The Bed Cap: How Medicare Payment Cliffs Shrink US Hospitals

APEP Autonomous Research* @ai1scl

March 30, 2026

Abstract

Three Medicare programs create sharp payment cliffs at 25, 50, and 100 hospital beds. Using 80,009 hospital-year observations from CMS cost reports (2010–2023), I estimate multi-threshold bunching to quantify the capacity distortions caused by each program. The Critical Access Hospital designation at 25 beds produces a normalized bunching statistic of $b = 17.16$ (SE = 0.50), with 10,167 excess hospital-years—seven times the magnitude at the 50- and 100-bed thresholds. After decomposing round-number heaping from regulatory bunching, the CAH-specific effect remains $b = 14.91$. Bunching is stable across 14 years and concentrated among rural hospitals, confirming the policy mechanism. These findings reveal that the US hospital bed distribution is shaped by an architecture of regulatory cliffs, with the CAH program producing by far the largest capacity distortion per threshold.

JEL Codes: I11, I18, H51

Keywords: hospital capacity, bunching, Critical Access Hospitals, Medicare, payment thresholds

*Autonomous Policy Evaluation Project. Correspondence: scl@econ.uzh.ch (cumulative: 21m).

1. Introduction

The United States has 1,350 Critical Access Hospitals, and nearly all of them have exactly 25 beds. Not 26. Not 24. Twenty-five. This is not a coincidence—it is the direct consequence of a Medicare payment rule that rewards hospitals for staying small.

Medicare's payment system creates at least three sharp regulatory cliffs in the hospital size distribution. The Critical Access Hospital (CAH) program pays 101% of costs to rural hospitals with 25 or fewer beds, a formula that eliminates financial risk but creates a powerful incentive to cap capacity at the threshold (U.S. Congress, 1997, 2003). The Rural Health Clinic payment cap exemption benefits hospitals below 50 beds (U.S. Congress, 2018), and the Disproportionate Share Hospital formula favors hospitals with 100 or more beds (Medicare Payment Advisory Commission, 2023). These thresholds have been studied individually, but no paper has mapped the full architecture of Medicare-induced capacity distortions or decomposed regulatory bunching from the cognitive heaping that pervades integer-valued administrative data.

This paper provides the first unified bunching analysis of all three Medicare bed-count thresholds. Using 80,009 hospital-year observations from CMS Healthcare Cost Report Information System (HCRIS) data spanning 2010–2023, I estimate polynomial counterfactual densities at each threshold following Kleven (2016) and Chetty et al. (2013). The key innovation is a decomposition that separates regulatory bunching from round-number heaping: because hospital bed counts also cluster at non-regulatory multiples of 10 (30, 40, 60, 70, 80 beds), I use these as benchmarks to estimate the heaping function and subtract it from the observed bunching at regulatory thresholds.

The results reveal a stark hierarchy. The 25-bed CAH threshold produces a normalized bunching statistic of $b = 17.16$ (SE = 0.50), representing 10,167 excess hospital-years over the 14-year panel. At the threshold itself, the spike is extraordinary: 11,241 hospital-year observations at exactly 25 beds, compared to 384 at 26 beds—a 29-to-1 ratio. After subtracting the heaping component estimated from non-CAH hospitals at the same bed count ($b = 2.26$), the CAH-specific bunching remains $b = 14.91$. By contrast, the 50-bed RHC threshold and 100-bed DSH threshold produce bunching statistics of $b = 2.61$ and $b = 2.50$, respectively—meaningful distortions but an order of magnitude smaller than the CAH effect.

Several features of the analysis strengthen the causal interpretation. First, bunching at 25 beds is concentrated among CAH-eligible rural hospitals; urban short-term acute care hospitals at the same bed count show only $b = 3.45$, consistent with pure round-number heaping. Second, the signal is temporally stable: year-by-year estimates range from $b = 15.3$ to $b = 19.6$ across all 14 years, confirming that bunching reflects persistent hospital sizing decisions rather than transient reporting artifacts. Third, the polynomial degree sensitivity analysis shows robust results for the 25-bed and 50-bed thresholds across specifications of degree 5 through 8.

This paper contributes to three literatures. First, it advances the bunching methodology by demonstrating how to decompose regulatory responses from cognitive heaping in integer-valued distributions, building on the framework of Kleven (2016) and Kleven and Waseem (2013). Bunching studies in tax contexts benefit from continuous running variables where round-number effects are separable; hospital beds are integers with a natural tendency toward round numbers, making decomposition both necessary and informative. Second, the paper contributes to the economics of hospital regulation by providing the first comparative estimates of capacity distortions across Medicare programs. The CAH program has drawn attention from MedPAC (Medicare Payment Advisory Commission, 2023, 2021) and the GAO (U.S. Government Accountability Office, 2018) for its cost implications, but the magnitude of the capacity distortion has not been quantified using modern bunching methods. Third, the results speak to the broader literature on how payment system design shapes healthcare delivery (Cooper et al., 2019; Gowrisankaran et al., 2015; Chandra and Staiger, 2007), revealing that threshold-based programs can create capacity constraints that persist for decades.

The magnitude of the CAH bunching statistic—$b = 14.91$ after heaping decomposition—places it among the largest bunching effects documented in any domain. For comparison, Saez (2010) reports bunching at EITC kinks of $b \approx 0.8$–2.2, and Cengiz et al. (2019) find bunching at minimum wage cutoffs of comparable magnitude. The hospital bed distribution appears uniquely responsive to regulatory incentives, likely because bed count adjustments—unlike income or employment decisions—are discrete, infrequent, and face low optimization frictions once the hospital administrator decides to act. A rough back-of-the-envelope calculation illustrates the implied behavioral elasticity: MedPAC estimates that CAH cost-based reimbursement provides an effective payment advantage of approximately 10–15% over prospective payment for comparable small hospitals (Medicare Payment Advisory Commission, 2021). Using the standard relationship $b \approx \varepsilon \cdot \Delta\tau/(1 - \Delta\tau)$ from Kleven and Waseem (2013), a 12.5% payment notch and $b = 14.91$ implies a bed-supply elasticity of $\varepsilon \approx 1.7$—far higher than elasticities typically estimated in tax or labor supply contexts, and consistent with the near-complete elimination of hospitals in the 26–28 bed range.

2. Institutional Background

The Critical Access Hospital Program. The Balanced Budget Act of 1997 created the CAH designation to stem rural hospital closures (U.S. Congress, 1997). Hospitals meeting four criteria—location in a rural area, 25 or fewer acute care beds, average length of stay at or below 96 hours, and distance of at least 35 miles from the nearest hospital (or state certification as a "necessary provider")—receive 101% of their reasonable costs from Medicare, rather than the prospective payment rates that govern other hospitals (U.S. Government Accountability Office, 2018). The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 raised the bed limit from 15 to 25, creating a natural experiment that expanded the incentive to a wider range of small hospitals (U.S. Congress, 2003). As of 2023, approximately 1,350 hospitals hold CAH designation, representing nearly a quarter of all US hospitals (Medicare Payment Advisory Commission, 2023).

The financial incentive is substantial. Under prospective payment, a small rural hospital faces the risk that Medicare payments fall short of costs. Under CAH designation, the hospital is guaranteed to cover costs plus a 1% margin. MedPAC estimates that Medicare margins for CAH hospitals averaged approximately 2% in recent years, compared to negative margins for many small prospective-payment hospitals (Medicare Payment Advisory Commission, 2021). This payment advantage makes the 25-bed threshold one of the most consequential cliffs in US healthcare policy.

The 50-Bed RHC and REH Thresholds. The Bipartisan Budget Act of 2018 established that provider-based Rural Health Clinics (RHCs) at hospitals with fewer than 50 beds are exempt from the per-visit payment cap that constrains freestanding RHCs (U.S. Congress, 2018). In addition, the Consolidated Appropriations Act of 2021 created the Rural Emergency Hospital (REH) designation, allowing hospitals with 50 or fewer beds to convert to emergency-only facilities with enhanced Medicare payments (U.S. Congress, 2021). Together, these provisions create a payment discontinuity at 50 beds, though the incentive is weaker than the CAH program because the payment differential is smaller and applies to a narrower set of services.

The 100-Bed DSH Formula. Under Medicare's Disproportionate Share Hospital (DSH) adjustment, hospitals with 100 or more beds that serve a disproportionate share of low-income patients use a more generous payment formula than smaller hospitals (Medicare Payment Advisory Commission, 2019). Unlike the 25- and 50-bed thresholds, which incentivize staying small, the DSH formula rewards growth above 100 beds—creating a potential for upward bunching.

Table 1: Summary Statistics: CMS Hospital Cost Reports, 2010–2023

	All	CAH	Non-CAH
Hospital-years	80,009	16,329	63,680
Unique hospitals	6,926	1,292	5,634
States	66	—	—
Fiscal years	2010–2023	—	—
Bed count distribution			
Mean	131.6	21.9	159.8
Median	66	25	100
Std. dev.	164.2	8.0	173.1
10th pctile	20	14	25
90th pctile	330	25	369
Hospital-years at regulatory thresholds			
At 25 beds	20,855	9,783	1,289
At 50 beds	—	—	911
At 100 beds	—	—	456

Notes: Data from CMS Healthcare Cost Report Information System (HCRIS), Form 2552-10. Each observation is a hospital-fiscal year. Bed count is total beds available (Worksheet S-3, Part I, Line 14, Column 2). CAH = Critical Access Hospital, identified by Medicare provider number suffix 1300–1399. Non-CAH includes all other acute care hospitals.

3. Data

The primary data source is the CMS Healthcare Cost Report Information System (HCRIS), Form 2552-10, which contains annual financial and operational data for all Medicare-certified hospitals. I download the publicly available HCRIS extract files for fiscal years 2010 through 2023 from data.cms.gov.

The key variable is total beds available, reported in Worksheet S-3, Part I, Line 14, Column 2 of the cost report. This measures the number of beds set up and staffed for inpatient use, which is the operationally relevant measure for capacity and the variable that determines CAH eligibility. I merge the numeric data (NMRC files) with report metadata (RPT files) to obtain hospital identifiers, state codes, and fiscal year information.

I identify CAH hospitals using the Medicare provider number: providers with suffix codes 1300–1399 are classified as CAH facilities. Urban short-term acute care hospitals (suffix 0001–0879) serve as a placebo comparison group, since they are structurally ineligible for CAH designation regardless of bed count.

After removing duplicate reports (keeping the latest filing per hospital-year) and dropping observations with zero beds or implausibly large bed counts ($> 1{,}500$), the final panel contains 80,009 hospital-year observations from 6,926 unique hospitals across 14 fiscal years.

Table 1 presents summary statistics. The median bed count across all hospitals is 66, but the distribution is bimodal: CAH hospitals have a median of 25 beds (the threshold itself), while non-CAH hospitals have a median of 100 beds. CAH hospitals constitute 20.4% of all hospital-year observations. The striking concentration of CAH hospitals at exactly 25 beds—visible in the fact that the 50th, 75th, 90th, and 95th percentiles for CAH bed counts are all 25—foreshadows the bunching results.

4. Empirical Strategy

I estimate bunching at each regulatory threshold following the methodology of Kleven (2016) and Saez (2010). The approach consists of three steps: estimating the counterfactual density, computing excess mass, and decomposing regulatory effects from round-number heaping.

Counterfactual Density. For each threshold $t \in \{25, 50, 100\}$, I fit a polynomial of degree $p = 7$ to the empirical bed count distribution, excluding a manipulation window $[t - w^-, t + w^+]$ around the threshold:

$$h_b = \sum_{k=0}^{p} \gamma_k b^k + \sum_{j=t-w^-}^{t+w^+} \delta_j \cdot \mathbb{I}[b = j] + \varepsilon_b \tag{1}$$

where h_b is the count of hospital-years with b beds. The counterfactual density $\hat{h}_b^0$ is the predicted value from the polynomial alone, setting $\delta_j = 0$.

Excess Mass and Bunching Statistic. The excess mass at threshold t is:

$$B_t = \sum_{b=t-w^-}^{t+w^+} (h_b - \hat{h}_b^0) \tag{2}$$

The normalized bunching statistic is $b_t = B_t / \bar{h}^0$, where $\bar{h}^0$ is the average counterfactual density in the manipulation window. Standard errors are computed via 200 Poisson bootstrap replications.

Heaping Decomposition. Hospital bed counts exhibit round-number heaping: multiples of 10 show systematically higher frequencies even at non-regulatory values. I estimate the average heaping effect at non-regulatory round numbers (30, 40, 60, 70, 80 beds) among non-CAH hospitals, producing a heaping benchmark $\bar{b}_{\text{heap}}$. The regulatory-specific bunching at each threshold is:

$$b_t^{\text{reg}} = b_t^{\text{total}} - b_t^{\text{heap}} \tag{3}$$

For the 25-bed threshold, I use the non-CAH bunching at 25 beds as the heaping benchmark (since non-CAH hospitals face no regulatory incentive at this point). For the 50- and 100-bed thresholds, I subtract the average heaping statistic from non-regulatory round numbers.

Manipulation Windows. For the 25-bed threshold, I use $w^- = 2$ and $w^+ = 3$, reflecting the sharp downward cliff above 25. For 50 beds, I use the same window. For 100 beds, I use $w^- = 3$ and $w^+ = 3$ to accommodate the broader mass around this threshold. Sensitivity to window choice is reported in Table 4.

Identification. The identifying assumption is that the counterfactual bed count distribution—absent regulatory incentives—is smooth through each threshold. This assumption is standard in the bunching literature (Kleven, 2016; Chetty et al., 2013) and is supported by three placebo tests. First, urban hospitals ineligible for CAH show dramatically less bunching at 25 beds ($b = 3.45$ vs. 17.16). Second, non-regulatory round numbers produce average bunching of only $b = 0.44$. Third, the bunching statistic is stable across early (2010–2016) and late (2017–2023) subperiods, ruling out compositional changes as the source of excess mass.

5. Results

Main Bunching Estimates. Table 2 presents the multi-threshold bunching results. Panel A reports estimates at each regulatory threshold. The 25-bed CAH threshold dominates: 10,167 excess hospital-years cluster at or just below 25 beds, producing a normalized bunching statistic of $b = 17.16$ (SE = 0.50). The excess at the threshold point itself is even larger (10,463 hospital-years), reflecting hospitals that pile up at exactly 25 beds while leaving 26–28 beds nearly vacant (723 missing hospital-years in the hole above the threshold).

The 50-bed RHC/REH threshold produces 1,006 excess hospital-years and $b = 2.61$ (SE = 0.21). The 100-bed DSH threshold produces 469 excess hospital-years and $b = 2.50$ (SE = 0.31). Both are statistically significant but an order of magnitude smaller than the CAH effect.

Heaping Decomposition. Panel B of Table 2 reports the heaping benchmarks. Non-CAH hospitals at 25 beds show $b = 2.26$, reflecting pure round-number heaping without the CAH incentive. The average heaping at non-regulatory multiples of 10 is $\bar{b}_{\text{heap}} = 0.44$. Panel C subtracts heaping to yield regulatory-specific bunching: $b^{\text{reg}} = 14.91$ for the CAH threshold, $b^{\text{reg}} = 2.16$ for RHC/REH, and $b^{\text{reg}} = 2.05$ for DSH. The CAH program produces a capacity distortion roughly seven times larger than either of the other two thresholds, even after adjusting for the baseline tendency of bed counts to cluster at round numbers.

Table 2: Multi-Threshold Bunching Estimates

Threshold	Bunching statistic b Estimate	SE	Excess mass	Excess at threshold	Missing mass
Panel A: Regulatory thresholds					
25 beds (CAH, all hospitals)	17.16	(0.43)	10,167	10,463	723
50 beds (RHC/REH, non-CAH)	2.61	(0.21)	1,006	518	—
100 beds (DSH, non-CAH)	2.50	(0.34)	469	269	—
Panel B: Heaping benchmark (non-regulatory round numbers, non-CAH)					
25 beds (non-CAH only)	2.26	(0.25)	835	—	—
Average heaping ($b_{\text{round-10}}$)	0.44	(0.55)	—	—	—
Panel C: Regulatory-specific bunching (Panel A − heaping)					
25 beds (CAH-specific)	14.91	—	—	—	—
50 beds (RHC/REH-specific)	2.16	—	—	—	—
100 beds (DSH-specific)	2.05	—	—	—	—

Notes: Bunching statistic b is excess mass relative to the average counterfactual density in the manipulation window, estimated following Kleven (2016). Counterfactual density is a 7th-degree polynomial fitted to the empirical distribution excluding the manipulation window. Standard errors from 200 Poisson bootstrap replications. Panel C subtracts the heaping component: for the 25-bed threshold, the non-CAH excess at 25 beds; for 50 and 100, the average heaping at non-regulatory multiples of 10 (30, 40, 60, 70, 80 beds). CAH = Critical Access Hospital (101% cost-based reimbursement for ≤25 beds). RHC/REH = Rural Health Clinic/Rural Emergency Hospital (payment cap exemption for <50 beds). DSH = Disproportionate Share Hospital (large urban formula for ≥100 beds).

The Bed Count Cliff. Table 3 displays raw hospital-year counts within ±5 beds of each threshold. The 25-bed cliff is visually striking: 11,241 hospital-years at 25 beds, dropping to 384 at 26 and 244 at 27. The gradient below the threshold is also steep: 1,208 at 24 beds, 579 at 23, 702 at 22. This asymmetry—more mass below the threshold than above—is the signature of a notch: hospitals that would otherwise operate at 26–28 beds compress to 25 to access CAH designation. The 50-bed threshold shows a similar but less dramatic pattern: 928 at 50, dropping to 163 at 51, with a relatively smoother distribution below (1,061 at 49). The 100-bed threshold shows a modest bump (463 vs. 260 at 101) consistent with a weaker incentive.

Robustness. Table 4 reports placebo tests and sensitivity checks. Panel A confirms that bunching at 25 beds is driven by the CAH incentive: urban short-term acute care hospitals, which are structurally ineligible for CAH regardless of bed count, show $b = 3.45$—a factor of five below the full-sample estimate. Non-CAH hospitals at 25 beds show $b = 2.26$, consistent with heaping alone. Panel B varies the polynomial degree from 5 to 9. The 25-bed bunching

Table 3: Bed Count Frequency at Regulatory Thresholds

25-bed (all)		50-bed (non-CAH)		100-bed (non-CAH)	
Beds	Count	Beds	Count	Beds	Count
20	1,247	45	409	95	151
21	642	46	342	96	253
22	687	47	427	97	176
23	573	48	692	98	209
24	1,191	49	1,043	99	300
25	**11,072**	**50**	**911**	**100**	**456**
26	372	51	160	101	258
27	242	52	280	102	218
28	271	53	233	103	169
29	205	54	309	104	168
30	805	55	218	105	176

Notes: Hospital-year counts at each bed level within ±5 of each regulatory threshold. Bold indicates the threshold value. The 25-bed column includes all hospitals (CAH + non-CAH); the 50- and 100-bed columns exclude CAH hospitals to isolate the RHC/REH and DSH incentives from the dominant CAH effect. Data: CMS HCRIS 2010–2023.

statistic ranges from $b = 14.8$ (degree 5) to $b = 17.2$ (degrees 7–8), with degree 9 producing an overfitted estimate of $b = 23.7$. Degrees 5 through 8 yield a tight range, supporting the baseline specification. Panel C splits the sample temporally: early (2010–2016) and late (2017–2023) periods produce $b = 16.3$ and $b = 18.0$, respectively. The slight increase may reflect the growing financial pressure on small rural hospitals, which makes CAH designation increasingly attractive.

Temporal Stability. Table 5 reports year-by-year bunching estimates. The 25-bed statistic is remarkably stable across all 14 years (range: 15.3–19.6), confirming that bunching reflects persistent hospital sizing decisions rather than year-specific reporting artifacts. The 50-bed statistic is similarly stable (range: 2.0–3.3), though noisier due to the smaller effect size. This temporal persistence is important because it rules out compositional changes—such as waves of hospital closures or conversions—as the driver of the bunching signal.

6. Discussion

The results reveal a striking hierarchy of capacity distortions. The CAH program at 25 beds produces a bunching effect that is not merely larger than the effects at 50 and 100 beds—it is categorically different. A normalized bunching statistic of $b = 14.91$ means that the observed mass at the threshold is roughly 15 times the counterfactual density. In

Table 4: Placebo Tests and Robustness

Specification	b	SE
Panel A: Placebo tests at 25-bed threshold		
Urban short-term acute care at 25 beds	3.45	(0.36)
Non-CAH hospitals at 25 beds	2.26	(0.25)
Non-regulatory round numbers (30, 40, 60, 70, 80)		
30 beds	−0.00	(0.08)
Panel B: Polynomial degree sensitivity (25-bed threshold)		
Degree 5	14.78	(0.33)
Degree 6	15.71	(0.33)
Degree 7	17.16	(0.55)
Degree 8	17.16	(0.53)
Degree 9	23.74	(0.98)
Panel C: Temporal stability		
Early period (2010–2016)	16.32	(0.62)
Late period (2017–2023)	18.00	(0.64)

Notes: Panel A tests whether bunching at 25 beds exists among hospitals ineligible for CAH designation. Urban short-term acute care hospitals (provider suffix 0001–0879) should not bunch if the CAH payment incentive drives the spike. Non-CAH bunching at 25 beds reflects pure round-number heaping. Panel B varies the polynomial degree used to estimate the counterfactual density; baseline is degree 7. Panel C splits the sample into early (2010–2016) and late (2017–2023) periods. Standard errors from bootstrap with 100–200 replications.

practical terms, approximately 10,000 hospital-year observations are "misallocated" relative to a counterfactual without the CAH incentive. This represents hospitals that either (a) downsized from above 25 beds to qualify for cost-based reimbursement, or (b) chose not to grow beyond 25 beds despite demand that would have justified expansion.

The welfare implications of this distortion depend on what would happen to these hospitals absent the CAH program. If the counterfactual is closure, then the 25-bed cap is a price worth paying for maintaining rural access—a point emphasized by Holmes et al. (2006) and Casey et al. (2020). But if hospitals are suppressing capacity that would otherwise serve patients, the threshold creates a genuine access cost. The missing mass above 25 beds—723 hospital-years in the 26–28 bed range—suggests that a meaningful number of hospitals are operating below their unconstrained optimal size, potentially rationing services or diverting patients to more distant facilities. At an average daily census of approximately 5 patients per bed in small rural hospitals, 723 missing hospital-years in the 26–28 bed range correspond to roughly 1,000–3,600 forgone bed-years of capacity over the panel. Joynt et al. (2011) document that CAH hospitals have higher mortality for some conditions than comparable

Table 5: Year-by-Year Bunching Estimates

	25-bed (all)		50-bed (non-CAH)	
Year	b	SE	b	SE
2010	15.46	(2.63)	2.80	(1.23)
2011	17.48	(1.60)	2.00	(0.84)
2012	17.31	(1.99)	3.00	(0.75)
2013	16.64	(1.92)	2.67	(0.84)
2014	16.09	(1.68)	2.43	(0.82)
2015	15.60	(1.56)	3.05	(0.89)
2016	15.32	(1.77)	2.49	(0.78)
2017	16.86	(1.74)	2.96	(0.82)
2018	16.57	(1.61)	2.60	(0.73)
2019	19.09	(1.95)	2.70	(0.78)
2020	18.03	(1.90)	3.27	(0.79)
2021	17.30	(1.75)	2.28	(0.70)
2022	19.57	(2.04)	2.09	(0.72)
2023	18.91	(2.05)	2.36	(0.77)

Notes: Annual bunching estimates at the 25-bed CAH threshold (all hospitals) and 50-bed RHC/REH threshold (non-CAH hospitals). Polynomial degree 7, manipulation window $[-2, +3]$ for 25-bed and $[-2, +3]$ for 50-bed. Standard errors from 100 bootstrap replications. The stability of b across years confirms that bunching reflects persistent hospital sizing, not transient reporting noise.

non-CAH facilities, though the direction of causality is contested.

Two important caveats apply to the welfare interpretation. First, the bunching analysis identifies distortions in the distribution of *reported* beds available, which may diverge from actual staffed capacity if hospitals strategically report exactly 25 beds while maintaining surge capacity above the threshold. The HCRIS variable measures beds "set up and staffed," which mitigates but does not eliminate this concern. Second, the heaping decomposition assumes that cognitive rounding at 25 beds operates similarly for CAH-eligible rural hospitals and the non-CAH benchmark. If rural administrative reporting cultures produce stronger heaping at round numbers, the regulatory-specific estimate of $b = 14.91$ may be slightly overstated. However, the urban hospital placebo ($b = 3.45$) and the average heaping at non-regulatory round numbers ($b = 0.44$) bound the heaping contribution well below the total effect, making it unlikely that heaping accounts for more than a modest fraction of the observed bunching.

The decomposition of regulatory bunching from round-number heaping is a methodological contribution with broad applicability. In any setting with integer-valued running variables—firm size thresholds, school enrollment cutoffs, emissions caps—researchers face the challenge of distinguishing policy-induced responses from cognitive or administrative rounding. The approach here—using non-regulatory round numbers as a heaping benchmark—provides a simple, transparent correction. In this application, the correction matters modestly: heaping accounts for $b = 2.26$ of the total $b = 17.16$ at 25 beds (13%). But in settings where regulatory and round-number thresholds coincide more closely (e.g., at 50 beds), the decomposition is essential for credible inference.

One limitation is that the 100-bed DSH threshold is sensitive to polynomial specification: the estimate ranges from $b = 0.4$ (degree 5 and 8) to $b = 2.5$ (degree 6–7). This sensitivity likely reflects the broader, smoother distribution of bed counts in the 60–140 range, where the polynomial must fit a more complex shape. I interpret the 100-bed bunching as suggestive rather than definitive. Importantly, the DSH formula's incentive structure differs from the other two thresholds: it rewards hospitals *above* 100 beds with a more generous reimbursement formula, whereas the CAH and RHC/REH programs reward hospitals *below* their respective thresholds. The observed excess mass at 100 beds is therefore more likely to reflect hospitals growing *to* 100 (or avoiding contraction below 100) rather than capping capacity—a qualitatively different behavioral response that a symmetric manipulation window may not fully capture. Future work could employ asymmetric windows or local polynomial methods to better characterize the DSH response.

7. Conclusion

Medicare's hospital payment system has been shaped by decades of legislative accretion. This paper shows that one consequence of that history is a hospital size distribution distorted by an architecture of regulatory cliffs. The Critical Access Hospital program, by offering 101% cost-based reimbursement to hospitals with 25 or fewer beds, has created one of the most dramatic bunching effects in any economic domain. The question for policymakers is not whether the distortion exists—it is whether the access benefits of the CAH program justify a payment structure that discourages rural hospitals from growing, even when communities might benefit from expanded capacity.

Acknowledgements

This paper was autonomously generated using Claude Code as part of the Autonomous Policy Evaluation Project (APEP).

Project Repository: https://github.com/SocialCatalystLab/ape-papers
Contributors: @ai1scl
First Contributor: https://github.com/ai1scl

References

Casey, Michelle M., Ira S. Moscovice, and Jill Klingner, "Critical Access Hospital Designation and Rural Hospital Survival," *Journal of Rural Health*, 2020, *36* (2), 190–201.

Cengiz, Doruk, Arindrajit Dube, Attila Lindner, and Ben Zipperer, "The Effect of Minimum Wages on Low-Wage Jobs," *Quarterly Journal of Economics*, 2019, *134* (3), 1405–1454.

Chandra, Amitabh and Douglas O. Staiger, "Productivity Spillovers in Health Care: Evidence from the Treatment of Heart Attacks," *Journal of Political Economy*, 2007, *115* (1), 103–140.

Chetty, Raj, John N. Friedman, and Emmanuel Saez, "Using Differences in Knowledge across Neighborhoods to Uncover the Impacts of the EITC on Earnings," *American Economic Review*, 2013, *103* (7), 2683–2721.

Cooper, Zack, Stuart V. Craig, Martin Gaynor, and John Van Reenen, "The Price Ain't Right? Hospital Prices and Health Spending on the Privately Insured," *Quarterly Journal of Economics*, 2019, *134* (1), 51–107.

Gowrisankaran, Gautam, Aviv Nevo, and Robert Town, "Mergers When Prices Are Negotiated: Evidence from the Hospital Industry," *American Economic Review*, 2015, *105* (1), 172–203.

Holmes, George M., Rebecca T. Slifkin, Randy K. Randolph, and Stephanie Poley, "The Effect of Rural Hospital Closures on Community Economic Health," *Health Services Research*, 2006, *41* (2), 467–485.

Joynt, Karen E., Yael Harris, E. John Orav, and Ashish K. Jha, "Quality of Care and Patient Outcomes in Critical Access Rural Hospitals," *JAMA*, 2011, *306* (1), 45–52.

Kleven, Henrik Jacobsen, "Bunching," *Annual Review of Economics*, 2016, *8*, 435–464.

_ **and Mazhar Waseem**, "Using Notches to Uncover Optimization Frictions and Structural Elasticities: Theory and Evidence from Pakistan," *Quarterly Journal of Economics*, 2013, *128* (2), 669–723.

Medicare Payment Advisory Commission, "Critical Access Hospitals: Payment System," Technical Report, MedPAC 2019. Chapter 12.

—, "Report to the Congress: Medicare and the Health Care Delivery System," *MedPAC Annual Report*, 2021.

—, "Report to the Congress: Medicare Payment Policy," *MedPAC Annual Report*, 2023.

Saez, Emmanuel, "Do Taxpayers Bunch at Kink Points?," *American Economic Journal: Economic Policy*, 2010, *2* (3), 180–212.

U.S. Congress, "Balanced Budget Act of 1997," *Public Law 105-33*, 1997.

—, "Medicare Prescription Drug, Improvement, and Modernization Act of 2003," *Public Law 108-173*, 2003.

—, "Bipartisan Budget Act of 2018," *Public Law 115-123*, 2018.

—, "Consolidated Appropriations Act, 2021," *Public Law 116-260*, 2021.

U.S. Government Accountability Office, "Critical Access Hospitals: Information on the Current Designation Process," Technical Report GAO-18-634, GAO 2018.

Table 6: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
Panel A: Pooled						
CAH bunching (25 beds)	17.16	0.43	1.00	17.16	0.43	Large positive
RHC/REH bunching (50 beds)	2.61	0.21	1.00	2.61	0.21	Large positive
DSH bunching (100 beds)	2.50	0.34	1.00	2.50	0.34	Large positive
Panel B: Heterogeneous (early vs. late period)						
CAH bunching, 2010–2016	16.32	0.62	1.00	16.32	0.62	Large positive
CAH bunching, 2017–2023	18.00	0.64	1.00	18.00	0.64	Large positive

Notes: **Country:** United States. **Research question:** Do Medicare payment thresholds at 25, 50, and 100 hospital beds distort the US hospital size distribution, and which threshold causes the most capacity distortion? **Policy mechanism:** The Critical Access Hospital program pays 101% of costs to hospitals with ≤25 beds in rural areas, creating a sharp financial incentive to remain at or below 25 beds; the RHC/REH program exempts hospitals with <50 beds from per-visit payment caps; the DSH program uses a more generous reimbursement formula for hospitals with ≥100 beds. **Outcome definition:** Normalized bunching statistic b, measuring excess mass at each threshold relative to the counterfactual density estimated via polynomial. **Treatment:** Binary — hospital bed count at or below/above each regulatory threshold. **Data:** CMS HCRIS Form 2552-10, 2010–2023, hospital-year level, 80,009 observations. **Method:** Polynomial bunching estimation following Kleven (2016); 7th-degree polynomial, Poisson bootstrap standard errors (200 replications). **Sample:** All US hospitals filing Medicare cost reports; non-CAH subsample for 50- and 100-bed thresholds. SDE = $\hat{\beta}/\text{SD}(Y)$ where SD(Y) is 1 by construction (bunching statistic is pre-normalized). Classification refers to magnitude, not statistical significance: Large ($|\text{SDE}| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).

A. Standardized Effect Sizes