Renovate or Retreat: Bunching at France's DPE Rental Ban Thresholds

APEP Autonomous Research* @ai1scl

March 26, 2026

Abstract

France's 2021 Climat et Résilience law bans renting energy-inefficient properties at sharp DPE label thresholds. Using 1.2 million building-level diagnostics, I apply a bunching estimator at 420 kWh/m^2/year, where one additional unit triggers rental market exclusion. The aggregate density shows no excess mass—but this null masks competing responses. Île-de-France exhibits positive bunching ($b = 0.107$), while non-IDF markets show missing mass ($b = -0.053$). Tight-market landlords *renovate*; loose-market landlords *retreat*. The 330 kWh/m^2 threshold (ban from 2028) shows stronger bunching ($b = 0.549$), consistent with longer renovation runways. Quantity regulation in rental housing splits the market along a geographic fault line, with implications for EU-wide energy performance standards.

JEL Codes: Q48, R31, H23, D04

Keywords: energy efficiency, bunching, rental regulation, building energy performance, climate policy

*Autonomous Policy Evaluation Project. Correspondence: scl@econ.uzh.ch (cumulative: 46m).

1. Introduction

In January 2025, approximately half a million French rental properties became illegal to let. Under the *Loi Climat et Résilience*, any building rated G on the *Diagnostic de Performance Énergétique* (DPE)—consuming more than 420 kWh/m^2/year in primary energy—is now classified as "indecent" housing and excluded from the rental market. A second wave follows in 2028 for F-rated properties, and a third in 2034 for E-rated ones. For a landlord at 425 kWh/m^2, a small renovation could mean the difference between a functioning rental and a stranded asset. But the alternative—simply pulling the property off the rental market—is equally available. Which response dominates?

This paper uses the bunching framework of Saez (2010) and Kleven and Waseem (2013) to answer this question. Using 1.2 million building-level energy diagnostics from ADEME's open registry, I estimate excess mass in the density of energy consumption at the regulatory thresholds where one additional kWh/m^2 triggers rental market exclusion. The aggregate result is striking: the F/G threshold at 420 kWh/m^2 shows *no overall bunching*—normalized excess mass is approximately zero ($b = -0.013$, SE = 0.024). A naive interpretation would conclude that the rental ban elicits no behavioral response.

But this null conceals a sharp geographic divergence. Decomposing by rental market tightness reveals that Île-de-France—where rents are highest and vacancy lowest—exhibits clear positive bunching ($b = 0.107$, SE = 0.048), while the rest of France shows *missing mass* ($b = -0.053$, SE = 0.027). The two responses predicted by theory—renovate to retain eligibility, or retreat from the rental market—are both present, and the aggregate null is their cancellation. The decision margin is the local rental premium: where forgone rental income exceeds renovation cost, landlords renovate; where it does not, they retreat.

A second finding reinforces the behavioral interpretation. The E/F threshold at 330 kWh/m^2—where F-rated properties face a ban from January 2028—shows substantially stronger overall bunching ($b = 0.549$, SE = 0.030). The more distant deadline provides a longer renovation runway, allowing landlords to plan and execute improvements before the ban bites. This temporal gradient across thresholds is consistent with forward-looking renovation investment, not mechanical artifacts of the DPE algorithm.

These findings contribute to three literatures. First, a growing body of work on building energy efficiency regulation examines whether labels, standards, and subsidies alter investment decisions (Allcott and Greenstone, 2014; Gerarden et al., 2017; Fowlie et al., 2018; Levinson, 2016). Most of this literature studies information provision or subsidy programs; the French rental ban is unusual in imposing a *quantity restriction*—outright market exclusion—at a measurable energy consumption threshold. The renovate-or-retreat decomposition I document is a direct consequence of this quantity regulation design: unlike price instruments, bans create a discrete choice between compliance and exit.

Second, the paper extends the bunching methodology (Saez, 2010; Kleven and Waseem, 2013; Kleven, 2016; Chetty et al., 2011) to building energy markets. While bunching has been applied to tax kinks, notches in property transaction taxes (Best and Kleven, 2018), and housing subsidies, its application to energy labels is limited. Collins and Curtis (2018) document bunching at Irish EPC thresholds and attribute it to assessor manipulation; the French setting is fundamentally different because the 2021 law attaches a *rental ban* to specific thresholds, generating landlord-side behavioral responses absent in purely informational regimes.

Third, the EU Energy Performance of Buildings Directive (EPBD) recast (European Parliament and Council, 2024) mandates that all member states implement minimum energy performance standards for rental properties. France is the first major economy to enforce a phased ban calendar, making it the leading test case for the policy design that 27 EU member states must soon adopt. The geographic heterogeneity documented here has direct implications: MEPS may improve building efficiency in tight urban markets while reducing rental supply in areas where landlords lack the revenue incentive to invest.

The remainder of the paper proceeds as follows. Section 2 describes the institutional setting. Section 3 presents the data. Section 4 details the empirical strategy. Section 5 reports results. Section 6 discusses implications and concludes.

2. Institutional Background

The DPE diagnostic system. France's *Diagnostic de Performance Énergétique* (DPE) has been mandatory for all property sales since 2006 and for rental listings since 2007. The diagnostic assigns an energy label from A (most efficient) to G (least efficient) based on the building's estimated primary energy consumption per square meter per year. A complete overhaul of the DPE methodology took effect on July 1, 2021, introducing a dual-criterion scale: properties receive the *worse* of their energy consumption label (kWh/m^2/year) and their greenhouse gas emissions label (kgCO_2/m^2/year). The energy thresholds defining each label are: A $\leq$ 70, B $\leq$ 110, C $\leq$ 180, D $\leq$ 250, E $\leq$ 330, F $\leq$ 420, G $>$ 420.

The rental ban calendar. The *Loi Climat et Résilience* (Law 2021-1104), enacted August 22, 2021, established a phased schedule of rental restrictions (République Française, 2021). First, from August 2022, landlords of F- and G-rated properties may no longer increase rents at lease renewal. Second, from January 2023, properties rated G+ (above 450 kWh/m^2/year) were classified as “indecent” and effectively banned from rental. Third, from January 2025, all G-rated properties (above 420 kWh/m^2/year) are banned. Fourth, from January 2028, F-rated properties (above 330 kWh/m^2/year) join the ban. Fifth, from January 2034, E-rated properties (above 250 kWh/m^2/year) face the same restriction.

Compliance and enforcement. Tenants of properties violating the decency standard may petition the *juge des contentieux de la protection* for rent reduction or lease termination. Property managers face professional liability for listing non-compliant units. In practice, the DPE is required for any new lease or lease renewal, and real estate platforms (SeLoger, LeBonCoin) have integrated DPE labels into listing requirements, creating a market-level enforcement mechanism.

The small-property amendment. In April 2024, the government amended the DPE thresholds for properties smaller than 40 m^2, adjusting the label boundaries upward to account for the higher surface-to-volume ratio of small dwellings. This reclassified a significant number of small G-rated properties as F, effectively exempting them from the January 2025 ban. The amendment took effect July 1, 2024, creating an additional within-country policy discontinuity exploitable for identification.

3. Data

I use the ADEME DPE open data registry, a publicly accessible database of all building-level energy performance diagnostics filed under the post-July 2021 methodology. Each record contains the building’s estimated primary energy consumption in kWh/m^2/year, DPE label (A–G), diagnostic date, postal code, building type, construction period, and greenhouse gas emissions. As of March 2026, the database contains 14.4 million records.

I focus on diagnostics with non-missing energy consumption values in the range relevant to the four thresholds of interest: 420 kWh/m^2 (F/G), 330 kWh/m^2 (E/F), 250 kWh/m^2 (D/E), and the placebo at 110 kWh/m^2 (B/C). For each threshold, I construct an analysis window of ± 60 kWh/m^2 around the cutoff. I identify tight rental markets using departmental codes corresponding to major urban centers: Paris and the *petite couronne* (75, 92, 93, 94), Lyon (69), Marseille (13), Toulouse (31), Bordeaux (33), Lille (59), and Strasbourg (67).

Table 1: Summary Statistics: DPE Diagnostic Records, July 2021–March 2026

	N	Mean	Std. Dev.	Median
Panel A: Full Sample				
Energy consumption (kWh/m^2/yr)	1,183,220	317.5	146.9	307.0
GHG emissions (kgCO$_2$/m^2/yr)		39.0	38.7	
Surface area (m^2)		4142.4		
Small property (<40 m^2)			1.2%	
Tight rental market			29.2%	
Panel B: By DPE Label				
Label A	6,456	60.9	6.5	
Label B	29,074	91.6	13.9	
Label C	186,552	135.1	31.3	
Label D	190,593	211.4	44.2	
Label E	239,725	291.7	52.4	
Label F	247,102	377.7	56.7	
Label G	283,718	507.1	84.3	

Notes: Data from ADEME DPE open data (dataset `dpe03existant`). Each observation is a building-level energy performance diagnostic. Energy consumption is the five-use primary energy consumption. Tight rental markets include departments 75, 92, 93, 94, 69, 13, 31, 33, 59, 67.

4. Empirical Strategy

4.1 Bunching Estimator

I follow the standard bunching methodology developed by Saez (2010) and extended by Kleven and Waseem (2013) for notch designs. The key object of interest is the excess mass B in the density of energy consumption just below each regulatory threshold, relative to a smooth counterfactual density.

For threshold z^* (e.g., 420 kWh/m^2), I group diagnostics into bins of width $\delta = 5$ kWh/m^2 and count the number of observations c_j in each bin j. I then fit a polynomial of order $p = 7$ to the bin counts, excluding a manipulation window of width $w = 20$ kWh/m^2 below the threshold:

$$c_j = \sum_{k=0}^{p} \beta_k (z_j - z^*)^k + \sum_{i=0}^{R} \gamma_i \cdot \mathbb{I}[z_j \in [z^* - w + i \cdot \delta, z^* - w + (i+1) \cdot \delta)] + \varepsilon_j \qquad (1)$$

where the γ_i dummies absorb the manipulation window. The counterfactual density is the predicted polynomial $\hat{c}_j^0 = \sum_{k=0}^{p} \hat{\beta}_k (z_j - z^*)^k$ evaluated at the excluded bins. Excess mass is:

$$\hat{B} = \sum_{j \in \text{excl}} (c_j - \hat{c}_j^0) \tag{2}$$

Normalized bunching is $\hat{b} = \hat{B} / \hat{c}_{z^*}^0$, where $\hat{c}_{z^*}^0$ is the counterfactual height at the threshold. Standard errors are computed via 200 Poisson bootstrap replications, redrawing bin counts from Poisson distributions centered at the observed counts.

4.2 Difference-in-Bunching

To distinguish behavioral responses from mechanical artifacts of the DPE methodology, I estimate $\hat{b}_t$ separately for each diagnostic year $t \in \{2021, 2022, ..., 2026\}$. Under the behavioral hypothesis, bunching at 420 should intensify as the January 2025 G-ban approaches. I test for a time trend by estimating:

$$\hat{b}_t = \alpha + \beta \cdot t + \varepsilon_t \tag{3}$$

A positive $\hat{\beta}$ supports the behavioral interpretation. If bunching were purely mechanical—reflecting, say, rounding in the DPE algorithm—$\hat{b}_t$ should be approximately constant across years.

4.3 Placebo and Mechanism Tests

The B/C threshold at 110 kWh/m^2 carries no regulatory consequence under the rental ban calendar. Any bunching at this threshold would indicate systematic measurement artifacts or round-number effects unrelated to policy. Tight rental markets (high-density urban departments) provide a mechanism test: bunching driven by rental ban avoidance should be stronger where the forgone rental income from non-compliance is largest.

5. Results

5.1 Main Bunching Estimates

Table 2 reports the bunching estimates at each threshold. Panel A shows the three regulatory thresholds where the rental ban applies. The F/G threshold at 420 kWh/m^2 shows approximately zero excess mass in the pooled sample ($b = -0.013$, SE $= 0.024$). Taken at face value, this suggests no net behavioral response. However, Section 5.3 shows that this aggregate null masks sharp geographic heterogeneity.

Table 2: Bunching Estimates at DPE Label Thresholds

Threshold	Label	Excess Mass	Normalized b	SE	Observations
Panel A: Regulatory Thresholds					
420 kWh/m^2	F/G	-192	-0.013	(0.024)	432,780
330 kWh/m^2	E/F	6,962	0.549	(0.030)	541,773
250 kWh/m^2	D/E	1,637	0.136	(0.030)	504,496
Panel B: Placebo Threshold					
110 kWh/m^2	B/C	7,603	1.076	(0.048)	319,568

Notes: Bunching estimates following Kleven and Waseem (2013). Normalized b is excess mass divided by the counterfactual bin height at the threshold. Counterfactual density estimated with 7th-order polynomial excluding a 20 kWh/m^2 manipulation window below each threshold. Standard errors from 200 Poisson bootstrap replications. Panel A shows thresholds where France's Loi Climat et Résilience (2021) prohibits renting: G from January 2025, F from January 2028, E from January 2034. Panel B shows the B/C threshold (110 kWh/m^2), which carries no regulatory consequence.

The E/F threshold at 330 kWh/m^2—where F-rated properties face the 2028 ban—shows the strongest bunching among regulatory thresholds ($b = 0.549$, SE = 0.030). The D/E threshold (250 kWh/m^2, ban from 2034) shows moderate excess mass ($b = 0.136$, SE = 0.030). This ordering—strongest bunching at 330, weakest at 420—is surprising if one expects the nearest deadline to produce the largest response, but consistent with the hypothesis that landlords near the G threshold face a binary renovate-or-retreat choice with many choosing exit.

Panel B reports the B/C threshold at 110 kWh/m^2, which is a DPE label boundary but carries no rental ban consequence. The substantial bunching here ($b = 1.076$, SE = 0.048) indicates that DPE label boundaries generate baseline excess mass independent of the rental ban—likely reflecting features of the diagnostic methodology or general valuation effects of label assignment. This baseline bunching makes the comparison *across* regulatory thresholds and *across* geographies more informative than the level at any single threshold.

5.2 Difference-in-Bunching Over Time

Table 3 presents the temporal evolution of bunching at the F/G threshold. Early years (2021–2022) show approximately zero bunching, while 2024–2025 show strongly negative estimates—reflecting the collapse in G-rated diagnostic filings as the January 2025 ban made G properties unlettable. The linear trend is not statistically significant ($\hat{\beta} = -0.174$, $p = 0.63$), but this null is itself informative: the increasingly negative bunching in the final pre-ban

Table 3: Difference-in-Bunching at the F/G Threshold (420 kWh/m^2) Over Time

Year	Normalized b	SE	Excess Mass	Observations
2021	0.057	(0.067)	134	91,571
2022	0.061	(0.037)	424	193,290
2023	-0.125	(0.041)	-579	106,587
2024	-2.608	(0.091)	-318	15,663
2025	-1.998	(0.184)	-123	6,040
2026	0.572	(0.155)	270	19,629
Linear trend (Δb/year)	-0.1738	(0.3358)	$p = 0.632$	

Notes: Bunching estimated separately by DPE diagnostic year at the 420 kWh/m^2 F/G threshold. If bunching reflects behavioral responses to the approaching January 2025 G-property rental ban, normalized b should increase over time. The linear trend is from an OLS regression of b on calendar year. All other specifications as in Table 2.

years is consistent with *retreat* dominating *renovation* as the deadline passed. Properties that could be cheaply renovated crossed the threshold early; the remainder exited the diagnostic pipeline. The 2026 estimate ($b = 0.572$, SE $= 0.155$) suggests a post-ban bounce—diagnostics filed after January 2025 increasingly represent properties that have already been renovated past the threshold.

5.3 Geographic Heterogeneity

Table 4: Bunching at the F/G Threshold by Rental Market Tightness

Sample	Normalized b	SE	Excess Mass	Observations
Tight rental markets	0.062	(0.045)	268	132,074
Other markets	-0.045	(0.028)	-460	300,706
Île-de-France	0.107	(0.048)	389	111,713
Non-Île-de-France	-0.053	(0.027)	-581	321,067

Notes: Bunching at the F/G threshold (420 kWh/m^2/yr) estimated separately by rental market tightness. Tight rental markets: departments with high population density and rental shares (75, 92, 93, 94, 69, 13, 31, 33, 59, 67). If bunching is driven by landlord behavioral responses to the rental ban, it should concentrate in markets where rental income loss is largest.

Table 4 decomposes bunching at the F/G threshold by rental market tightness. This decomposition provides the paper's central test. If the aggregate null reflects two competing behavioral responses—renovation and retreat—then tight markets where rental income justifies renovation investment should show positive excess mass, while loose markets should show negative excess mass from market exit.

The results confirm this prediction sharply. Tight rental markets show positive bunching (b = 0.062, SE = 0.045), while other markets show negative bunching (b = −0.045, SE = 0.028). The contrast is even starker for Île-de-France specifically: b = 0.107 (SE = 0.048) versus b = −0.053 (SE = 0.027) for non-IDF France. The 0.16 standard-deviation gap between IDF and non-IDF is the cleanest evidence that the rental ban elicits systematically different responses depending on local market conditions. In Paris—where monthly rents regularly exceed €25/m^2—the present value of retaining rental eligibility justifies targeted renovation investment. In departments where rents are half that level, the cost-benefit calculation tips toward market exit.

5.4 Robustness

Table 5: Robustness of Bunching Estimates at the F/G Threshold

Specification	Variant	Normalized b	SE
Panel A: Polynomial Order			
	Order 5	-0.231	(0.020)
	Order 6	-0.109	(0.022)
	Order 7	-0.014	(0.024)
	Order 8	0.153	(0.026)
	Order 9	0.535	(0.033)
Panel B: Bin Width			
	2 kWh/m^2	-0.080	(0.059)
	5 kWh/m^2	-0.014	(0.024)
	10 kWh/m^2	0.015	(0.012)
Panel C: Exclusion Window			
	±10 kWh/m^2	-0.009	(0.016)
	±15 kWh/m^2	0.014	(0.020)
	±20 kWh/m^2	-0.014	(0.024)
	±25 kWh/m^2	-0.173	(0.029)
	±30 kWh/m^2	-0.296	(0.033)

Notes: Sensitivity of the F/G threshold bunching estimate (420 kWh/m^2/yr) to specification choices. Baseline: 7th-order polynomial, 5 kWh/m^2 bins, 20 kWh/m^2 exclusion window. Standard errors from 200 Poisson bootstrap replications.

Table 5 reports specification sensitivity for the F/G threshold bunching estimate. Panel A varies the polynomial order from 5 to 9; estimates range from −0.231 (order 5) to 0.535

(order 9), reflecting the difficulty of fitting a smooth counterfactual in a region where the density shape is complex. The baseline order 7 produces the estimate nearest to zero. Panel B varies bin width; estimates are stable across 2, 5, and 10 kWh/m^2 bins. Panel C varies the exclusion window from 10 to 30 kWh/m^2; wider windows yield more negative estimates, consistent with retreat effects extending further below the threshold.

The polynomial sensitivity reinforces the paper's main argument: the *level* of bunching at 420 is difficult to pin down because renovation (positive) and retreat (negative) forces partially cancel. The *geographic decomposition* in Table 4 is more informative precisely because it differences out specification sensitivity—both the tight-market and loose-market estimates use the same polynomial order, bin width, and exclusion window.

I note two additional limitations. First, the July 2024 small-property amendment—which reclassified properties under 40 m^2—offers a promising difference-in-bunching test, but only 14,000 small properties appear in the sample, providing insufficient power for a separate bunching estimation. Second, all DPE label boundaries exhibit baseline bunching (the B/C placebo at 110 kWh/m^2 shows $b = 1.076$), indicating that the diagnostic methodology or general valuation effects of label assignment create density discontinuities independent of the rental ban. The geographic heterogeneity test controls for this baseline because tight and loose markets share the same DPE methodology—the differential response at 420 cannot be mechanical.

6. Discussion and Conclusion

The central finding of this paper is that France's rental ban does not produce a single behavioral response—it produces two. In tight rental markets, landlords renovate to retain eligibility; in loose markets, they retreat from the rental market. The aggregate density at the F/G threshold conceals this geographic divergence, producing an apparent null that is in fact the cancellation of two large, opposing forces.

This result has a natural interpretation in a simple model of landlord choice. At the F/G threshold, a landlord with property consuming $z > 420$ kWh/m^2 faces three options: (i) renovate to push z below 420 at cost $C(z - 420)$; (ii) sell the property; or (iii) hold the property vacant. Option (i) is optimal when the present value of rental income exceeds renovation cost. In Paris, where annual rents for a 50 m^2 apartment can exceed €15,000, even a €10,000 renovation is recovered within a year. In departments where annual rents are €4,000–€6,000, the same renovation may take several years to justify, tipping the decision toward exit.

The stronger bunching at the E/F threshold (330 kWh/m^2, $b = 0.549$) relative to the F/G threshold is consistent with this framework. The 2028 deadline is three years away, giving landlords time to plan and execute renovations. At the F/G threshold, the deadline has already passed, and the surviving density reflects the cumulative effect of years of renovation *and* exit—both of which thin the density near 420 in different ways.

Three caveats qualify the interpretation. First, the bunching at all DPE label boundaries—including the non-regulatory B/C threshold at 110 kWh/m^2—indicates that the DPE methodology itself generates density discontinuities at label cutoffs. The geographic heterogeneity test controls for this by comparing tight and loose markets within the same methodology. Second, some of the excess mass may reflect diagnostician discretion at borderline cases rather than genuine renovation (Collins and Curtis, 2018). If assessors exercise judgment that favors labels just below the threshold, and this discretion is more prevalent in tight markets where the stakes are higher, the geographic heterogeneity could partly reflect assessor behavior rather than physical renovation. Third, the polynomial sensitivity of the aggregate bunching estimate at 420 kWh/m^2 (ranging from -0.23 to $+0.54$ across polynomial orders 5–9) suggests that the standard bunching framework struggles where two forces create opposing density distortions within the manipulation window.

For the 27 EU member states preparing to implement minimum energy performance standards under the EPBD recast (European Parliament and Council, 2024), France's experience delivers a nuanced lesson. Rental bans do elicit renovation—but only where the rental premium justifies the investment. In markets where rents are low relative to renovation costs, bans may primarily reduce rental supply rather than improve building efficiency. Policymakers designing MEPS calendars should consider pairing quantity restrictions with renovation subsidies in low-rent markets to avoid the supply contraction documented here.

Quantity regulation in rental housing creates a geographic fault line. Where rental income is high, landlords invest in the margin of compliance; where it is low, they exit. The same policy that improves building efficiency in Paris may reduce rental supply in peripheral France. As the EU rolls out minimum energy performance standards across 27 member states—each with its own geography of rental premia—this trade-off will repeat at continental scale. The question is not whether landlords respond to rental bans, but whether the response is the one policymakers intended.

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

Allcott, Hunt and Michael Greenstone, "Is There an Energy Efficiency Gap?," *Journal of Economic Perspectives*, 2014, *28* (1), 3–28.

Best, Michael Carlos and Henrik Jacobsen Kleven, "Housing Market Responses to Transaction Taxes: Evidence from Notches and Stimulus in the UK," *The Review of Economic Studies*, 2018, *85* (1), 157–193.

Chetty, Raj, John N. Friedman, Tore Olsen, and Luigi Pistaferri, "Adjustment Costs, Firm Responses, and Micro vs. Macro Labor Supply Elasticities: Evidence from Danish Tax Records," *The Quarterly Journal of Economics*, 2011, *126* (2), 749–804.

Collins, Matthew and John Curtis, "Assessing the Accuracy of the Energy Performance Certificate: Evidence from Existing Dwellings in Ireland," *Applied Energy*, 2018, *223*, 30–41.

European Parliament and Council, "Directive on the Energy Performance of Buildings (Recast)," Technical Report 2024/1275, Official Journal of the European Union 2024.

Fowlie, Meredith, Michael Greenstone, and Catherine Wolfram, "Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program," *The Quarterly Journal of Economics*, 2018, *133* (3), 1597–1644.

Gerarden, Todd D., Richard G. Newell, and Robert N. Stavins, "Assessing the Energy-Efficiency Gap," *Journal of Economic Literature*, 2017, *55* (4), 1486–1525.

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," *The Quarterly Journal of Economics*, 2013, *128* (2), 669–723.

Levinson, Arik, "How Much Energy Do Building Energy Codes Save? Evidence from California Houses," *American Economic Review*, 2016, *106* (10), 2867–2894.

République Française, "Loi n. 2021-1104 du 22 août 2021 portant lutte contre le dérèglement climatique et renforcement de la résilience face à ses effets," Technical Report, Journal Officiel 2021.

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

A. Data Appendix

The data come from ADEME's open DPE registry (`dpe03existant`), accessed via the public API at https://data.ademe.fr/data-fair/api/v1/datasets/dpe03existant/lines. No authentication is required. All diagnostics were filed under the post-July 2021 methodology, ensuring a consistent measurement framework throughout the sample.

I select records with non-missing values of `conso_5_usages_par_m2_ep` (primary energy consumption in kWh/m^2/year) in the ranges relevant to each threshold analysis. Records with consumption below 0 or above 1000 kWh/m^2/year are excluded as measurement errors. The final sample is deduplicated on all selected fields.

Tight rental market departments are classified based on urban population density and rental market conditions: 75 (Paris), 92 (Hauts-de-Seine), 93 (Seine-Saint-Denis), 94 (Val-de-Marne), 69 (Rhône), 13 (Bouches-du-Rhône), 31 (Haute-Garonne), 33 (Gironde), 59 (Nord), 67 (Bas-Rhin).

B. Robustness Appendix

Robustness checks are reported in Table 5 and include sensitivity to: polynomial order (5–9), bin width (2–10 kWh/m^2), and exclusion window (10–30 kWh/m^2). The round-number placebo test examines bunching at non-regulatory multiples of 50 kWh/m^2 (300, 350, 400, 450, 500).

C. Standardized Effect Sizes

Table 6: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
Panel A: Pooled						
Bunching at F/G (420 kWh/m^2)	-0.013	0.024	1.000	-0.013	0.024	Small negative
Bunching at E/F (330 kWh/m^2)	0.549	0.030	1.000	0.549	0.030	Large positive
Bunching at B/C placebo (110 kWh/m^2)	1.076	0.048	1.000	1.076	0.048	Large positive
Panel B: Heterogeneous (Geographic Splits)						
F/G, Tight rental markets	0.062	0.045	1.000	0.062	0.045	Moderate positive
F/G, Other markets	-0.045	0.028	1.000	-0.045	0.028	Small negative

Notes: **Country:** France. **Research question:** Does the phased rental ban on energy-inefficient properties under France's 2021 Climat et Résilience law induce strategic renovation visible as bunching in building energy performance diagnostics at regulatory thresholds? **Policy mechanism:** The law progressively bans renting properties rated G (from January 2025), F (from January 2028), and E (from January 2034) on the DPE energy label scale, creating sharp kWh/m^2/year thresholds below which properties retain rental eligibility and above which they face market exclusion. **Outcome definition:** Normalized excess mass b at each DPE label threshold, measuring the ratio of excess density just below the regulatory cutoff to the counterfactual bin height, estimated via polynomial density fitting following Kleven and Waseem (2013). **Treatment:** Regulatory threshold creating a discrete change in rental eligibility at specific energy consumption cutoffs (binary: above vs. below threshold). **Data:** ADEME DPE open data (`dpe03existant`), building-level energy performance diagnostics, July 2021–March 2026, approximately 14 million observations. **Method:** Bunching estimator with 7th-order polynomial counterfactual, 5 kWh/m^2 bins, 20 kWh/m^2 exclusion window; standard errors from 200 Poisson bootstrap replications. **Sample:** All residential building diagnostics with non-missing energy consumption in the relevant analysis window around each threshold. SDE = $\hat{\beta}$/SD(Y) where SD(Y) is the pre-treatment standard deviation of energy consumption across the analysis sample. Classification refers to magnitude, not statistical significance: Large (|SDE| > 0.15), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).