-intensity peers. That result provides useful variation to study the downstream effects of the cuts in therapy on patients' health. We detect no change in mortality or re-hospitalization rates, outcomes that are central to nursing home value-add (Olenski and Sacher, 2024) and pay-for-performance policies. Turning to assessment-based measures of health, we find that patients are no more likely to experience falls, a key safety indicator. We detect a decline in patients' ability to function independently, but the estimated decline is unlikely to be clinically significant: we estimate that after a 10% reduction in therapy, function scores fall by only 0.8%.

We conduct the same analyses across subgroups of patients to test for signs of harm among those at greater risk. Medicare beneficiaries who visit a nursing home must first visit an acute-care hospital. That provides a wealth of third-party-reported characteristics that we use to develop predictors of patients' need for therapy and their risk of adverse outcomes. Across all subgroups, we find strikingly similar relative reductions in therapy. We also fail to detect changes in health outcomes across subgroups, even for high-risk groups.

Those findings are consistent with facilities targeting their reductions in therapy as they respond to incentives. In aggregate, we observe significant reductions in therapy, yet detect no changes in three health indicators and a small deterioration in one. These general patterns hold across subgroups, suggesting that facilities were able to reduce inputs safely even for patients at greater risk of harm. They also suggest that nursing homes were engaging in care that was flat of the curve: the return to health of the marginal reduction in therapy was close to zero.

Interpreting these effects requires one further observation. The facilities under the greatest pressure to cut therapy were also, by construction, those facing the largest

revenue losses under the reform. Their pre-reform production process relied on the therapy that the new system stopped rewarding. So the hardest-hit facilities cut care the most and lost the most money and still, their patients fared no worse.

References

Clemens, Jeffrey and Joshua D. Gottlieb, "Do Physicians' Financial Incentives Affect Medical Treatment and Patient Health?," *American Economic Review*, April 2014, *104* (4), 1320–1349.

Cutler, David M., "The Incidence of Adverse Medical Outcomes Under Prospective Payment," *Econometrica*, January 1995, *63* (1), 29.

Laffont, Jean-Jacques and Jean Tirole, *A theory of incentives in procurement and regulation*, Cambridge, Mass: MIT Press, 1993.

Lavy, Victor, "Evaluating the Effect of Teachers' Group Performance Incentives on Pupil Achievement," *Journal of Political Economy*, December 2002, *110* (6), 1286–1317.

Lewis, G. and P. Bajari, "Moral Hazard, Incentive Contracts, and Risk: Evidence from Procurement," *The Review of Economic Studies*, July 2014, *81* (3), 1201–1228.

Lewis, Gregory and Patrick Bajari, "Procurement Contracting With Time Incentives: Theory and Evidence," *The Quarterly Journal of Economics*, August 2011, *126* (3), 1173–1211.

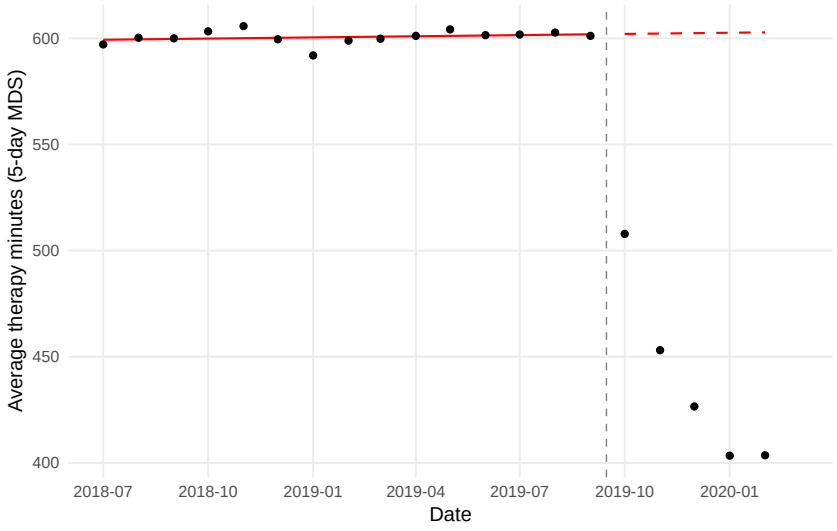
Olenski, Andrew and Szymon Sacher, "Estimating Nursing Home Quality with Selection," *Review of Economics and Statistics*, April 2024, pp. 1–31.

Rockoff, Jonah and Lesley J Turner, "Short-Run Impacts of Accountability on School Quality," *American Economic Journal: Economic Policy*, November 2010, *2* (4), 119–147.

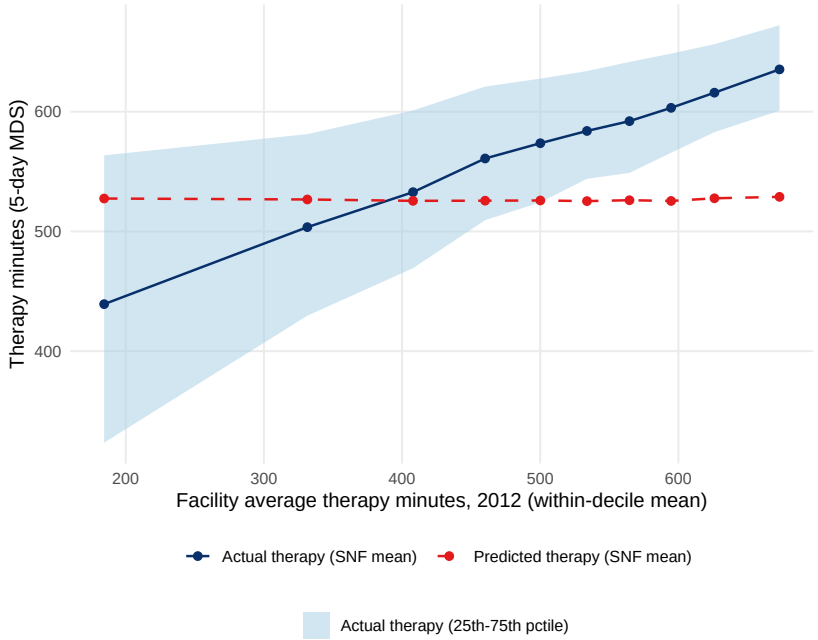
Rogerson, William P, "Economic Incentives and the Defense Procurement Process," *Journal of Economic Perspectives*, November 1994, *8* (4), 65–90.

Figure 1. Time Series and Across-SNF Distribution of Therapy Provision

(a) Average Therapy By Month Before and After PDPM

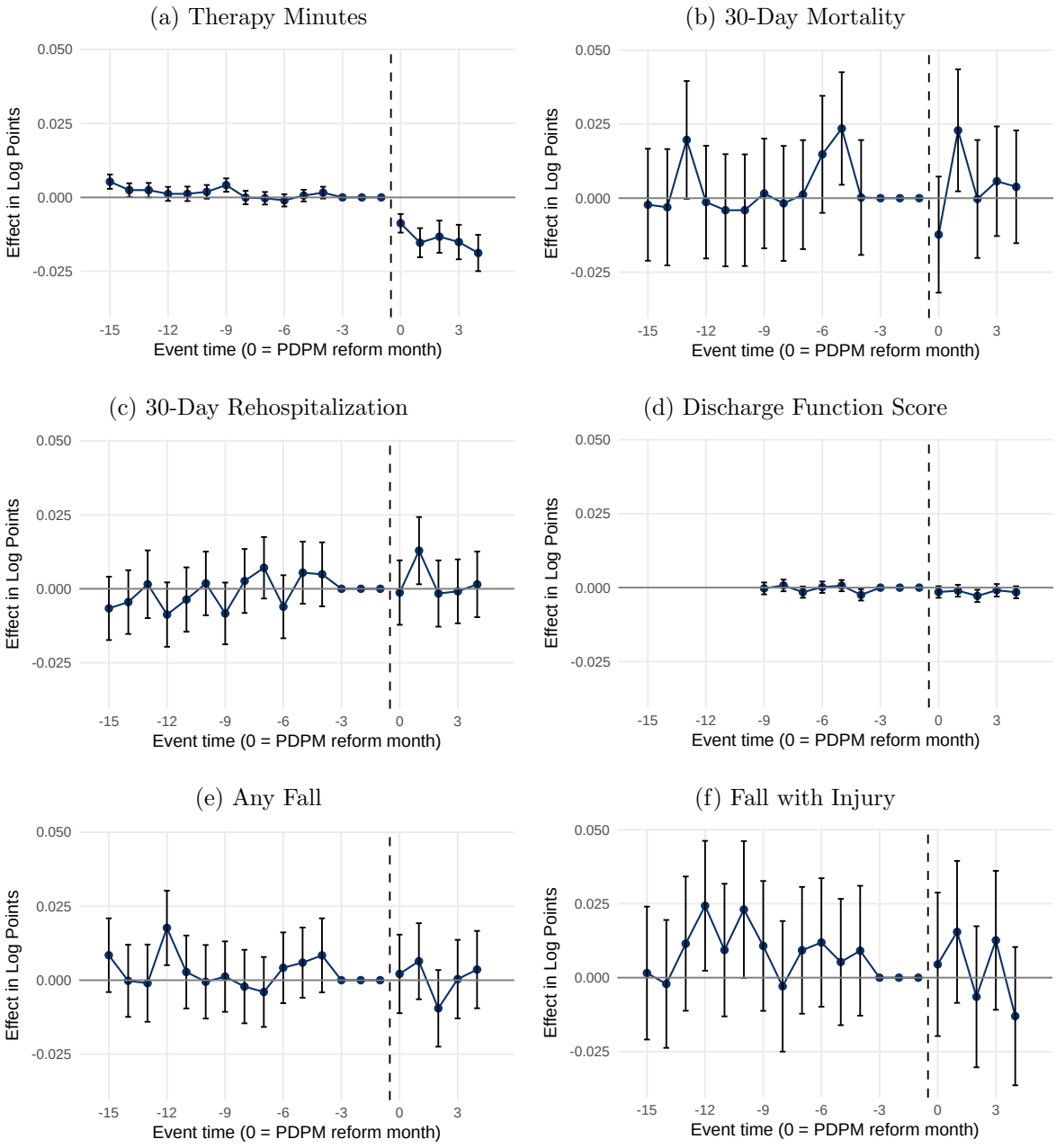


(b) Pre-Reform Therapy Distribution within SNFs, by Baseline Therapy



Panel A presents the time series of therapy at SNFs nationally, with the vertical dashed line indicating the beginning of PDPM. Each point is the average minutes of therapy delivered to patients in that month on their initial (5-day) assessments. Panel B shows how the instrument is associated with therapy delivery immediately prior to the reform. The x-axis is the SNF's average therapy minutes at baseline (2012), the instrument. The y-axis is the SNF's therapy minutes immediately prior to the reform. We calculate each SNF's average actual therapy, average predicted therapy based on pre-SNF observables, and its 25th and 75th percentiles of therapy among its patients. Then, we plot the average of these values for each SNF baseline therapy decile: actual therapy (blue line), predicted therapy (red dashed line), and 25th-75th percentiles (light blue shading).

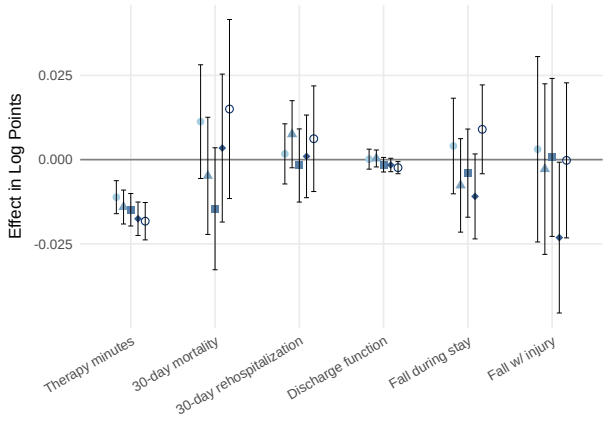
Figure 2. Event Studies of Key Outcomes



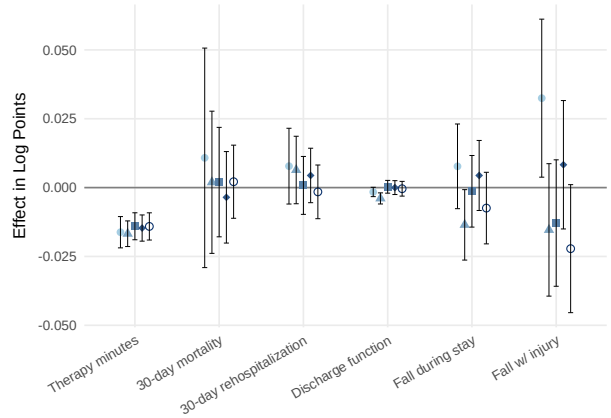
Each panel presents an event study of the effect of a 100-minute baseline difference in therapy on realized therapy (Panel a) or patient health outcomes (Panels b-f). The effects are given in log points. The vertical dashed line represents the start of PDPM. The quarter prior to PDPM is the reference period.

Figure 3. Effects by Quintiles of Therapy Need and Adverse Event Risk

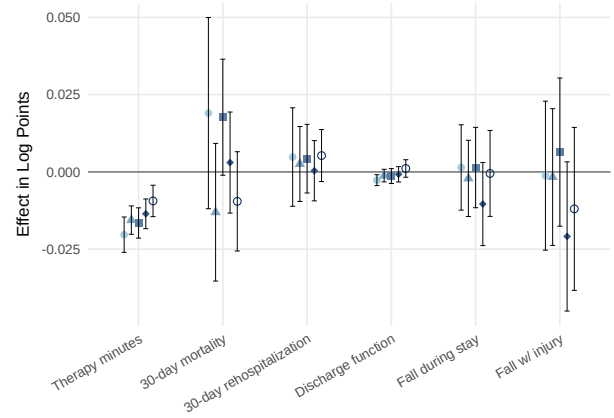
(a) By Predicted Therapy Quintile

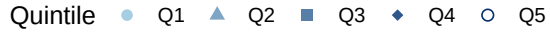


(b) By Predicted Mortality Quintile



(c) By Predicted Rehospitalization Quntile





Each panel shows effects on the key study outcomes for patients subgrouped into quintiles based on their predicted therapy (Panel a) or predicted probability of an adverse event (Panels b and c). Predictions based on pre-SNF observables from a model trained on baseline (2012) data.

Table 1. Summary Statistics

Baseline therapy tercile:	Low	Middle	High
A. SNF Characteristics			
Beds	98.7	118.9	122.1
Ownership, %			
Non-profit	25.5%	24.5%	21.3%
For-profit	64.8%	70.0%	76.0%
Government	9.7%	5.5%	2.7%
SNF value added	0.042	0.045	0.05
B. Patient Characteristics			
Age, years	78.4	78.6	79.1
Dementia, %	24.7%	23.6%	21.8%
Prior Hospitalization			
Length of stay, days	7.4	7.4	7.3
DRG payment, $	13,658.1	13,763.5	14,324.1
Predicted therapy minutes	528.9	528.7	531.6
C. Treatment, Health, and Outcomes			
Actual therapy minutes	534	593.1	632.9
30-day rehospitalization, %	20.0%	20.8%	20.7%
30-day mortality, %	7.6%	7.5%	7.0%
Function score			
At admission	31.6	31.4	31.4
At discharge	46.3	46.6	47.1
Change	13.6	14	14.6
Falls, %			
Any	16.6%	15.9%	14.3%
With injury	6.0%	5.4%	4.7%
Stays	388,182	641,923	947,757
SNFs	4,442	4,452	4,452

Notes: This table shows summary statistics on the SNFs and patients in our analysis sample. SNFs are divided into terciles based on their baseline (2012) therapy intensity, the study instrument. Then, we show characteristics of those SNFs (Panel A) and patients at the SNFs (Panels B and C).

Table 2. Regression Analysis

Outcome:	Therapy	Mortality	Rehospital-ization	Function score	Any fall	Fall w/ injury
A. Regression coefficients						
Baseline therapy	-0.015	0.001	0.003	-0.001	-0.002	-0.005
× Post (in 100s minutes)	(0.002)	(0.005)	(0.003)	(0.001)	(0.003)	(0.006)
B. Elasticity estimates						
Elasticity of outcome		-0.067	-0.194	0.081	0.134	0.312
with respect to therapy		(0.296)	(0.175)	(0.039)	(0.212)	(0.382)
C. Marginal effect estimates						
Effect of 10% therapy		0	0.004	-0.379	-0.002	-0.002
reduction on outcome		(0.002)	(0.004)	(0.184)	(0.003)	(0.002)
DV Mean (Pre-PDPM)	600.597	0.073	0.206	46.747	0.152	0.052
Stays	2,603,150	2,594,059	2,602,056	1,206,552	2,601,508	2,575,600

Notes: This table presents results from our differences-in-differences regressions. These are poisson regressions and they include SNF and monthly fixed effects. Panel A reports the key coefficient from the regression, the effect on baseline (2012) 100s of average therapy minutes interacted with the post-policy period. The coefficient has a log-point effect interpretation. Panel B reports that coefficient and its standard error divided by the coefficient on therapy, yielding an elasticity of the outcome with respect to therapy. Panel C reports the estimated absolute effect of a 10% reduction in therapy on the outcome.