

# Hedonic Rent Regressions: Eviction Filing Intensity

Philly Evictions Project

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## 1 Overview

This document summarizes the hedonic rent regressions from `r/price-regs-eb.R`. The script estimates the relationship between eviction filing intensity (empirical Bayes shrinkage rate) and rent levels, controlling for building and neighborhood characteristics.

**Unit of analysis:** Building (PID)  $\times$  year panel, 2014–2019.

**Key data inputs:**

- `analytic_sample.csv` — PID  $\times$  year panel with rents, filing rates, building characteristics, and tenant demographics

### Sample restrictions:

- Years 2014–2019 (pre-COVID hedonic)
- Non-missing EB filing rate (pre-COVID)
- EB filing rate  $\leq 0.75$  (excludes extreme outliers)

## 2 Eviction Intensity Measures

Two representations of eviction filing intensity are used:

- **Binned:** Pre-COVID EB filing rate cut at 0, 5%, 10%, 20%, with reference category (5–10%]
- **Continuous:** Raw EB filing rate (pre-COVID), entering linearly

## 3 Empirical Strategy

### 3.1 Fixed Effects and Controls

All specifications include a rich set of fixed effects:

- **Year** (absorbs rent trends)
- **GEOID** (census tract — absorbs neighborhood-level rent premia)
- **Year built decade** (construction vintage)
- **Rent source** (Altos vs other)
- **Unit count bin** (building size category)
- **Building type** (structural type)
- **Quality grade** (A/B/C/D, standardized)
- **Number of stories bin**

Additional controls:  $\log(\text{total area})$ ,  $\log(\text{market value})$ .

Regressions are weighted by total units and clustered by PID.

### 3.2 Model 1: Binned Eviction Intensity (Baseline)

$$\log(\text{rent}_{it}) = \sum_b \beta_b \cdot \mathbb{1}[\text{EB bin}_i = b] + \gamma_1 \cdot \text{ViolFlag}_i + \gamma_2 \cdot \text{ComplaintFlag}_i + \delta' X_i + \alpha_{\text{tract}} + \phi_t + \varepsilon_{it}$$

where  $\text{ViolFlag}_i$  indicates any unsafe/dangerous/hazardous violation and  $\text{ComplaintFlag}_i$  indicates any heat/fire/drainage/plumbing complaint. Reference bin: (5–10%].

### 3.3 Model 2: Continuous EB Filing Rate

$$\log(\text{rent}_{it}) = \beta \cdot \text{EB rate}_i + \delta' X_i + \alpha_{\text{tract}} + \phi_t + \varepsilon_{it}$$

### 3.4 Models 3–4: Tenant Composition Controls

Models 1 and 2 augmented with additive tenant composition controls:

- `infousa_pct_black_imp` (share Black, mean-imputed)
- `infousa_pct_female_imp` (share female HoH, mean-imputed)
- `infousa_pct_black_female_imp` (share Black female HoH)
- `infousa_share_persons_demog_ok_imp` (demographic coverage)

- `tenant_comp_missing` (indicator for missing composition)

### 3.5 Model 5: Complaint $\times$ High-Eviction Interaction

$$\log(\text{rent}_{it}) = \beta_1 \cdot \text{ComplaintFlag}_i + \beta_2 \cdot \text{HighEvict}_i + \beta_3 \cdot \text{ComplaintFlag}_i \times \text{HighEvict}_i + \delta' X_i + \alpha_{\text{tract}} + \phi_t + \varepsilon_{it}$$

where  $\text{HighEvict}_i = \mathbb{1}[\text{EB rate}_i > 0.20]$ . Uses a sparser FE set (year + GEOID + unit count bin).

## 4 Results

### 4.1 Baseline: Binned and Continuous Specifications

Dependent Variable:	log_med_rent	
Model:	(1)	(2)
<i>Variables</i>		
filing_rate_eb_pre_covid		-0.2324*** (0.0295)
<i>Fixed-effects</i>		
year	Yes	Yes
GEOID	Yes	Yes
year_blt_decade	Yes	Yes
source	Yes	Yes
num_units_bin	Yes	Yes
building_type	Yes	Yes
quality_grade_standard	Yes	Yes
num_stories_bin	Yes	Yes
<i>Fit statistics</i>		
Observations	114,144	114,144
R <sup>2</sup>	0.69300	0.69037

*Clustered (PID) standard-errors in parentheses*

*Signif. Codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1*

## 4.2 Full Table: With Tenant Composition Controls

Dependent Variable: Model:		log_med_rent		
	(1)	(2)	(3)	(4)
<i>Variables</i>				
filing_rate_longrun_pre2019_cuts = (0-5%]5-10%]"	0.0640*** (0.0124)		0.0638*** (0.0124)	
filing_rate_longrun_pre2019_cuts = (10-20%]5-10%]"	-0.0184 (0.0123)		-0.0168 (0.0123)	
filing_rate_longrun_pre2019_cuts = 20%+5-10%]"	-0.0236* (0.0123)		-0.0239* (0.0123)	
any_unsafe_dangerous_violationTRUE	-0.0103 (0.0157)		-0.0104 (0.0157)	
any_heat_fire_drainage_plumbing_complaintTRUE	-0.0370*** (0.0134)		-0.0374*** (0.0134)	
log(total_area)	0.0128 (0.0084)	0.0127 (0.0087)	0.0133 (0.0083)	0.0132 (0.0086)
log(market_value)	0.0588*** (0.0109)	0.0559*** (0.0107)	0.0584*** (0.0109)	0.0555*** (0.0107)
filing_rate_eb_pre_covid		-0.2324*** (0.0295)		-0.2318*** (0.0294)
infousa_pct_black_imp			-0.0698*** (0.0165)	-0.0709*** (0.0164)
infousa_pct_female_imp			-0.0454*** (0.0113)	-0.0459*** (0.0114)
infousa_pct_black_female_imp			0.0514*** (0.0144)	0.0519*** (0.0146)
infousa_share_persons_demog_ok_imp			0.0231 (0.0144)	0.0260* (0.0146)
tenant_comp_missing			0.0281*** (0.0082)	0.0284*** (0.0082)
<i>Fixed-effects</i>				
year	Yes	Yes	Yes	Yes
GEOID	Yes	Yes	Yes	Yes
year_blt_decade	Yes	Yes	Yes	Yes
source	Yes	Yes	Yes	Yes
num_units_bin	Yes	Yes	Yes	Yes
building_type	Yes	Yes	Yes	Yes
quality_grade_standard	Yes	Yes	Yes	Yes
num_stories_bin	Yes	Yes	Yes	Yes
<i>Fit statistics</i>				
Observations	114,144	114,144	114,144	114,144
R <sup>2</sup>	0.69300	0.69037	0.69387	0.69126

*Clustered (PID) standard-errors in parentheses*

*Signif. Codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1*

## 4.3 Coefficient Comparison: Eviction Intensity Across Specifications

Table 1: Eviction intensity coefficients: baseline vs tenant-composition controlled

Model	Term	Estimate	SE	\$p\$
baseline_bin	(0-5%]5-10%]"")	0.0640	0.0124	0.000
baseline_bin	(10-20%]5-10%]"")	-0.0184	0.0123	0.137
baseline_bin	20%+5-10%]"")	-0.0236	0.0123	0.056
tenant_bin	(0-5%]5-10%]"")	0.0638	0.0124	0.000
tenant_bin	(10-20%]5-10%]"")	-0.0168	0.0123	0.174
tenant_bin	20%+5-10%]"")	-0.0239	0.0123	0.051
baseline_cont	filing_rate_eb_pre_covid	-0.2324	0.0295	0.000
tenant_cont	filing_rate_eb_pre_covid	-0.2318	0.0294	0.000

#### 4.4 Coefficient Plot: Binned Model

Coefficient plot not found. Run price-regs-eb.R first.

## 5 Exploratory Diagnostics

These plots are produced when `PRICE_REGS_RUN_EXPLORATORY=true` is set. They residualize both rent and eviction intensity on the same controls and fixed effects used in the hedonic regressions, then examine the remaining relationship.

### 5.1 Residual Variation in EB Filing Rate

Residual histogram not found. Run `price-regs-eb.R` with `PRICE_REGS_RUN_EXPLORATORY=true`.

### 5.2 Residualized Rent vs Eviction Intensity: Bin Scatter

Bin scatter not found. Run `price-regs-eb.R` with `PRICE_REGS_RUN_EXPLORATORY=true`.

### 5.3 Spline-Implied Stigma Curve

Spline stigma curve not found. Run `price-regs-eb.R` with `PRICE_REGS_RUN_EXPLORATORY=true`.

## 6 Interpretation

The hedonic regressions estimate the **rent penalty** (or premium) associated with eviction filing intensity, conditional on neighborhood (tract FE) and building observables. Key quantities:

- **Binned model (Model 1):** The coefficient on the 20%+ bin relative to (5–10%] gives the rent differential for the highest-evicting buildings vs moderate-evicting buildings *within the same tract and building type*.
- **Continuous model (Model 2):** A one-unit increase in EB filing rate (e.g., from 0 to 1, which spans the entire range) is associated with a  $\beta$ -log-point change in rent. For typical variation (0 to 0.20), multiply by 0.20.
- **Tenant composition stability:** If adding tenant composition controls (Models 3–4) substantially attenuates the eviction intensity coefficients, it suggests the rent–eviction relationship partly reflects sorting by demographics. If coefficients are stable, the relationship is robust to observable tenant composition.
- **Complaint  $\times$  high-eviction interaction (Model 5):** Tests whether buildings with both habitability complaints and high eviction rates have differentially lower rents, consistent with a “stigma” or quality channel.