

WORKING PAPER

A Single Staircase to Solve Housing? Evidence from Seattle

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Abstract

The building code requirement in North America for multiple exit stairwells in apartment buildings has increasingly drawn attention for its potential role in restricting the housing supply. Although many jurisdictions are currently considering a repeal of this requirement, the impact of legalizing single-stairwell apartment buildings has not been empirically tested. I use Seattle's legalization of small single-stairwell apartment buildings to measure the impact of the code change on the housing supply. I find evidence that the code change facilitated the construction of additional dwelling units. However, the magnitude of the contribution to the housing supply is relatively small.

Contents

1	Introduction	1
2	Model	3
2.a	Unregulated Case	3
2.b	Regulated Case	4
3	Data	5
3.a	Background	5
3.b	Dataset and Sample	6
4	Empirical Methodology	7
4.a	Estimation	7
4.b	Possible Threats to Inference	8
4.b.i	Survival Bias	8
4.b.ii	Measurement Error	10
4.b.iii	Missing Data	10
4.b.iv	Land Use Regulations	11
5	Results	11
5.a	Robustness	13
6	Conclusion	15
7	Bibliography	17
8	Tables and Figures	19

1 Introduction

Housing prices have risen far above real construction costs in many in-demand, highly productive cities, suggesting that the web of regulations governing the built environment is artificially restricting the housing supply (Gyourko & Molloy, 2015; Glaeser & Gyourko, 2018; Metcalf 2018). Many point to zoning and land use regulations as the main culprit. However, architects have recently drawn attention to the impact of an oft-overlooked building code requirement: the requirement for multiple stairwells in multi-story apartment buildings. Since at least the mid-20th century, building codes throughout the US and Canada have required apartment buildings over three stories to have at least two stairwells to serve as fire exits. In addition, both stairwells are required to be accessible from all dwelling units, meaning that there must also be a central hallway running through the building. These requirements increase construction costs and take up valuable floor area, making housing development less feasible and less profitable. Some argue that the multiple stairwell requirement effectively locks up many urban neighborhoods with from further densification by making multistory buildings on small lots unviable (Utile et al., 2024; Smith & Mendoza, 2024).

This building code requirement is anomalous outside of North America. In Europe and Asia, single-stairwell buildings or point access blocks (PABs) are the standard form of apartment construction and have not been linked to increased fire risk. Advocates of PAB legalization argue that changing American building codes to match global standards would boost housing the supply with minimal downside. In a policy brief, Utile et al. (2024) estimate that PAB legalization could facilitate an additional 130,000 housing units in eastern Massachusetts alone. Advocates also argue that small, space-efficient PABs could become an increasingly important contributor to the urban housing supply as larger industrial lots are built out, leaving only single-family lots in residential neighborhoods as development opportunities (Utile et al., 2024).

Although PAB legalization appears to be a promising way to expand the housing supply, its aggregate impact has not been empirically measured. A variety of factors could hinder PAB construction in practice: the broader land use and building regulatory environment, market demand, or lack of firm expertise could all be obstacles. My contribution is to measure the aggregate impact of PAB legalization on the housing supply at a

city-wide scale. I use data from Seattle, a pioneer in code reform which legalized small PABs in 1977. Seattle is a particularly useful case study since recent PAB legalization efforts elsewhere look to the city's code as an example; as such, studying Seattle can shed light on the potential impacts of following Seattle's code model. Using a difference-in-differences analysis on a dataset of Seattle apartment buildings aggregated at the year-story level, with small apartment buildings outside of the allowable height range for PABs as the control group, I find evidence that PAB legalization led to the construction of approximately 53.3 additional dwelling units per year. However, the magnitude of this effect is relatively small and comes against the backdrop of a falling rate of small apartment building construction. I also do not find conclusive evidence that the space efficiency benefits of PABs translated into higher quality, more spacious apartments in Seattle so far.

My work builds upon a growing body of literature focused on the impact of regulation on the housing supply. Most previous empirical work has focused exclusively on the impact of land use regulations while neglecting the potential role of building codes. Glaeser & Ward (2009), Zabel & Dalton (2011), and Jackson (2015), for example, all used panel datasets detailing land use regulations but without accounting for potential building factors. The Wharton Residential Land Use Regulatory Index (WRLURL), one of the most common measures of regulatory restrictiveness for American municipalities, also does not factor in building codes (Gyourko, 2008; Gyourko, 2021). The few studies which have focused on building codes are generally dated, lacking in quantitative rigor, or suffering from endogeneity issues (Listokin, 2005; Noam, 1982).

Building codes have often neglected because they are thought to only impact construction costs rather than land costs (Gyourko & Molloy, 2015). Since real construction costs have increased only marginally over time, some argue that building codes are no more than a minor constraint. The multiple-stairwell building code requirement, however, has the potential to place an effective cap on density in a similar way to zoning regulations on building height. My work sheds light on this important but overlooked aspect of regulation at a time when PAB legalization is being considered in many jurisdictions.

PAB legalization has some similarities to upzoning, whereby land use regulations are relaxed in designated areas of a city with the goal of promoting controlled densification.

Previous empirical work suggests that such targeted upzoning efforts causally increase housing supply, but with a significant outside lag. Using data from Zurich, Büchler & Lutz (2024) found that the number of housing units in an area increased by 7-9% relative to non-upzoned areas 5 to 10 years after the policy change. In the first 5 years after upzoning, however, the authors found no significant housing supply effects. Freemark (2020) found a similar lack of immediate effects on housing supply after upzoning in Chicago, although Freemark also observed an increase in land prices which may preempt future construction. Meanwhile, Greenaway-McGrevy & Philips (2003) found that the number of residential building permits began increasing immediately after upzoning in Auckland. However, the increase in permits was gradual and continued to filter in five years later. Although PAB legalization bears some key differences to upzoning, my work may also contribute to this literature investigating the short- and long-term impacts of relaxing regulations on the built environment.

The rest of the paper is organized as follows: Section 2 presents the economic model, Section 3 describes the data, Section 4 presents the empirical methodology and addresses threats to identification, Section 5 presents the results and tests for robustness, and Section 6 concludes.

2 Model

I present a simple model to illustrate the impact of a multiple stairwell requirement on housing development. Suppose that there is an apartment developer considering a new building with s stories with a footprint of α square feet on a small lot in a dense urban area. Assume that the developer is profit-maximizing and is operating in a perfectly competitive market of small housing developers.

2.a Unregulated Case

Suppose for now that there is no regulation. Equation (1) represents the marginal cost of an additional story, where v_b is the cost per additional square foot of floor area and γ is a constant representing the additional cost incurred by density ($\frac{s}{\alpha}$).

$$MC(s, \alpha) = v_b \alpha + \gamma \frac{s}{\alpha} \quad (1)$$

Equation (2) represents the total cost of the building. In addition to the summed of the marginal costs for each story, there is a fixed cost f_b per square foot of building footprint. This includes land acquisition costs and transaction costs. Equation (3) represents the average total cost per story.

$$TC(s, \alpha) = f_b \alpha + v_b \alpha s + \gamma \sum_{i=1}^s \frac{i}{\alpha} \quad (2)$$

$$ATC(s, \alpha) = f_b \frac{\alpha}{s} + v_s \alpha + \frac{\gamma}{s} \sum_{i=1}^s \frac{i}{\alpha} \quad (3)$$

Equation (4) represents the marginal revenue of each additional story, where ρ is the rental price per square foot of floor space and θ_b is the proportion of non-leasable floor space. Stairwells, elevators, and hallways would be included in θ_b .

$$MR(s, \alpha) = \rho * (1 - \theta_b) \alpha \quad (4)$$

The developer will add additional stories to the building until $MC(s, \alpha) = MR(s, \alpha)$. However, if $MR(s, \alpha) < ATC(s, \alpha)$, the developer will not move forward with the project.

2.b Regulated Case

Suppose now that buildings where $s \geq S_T$ are required to have two stairwells connected by a central hallway. Equation (5) represents the marginal cost per story. The dummy D_{S_T} equals 1 if $s = S_T$, and the dummy D_S equals 1 if $s \geq S_T$. If the additional story breaks the multiple stairwell threshold, there are two compliance costs: f_r representing the cost of bringing all stories below S_T into compliance and v_r representing the cost of bringing each additional story at or above S_T into compliance.

$$MC'(s, \alpha) = v_s \alpha + \gamma \frac{s}{\alpha} + D_{S_T} f_r \alpha + D_S v_r \alpha \quad (5)$$

Equations (6) and (7) represent the total cost and average total cost per story respectively. The additional regulatory compliance costs are triggered when $D_S = 1$.

$$TC'(s, \alpha) = f_b \alpha + v_s \alpha s + \gamma \sum_{i=1}^s \left(\frac{i}{\alpha} \right) + D_S [f_r \alpha + v_r \alpha (s - S_T + 1)] \quad (6)$$

$$ATC'(s, \alpha) = f_b \frac{\alpha}{s} + v_s \alpha + \frac{\gamma}{s} \sum_{i=1}^s \left(\frac{i}{\alpha}\right) + D_S \left[f_r \frac{\alpha}{s} + v_r \frac{\alpha}{s} (s - S_T + 1) \right] \quad (7)$$

Equation (8) represents the marginal revenue per additional story. If $D_S = 1$, the proportion of leasable floor space declines by θ_r as space is dedicated to stairwells and hallways.

$$MR'(s, \alpha) = \rho * (1 - \theta_b - D_S \theta_r) \alpha \quad (8)$$

Compared to the unregulated case, $MC' > MC$, $MR' < MR$, and $ATC' > ATC$. The model thus predicts that mandating multiple stairwells reduces building height, since the level of s at which $MR' = MC'$ is lower than in the unregulated case. The model also predicts that regulation causes some projects to become unviable especially if the fixed cost f_b is high. The requirement makes it more difficult to spread out f_b over a large number of units by building additional stories. If instead the multiple-stairwell threshold is relaxed or if the requirement is removed entirely, the model predicts the opposite effects: both taller buildings and more viable projects.

3 Data

3.a Background

I document the history of Seattle's building code provisions relating to stairwell exits in Table (1). Originally, in the 1942 building code, all apartment buildings with three stories or more were required to have two exits. In 1956 this provision was further tightened, requiring even two story buildings to have two exits. In 1977, however, Seattle amended the code to allow apartment buildings with a single exit up to any height given that there were no more than 4 dwelling units per floor and that the exit stairwell was directly accessible from each apartment. The 1987 edition of the code capped single-exit buildings to 6 stories, added additional fire safety requirements, and allowed up to 20 feet of travel distance to the exit stairwell. The limit of 4 dwelling units per floor remained in place. Requirements were slightly tightened in 1991, allowing only up to 4 stories of residential use to be served by a single exit. An additional requirement that no more than 2 single exit conditions can be located on the same property was also instituted. In 1998, the modern form of the single exit provision took shape. The maximum height

limit was relaxed to 5 stories of residential use within a 6 story building, but the other conditions stipulated in previous codes remained. Changes have been minimal since 1998.

For simplicity and consistency, I measure the impact of PAB legalization on the construction of 4, 5, and 6 story buildings, which I refer to as treated. Shorter buildings with 3 or fewer stories are not part of the treated group since International Building Code¹ has allowed them to have a single exit since 2009. As a result, measuring the impact of legalizing 2 and 3 story PABs is not relevant to the current policy discussion. Seattle's single-exit conditions for buildings with 3 stories or less have also consistently been more lenient than 4 to 6 story buildings, meaning that they are subject to fundamentally different policy. Taller buildings with 7 or more stories are also excluded from the treatment group since they are highly unlikely to be PABs. While there was technically no height limit for PABs between 1977 and 1986, it is implausible that building officials would approve a very tall building with a single exit stairwell, especially given that a height limit of 6 stories was subsequently introduced. Nonetheless, since this definition of the treated group is imperfect, I test the sensitivity of my results to treatment group definition in section 5.a.

3.b Dataset and Sample

My dataset consists of information about all multifamily residential properties in Seattle in 2024, obtained from the King County Assessor's Office. The property-level data include year built, number of stories, number of dwelling units, number of buildings, lot size, and assessed value. From this dataset I remove all historic properties with a year built before 1950, and I restrict the dataset to midrise buildings by keeping only properties with 3 to 8 stories. After these restrictions, the sample consists of 4,475 properties in total. Descriptive statistics for this full sample can be found in column 1 of Table (2).

To reflect the conditions that the Seattle building code places on a PAB, I further restrict the sample using the following criteria:

1. No more than two buildings on the property, since the code has only allowed up to

¹This is the model building code adopted by most jurisdictions around the United States. Seattle has also adopted the International Building Code, but with local amendments including PAB legalization.

two PABs on the same property since 1991.

2. No more than 24 dwelling units per building, since a PAB can only have up to 4 dwelling units per floor and no more than 6 stories of residential use.
3. Lot size no greater than 0.5 acres, to help exclude non-PABs.

After applying these additional restrictions, the remaining sample consists of 2,660 properties. Descriptive statistics for this restricted sample can be found in Column (2) of Table (2).

4 Empirical Methodology

4.a Estimation

The model predicts that PAB legalization should increase the number of units built per year in treated properties both by increasing the number of development projects and by increasing the height of projects. I estimate this effect using a two-way fixed effects regression at the year-story level, as shown in equation (9). The response variable $Units_{st}$ represents the aggregate number of units in all buildings with a given vintage and height. The dummy $TreatedStories_{st}$ takes a value of 1 if the number of stories is 4, 5, or 6, and the dummy $Post1977_{st}$ takes a value of 1 if the year built is 1977 or later. The control group consists of apartment buildings with 3, 7, or 8 stories. As such, the interaction variable $TreatedStories_{st} \times Post1977_{st}$ represents the building code change. I include story fixed effects δ_s and year built fixed effects δ_t . The coefficient of interest is β and the intercept is α .

$$Units_{st} = \alpha + \delta_s + \delta_t + \beta(TreatedStories_{st} \times Post1977_{st}) + \epsilon_{st} \quad (9)$$

The regression in equation (9) can be used for inference under the assumption that trends for treated and untreated properties would be parallel without the code change. Although this assumption cannot be directly tested, I show in Figure (1) that the trends in annual number of units before 1977 are roughly parallel for treated and untreated properties. This is especially true for the restricted sample of smaller properties which are the main data of interest.

In addition to the main regression in equation (9), I test three additional claims made by PAB advocates. The first is that the floor plan of a PAB is much more space-efficient, allowing an architect to fit more units into a building regardless of height. I test this using a two-way fixed effects regression at the property level, as shown in equation (10), with logged density in units per acre as the response variable. $\ln(Units_p)$ represents the logged number of dwelling units on the property and $\ln(Area_p)$ represents the logged acreage of the property. The interaction variable representing the building code change, $TreatedStories_p \times Post1977_p$, takes a value of 1 if the property has 4 to 6 stories and was built in 1977 or later. I include story fixed effects δ_s and year built fixed effects δ_t , the coefficient of interest β , and intercept α as in equation (9). I also include a control for average unit size, represented by γZ .

$$\ln\left(\frac{Units_p}{Area_p}\right) = \alpha + \delta_s + \delta_t + \beta(TreatedStories_p \times Post1977_p) + \gamma Z + \epsilon_p \quad (10)$$

The second claim is that the quality of apartments in PABs is higher. The argument is that without a central hallway, apartments are free to extend across the entire floor plate and have windows on multiple sides, increasing living space and natural light. I test this with another property-level regression with logged assessed value per unit as the response variable as shown in equation (11). $\ln(Value_p)$ represents the logged 2024 assessed value of the property and $\ln(Units_p)$ represents the logged number of dwelling units on the property. I also control for the logged lot acreage $\ln(Area_p)$ to account for value derived from extra green space. I include story fixed effects δ_s and year built fixed effects δ_t , the coefficient of interest β , and intercept α as in equations (9) and (10). I also include controls for logged lot size and average unit size, represented by γZ .

$$\ln\left(\frac{Value_p}{Units_p}\right) = \delta_s + \delta_t + \gamma_t + \beta(TreatedStories_p \times Post1977_p) + \gamma Z + \epsilon_p \quad (11)$$

4.b Possible Threats to Inference

4.b.i Survival Bias

One key limitation of the data is that it consists of a cross-section of properties in 2024 as opposed to a panel dataset detailing new construction in each year. The pattern of

building survival until 2024 may not be random. If buildings between 4 to 6 stories are systematically demolished at a higher rate than those with 3, 7, or 8 stories, the estimate for the impact of PAB legalization may be biased. I mitigate survival bias by excluding historic properties built before 1950 from the sample, since any buildings from the pre-World War II era were selectively preserved in the face of the mid-20th century urban redevelopment. Nonetheless, some survival bias does remain in the dataset.

For the main regression in equation (9) using the restricted sample of smaller buildings, I argue that the survival bias is likely to bias the coefficient of interest β downwards, thereby slightly underestimating the impact of PAB legalization. Consider a hypothetical city where regulation is not a time-varying factor and where building demolition is conducted by profit-maximizing developers. I model the developer’s decision to demolish a building e and replace it with a new building n using equation (12). The developer would only choose to demolish and rebuild if profit from the new building π_n is greater than the construction cost of the new building C , the demolition cost of the old building D , and the opportunity cost represented by the profit from the old building π_e . The profit from a building depends on the underlying land value λ and its number of stories (s_n and s_e respectively). Construction cost scales with the height of the new building, while demolition cost scales with the height of the old building.

$$\pi_n(\lambda, s_n) > C(s_n) + D(s_e) + \pi_e(\lambda, s_e) \quad (12)$$

This model predicts that shorter buildings are more likely to be demolished with time compared to their taller counterparts: their opportunity cost π_e and demolition cost $D(s_e)$ are both lower. While the model neglects non-profit-maximizing public demolition for programs like highway construction and urban renewal, such forms of demolition are not a major factor in the context of my dataset and sample. Large-scale public demolition in Seattle occurred primarily in the early part of the study period (1950s-70s) and largely involved the demolition of buildings built before 1950.

As a result, we can assume that 3-story, untreated buildings are more likely to be demolished than treated buildings with 4-6 stories. In the restricted sample, the vast majority of untreated properties have 3 stories, with only a few 7-8 story properties (Table (2)). Therefore, if survival bias were strong, we would expect more tall, treated 4-6 story build-

ings among older vintages and we would expect more short, untreated 3-story buildings among newer vintages. In a difference-in-differences setup, this would bias the data to show that the number of treated buildings is declining over time relative to the control group consisting mostly of 3-story buildings. We expect that PAB legalization will have the opposite effect. If we nonetheless observe a relative increase in the number of treated properties after PAB legalization, we can be confident that the result was not the result of survivorship bias.

4.b.ii Measurement Error

A property may sometimes be misclassified as treated due to measurement error in the number of stories. Basements, ground floors, and any other level which is partially underground could be counted as an extra story even if they do not count toward the maximum number of stories for a PAB according to the building code. If the distribution of these auxiliary stories is random across buildings, we would expect this form of measurement error to attenuate the coefficient of interest β . In section (5.a), I conduct a robustness check to test the impact of number of stories measurement error.

Measurement error can also manifest in cases where a property has multiple buildings. The King County Assessor's dataset does not break down the year built, number of stories and units by building; instead, only one value for the entire property is provided. No documentation was provided as to how a year built or number of stories value is assigned to multi-building properties. However, since 86% of properties in the restricted sample contain only one building, this is unlikely to significantly impact the results.

4.b.iii Missing Data

Missing data is a potential issue for the value per unit regression in equation (11). 2,006 properties in the full sample and 1,131 properties in the restricted sample of smaller buildings have either a zero or missing assessed value. These drop out of the log-log regression specification and may impact the results if the pattern of missing data is non-random. This is an inherent data limitation which could be examined in future research.

4.b.iv Land Use Regulations

The impact of PAB legalization cannot be separated from the broader regulatory environment in Seattle. A zoning change changing maximum building height in an area, for example, may impact the number of 4-6 story properties built. A comprehensive and detailed examination of Seattle's zoning changes from 1950 to 2024 for each neighborhood of the city is not within the scope of this project. However, it is reasonable to assume that land use regulations have generally become more strict over the study period in accordance with national trends. If PAB legalization is observed to increase the number of 4-6 story apartments, then the estimated impact is likely to be an underestimate in light of tightening land use regulation.

5 Results

Table (3) presents regression results with the number of dwelling units at the year-story level as the response variable. Using the restricted sample of smaller properties as defined in section (3.b), PAB legalization is associated with an approximately 0.7-0.8% increase in the number of dwelling units in treated properties according to log-linear and PPML² specifications (Columns (2) and (3)), significant at the 1% level. According to the OLS specification (Column (1)), this represents approximately 17.8 additional dwelling units per story-year, significant at the 10% level. Summed across the three treated stories (4, 5, and 6), PAB legalization is associated with 53.3 an additional units built per year on average.³ Further, as discussed in section (4.b), there is reason to believe that this result is a slight underestimate due to data limitations and measurement error.

To examine the impact of PAB legalization in more temporal detail, I conducted an event study in which I regressed the year-story number of units on the interactions between individual year dummies and the treated stories dummy. I included dummies for each year from 1950 to 2020 with the exception of 1976, which was set as the reference year. I also include year and story fixed effects. Figure (2) presents the point estimates and 95% confidence intervals for the coefficients on each of the annual interaction variables. For additional context, the top panel of Figure (3) shows the number of dwelling units

²Poisson pseudo-maximum likelihood estimation

³For context, the size of Seattle's total housing stock was 247,437 units in 2024

built per year of vintage in the restricted sample broken down by treated and untreated properties. Event study coefficients for 1950 to 1954 are not shown since there are no properties with the treated stories in the data. From 1955 to 1969 coefficients are consistently negative, reflecting lower construction rates of small 4-6 story properties. In 1970, the "Boeing Bust" hit Seattle's economy around 1970 and abruptly slowed all housing construction. The positive event study coefficients from 1970 to 1976 largely reflect a floor effect in which construction rates for both treated and untreated properties fall toward zero. Although the construction of smaller untreated properties was first to recover in the late 1970s, treated properties quickly caught up through the 1980s as developers increasingly took advantage of PAB legalization. From the late 1980s onwards, treated properties consistently make up a larger share of new small apartment complexes than before PAB legalization. Event study coefficients remain consistently positive from 1990 to 2020 despite cyclical economic changes.

This positive impact of PAB legalization, however, takes place against a backdrop of general decline in the construction of small properties. This is clear in the top panel of Figure (3) showing that number of units in both treated and untreated properties in the restricted sample has declined significantly since the late 1980s. The positive coefficients observed in columns (1)-(3) of Table (3) come about because the number of units in treated small properties has declined less than in untreated small properties. Meanwhile, the bottom panel of Figure (3) shows that in the full sample with both small and large properties, the number of units built per year has significantly increased over time. Apartment construction increasingly shifted away from small properties and toward larger properties. I also find evidence of this in the regression results: in column (4) of Table (3), the full sample estimated coefficient of interest is 361.4, much larger in magnitude than the coefficient using the restricted sample. This effect primarily reflects the proliferation of large, wood-framed, and cheap to build "5-over-1" apartment complexes in the 2000s and 2010s. Although these buildings often fall within the range of treated stories, they are not PABs. One possible driver for the shift toward larger buildings might be regulatory constraints which increase fixed costs for potential developments, disproportionately impacting smaller properties. An example would be Seattle's Design Review procedure, implemented in 1994, requiring some apartment buildings as small as 4 units to go through

an aesthetic review process (City Council, 1993).⁴ Other possible drivers might include increasingly strict zoning regulations especially in single-family residential areas, high per-project transaction costs, and customer preferences for living in larger properties.

At the property level, I find limited evidence supporting architects' claims about the space efficiency and quality benefits of PABs. Table (4) presents the property level results for both the restricted and full samples. The results show that PAB legalization is associated with an estimated 18.9% increase in density of units per acre in treated properties within the restricted sample. However, this figure jumps to 35.5% for the full sample, suggesting that larger, non-PAB "5-over-1" buildings have been even more efficient with land use in the years since 1977.

PAB legalization also does not significantly increase value per dwelling unit among treated properties in the restricted sample. Meanwhile, regression results using the full sample show that non-PAB treated properties built since 1977 do appear to be more highly valued. This may suggest that there is an underlying customer preference for living in larger "5-over-1s" over small PABs, perhaps because larger properties may offer more amenities. Alternatively, the most desirable areas may simply have the most construction of larger properties. The restricted sample's average per-acre land value is indeed lower than the full sample (see Table (2)). But if increasing the supply of affordable housing is the goal, the fact that units in 4-6 story PABs are not more expensive could be seen as a success.

5.a Robustness

To test the sensitivity of the results to sample restrictions, I vary the unit and area restrictions and present the results in Table (5) and Table (6) respectively. I use the year-story regression specification presented in equation (9), but I add each unit or area sample restriction independently to test their individual impact on the results. When the sample is just restricted to properties with less than 25 units, the coefficient on the interaction term becomes no longer significant. Adjusting the unit restriction to be lower than 25 makes the coefficient of interest drift toward zero and become increasingly less

⁴In a 2024 working paper, I found evidence that design review increased the average size of new multi-family developments

significant. Meanwhile, when the sample is just restricted to properties on lots less than 0.5 acre, the coefficient on the interaction term is both large and significant. Smaller acre restrictions reduce the point estimates for the coefficient, but the coefficients remain significant at the 1% level even for a lot size restriction of 0.15 acres. The large magnitude of the coefficient of interest in Column (1) of Table (6), 65.44, relative to the coefficient in Column (1) of Table (3), 17.77, shows that developers are able to fit non-PAB buildings with 4-6 stories even on very small lots. These coefficients should be similar if the increase in 4-6 story buildings on lots less than 0.15 acres were entirely due to PABs.

The evidence thus suggests that developers only turn to building PABs when constrained by both small lot size and a limited maximum number of units. Hence the coefficient on the interaction variable in Column (1) of Table (3) using the restricted sample is significant at the 10% level even when a simple 25 unit restriction in Column (5) of Table (5) yields insignificant results. Further, if the restricted sample were to be redefined with a slightly stricter combination of unit count and lot size restrictions, the coefficient of interest becomes more significant. With a new restricted sample consisting of properties with less than 20 units per building, less than 0.25 acre lot size, and less than 2 buildings on the property, the new estimated coefficient is 11.56 with a robust standard error of 5.01 (significant at $p < 0.05$).⁵ This is in contrast to the simple 20 unit sample restriction in Column (4) of Table (5) which is not significant.

I test the possible impact of measurement error in number of stories by redefining treated stories as either 5 and 6 or 5, 6, and 7 while excluding 4-story properties from the regression. This removes the potential for true 3-story buildings to be misclassified as being within the treated stories due to a basement or ground floor. Including 7-story properties also tests for whether some PABs with basements may have been misclassified as non-PABs. Table (7) presents the results using these regression specifications. When treated is defined as 5 and 6 stories, the OLS specification's estimated coefficient (Column (1)) becomes more precisely estimated and is now significant at the 1% level. Coefficients in the log-linear and PPML specifications (Columns (2) and (3)) are no more precisely estimated but are larger in magnitude, reflecting the fact that 5-6 story buildings were growing from a low base before 1977. When treated is defined as 5-7 stories, the OLS coefficient

⁵This restricted sample contains 2,021 properties in total, with 478 treated and 1543 untreated

(Column (4)) decreases in magnitude but remains precisely estimated, while log-linear and PPML coefficients in Columns (5) and (6) are broadly the same as in Columns (2) and (3). These results suggest a significant number of 3-story properties were misclassified as treated 4-story properties, reducing the precision of estimates in Table (3) and possibly also attenuating coefficients. However, misclassification of 6-story properties as untreated 7-story properties does not appear to be as significant.

6 Conclusion

Using data from Seattle, I empirically investigate whether legalizing small single-stairwell, point access block (PAB) apartment buildings is effective at expanding the housing supply. I find that allowing a single stairwell in buildings with 4 to 6 stories led to the construction of an additional 53.4 dwelling units per year in Seattle. However, the contribution of PABs to the Seattle's overall multifamily housing stock is relatively small in magnitude. In addition, I find some evidence that PAB legalization is linked to higher density of units per lot acre, and that apartments in 4-6 story PABs are no more highly valued than those in other small apartment buildings.

One key takeaway with policy relevance is that in order for Seattle-style PAB legalization to have a major impact on the housing supply, there must be corresponding changes which facilitate small-scale development. This might include exempting small PAB projects from regulatory requirements that impose a large fixed cost like design review or zoning variances. Doing so could reverse the trend toward larger buildings and unlock the potential of PABs as a form of incremental development that can expand the housing supply without being disruptive to neighborhood character.

An alternative policy solution would be to legalize PABs larger than what Seattle's code allows. Building codes outside of North America generally allow larger buildings with several sets of apartments which are each served by a single exit stairwell. Many building codes also have a height limit far above 6 stories. If the trend toward larger buildings is too difficult to reverse, the benefits of PABs can still be realized if they are allowed at larger scales. Nonetheless, this approach may carry fire safety risks.

Potential future avenues of research on PAB legalization in Seattle include validating

these results using novel datasets, investigating the impact of PABs on rents, examining the interactions between PAB legalization and other regulations, and qualitative research into the motivations and obstacles behind PAB construction. There may also be new opportunities to study the impact of PAB legalization in other settings as the building code changes across North America.

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8 Tables and Figures

Table 1: Seattle Building Code History

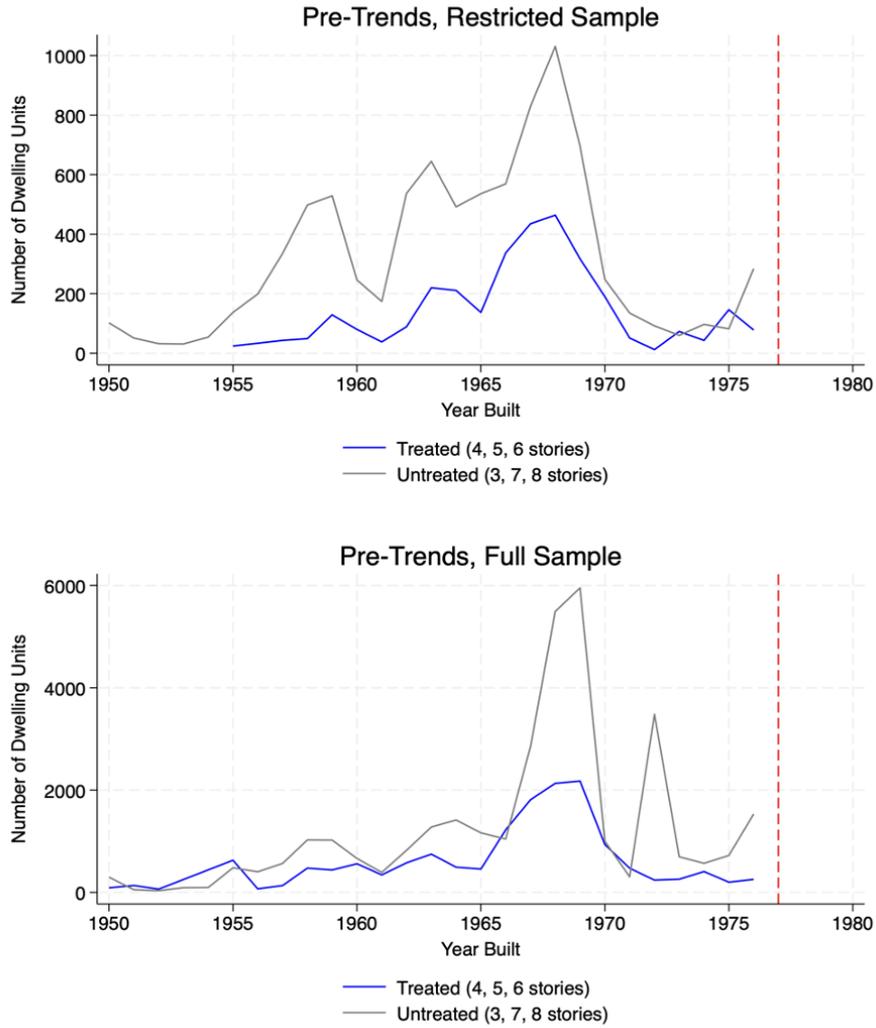
Year	Ordinance Number	Section	Description
1942	72200	621	“Not less than two (2) means of egress shall be available from each exit stairway of every room or apartment on every floor of a building,” with the exception of one or two-story apartment houses.
1956	85500	3302	“Not less than two exits shall be provided in all buildings as follows: 1. On each floor above the first floor.”
1977	106350	3302	“Any building of any height with not more than 4 living units per floor, with a smokeproof tower or an outside stairway as the exit, immediately accessible to all apartments served thereby, may have a single exit.”
1979	108508	3302	Minor clarifications addressing basements, occupied roofs, and ground floors on a grade. Code text not digitized.
1987	113701	3303	“Any Group R Occupancy building not more than six stories in height where all floors have no occupancy other than four or fewer dwelling units per floor may have a single exit” under a few conditions, including automatic sprinklers and other fire safety measures. Travel distance from an apartment to an exit stairwell must be not more than 20 feet.
1991	116012	3303	“Any Group R Occupancy building having not more than four stories of residential use may have a single exit” under similar conditions as in 1987. There is no explicit total height limit for the building, and nonresidential uses are permitted provided that they are otherwise code-compliant. There can be no more than two single exit conditions on the same property.
1998	119079	CA1004.2b	“Not more than 5 stories of Group R, Division 1 apartment occupancy in buildings not over 6 stories may be served by a single exit,” with the same conditions as in 1987 and 1991. The code provision has not been substantially modified since 1998.

Table 2: Descriptive Statistics

	(1)	(2)
	Full Sample	Restricted Sample
Count of Properties	4,466	2,660
Vintage		
Year Built	1991.4 (21.0)	1985.5 (19.4)
Effective Year Built	2003.6 (12.7)	2000.3 (12.6)
Size		
Number of Units	35.1 (55.2)	10.6 (6.5)
Number of Stories		
3	2,327 (52.1%)	1,867 (70.2%)
4	1,152 (25.8%)	630 (23.7%)
5	327 (7.3%)	97 (3.6%)
6	338 (7.6%)	48 (1.8%)
7	232 (5.2%)	11 (0.4%)
8	90 (2.0%)	7 (0.3%)
Number of Buildings		
1	3,672 (82.2%)	2,285 (85.9%)
2	497 (11.1%)	375 (14.1%)
3 or more	293 (6.7%)	—
Lot Acreage	0.350 (0.583)	0.180 (0.085)
Assessed Value, 2024		
Total Value (\$, M)	9.57 (15.89)	3.44 (1.96)
Land Value per Acre (\$, M)	11.20 (6.69)	9.84 (4.33)
Value per Unit (\$, k)	290.4 (114.4)	305.6 (111.8)
Unit Size (sqft)	869.6 (478.0)	944.9 (424.6)

Note: The full sample consists of all multifamily properties in Seattle in 2024 which were built in 1950 or later and which have between 3 and 8 stories. The restricted sample is the subset of the full sample which has 2 or fewer buildings, is on a lot of 0.5 acre or less, and has less than 25 dwelling units. Statistics are presented in mean (standard deviation) form except for Number of Stories and Number of Buildings, where each counts and percentages for each value are shown. The 2,006 properties which have zero or missing assessed value were excluded in total value, land value, and value per unit regressions.

Figure 1: Pre-Trends



Note: Line graphs are presented for the number of dwelling units in properties by vintage and number of stories. To examine pre-trends, only properties built before the 1977 building code change (labeled as a red dashed line) are included. The full sample consists of all multifamily properties in Seattle in 2024 which were built in 1950 or later and which have between 3 and 8 stories. The restricted sample is the subset of the full sample which has 2 or fewer buildings, is on a lot of 0.5 acre or less, and has less than 25 dwelling units.

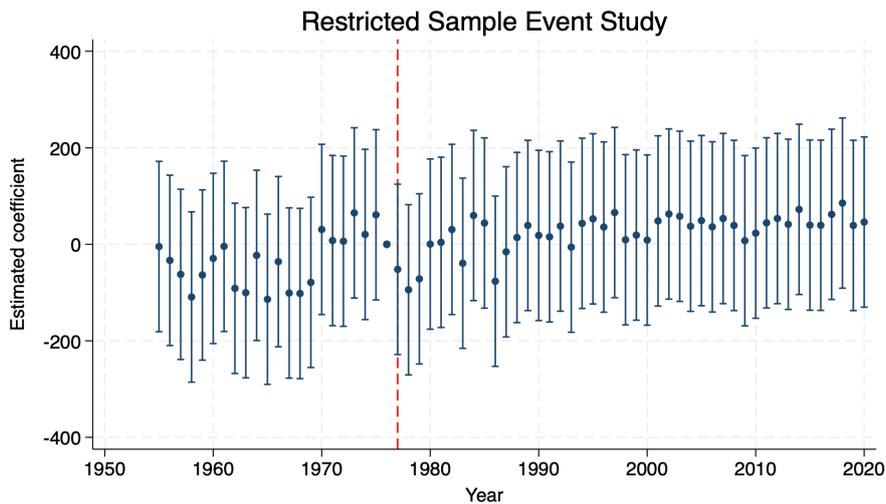
Table 3: Year-Story Number of Units

Variables	Restricted Sample			Full Sample		
	(1) units	(2) ln(units)	(3) PPML units	(4) units	(5) ln(units)	(6) PPML units
TreatedStories× Post1977	17.771* (9.260)	0.838*** (0.194)	0.737*** (0.123)	361.452*** (43.162)	0.686*** (0.232)	0.603*** (0.214)
Story Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	3675	227	450	3675	346	450

*** p<0.01, ** p<0.05, * p<0.1

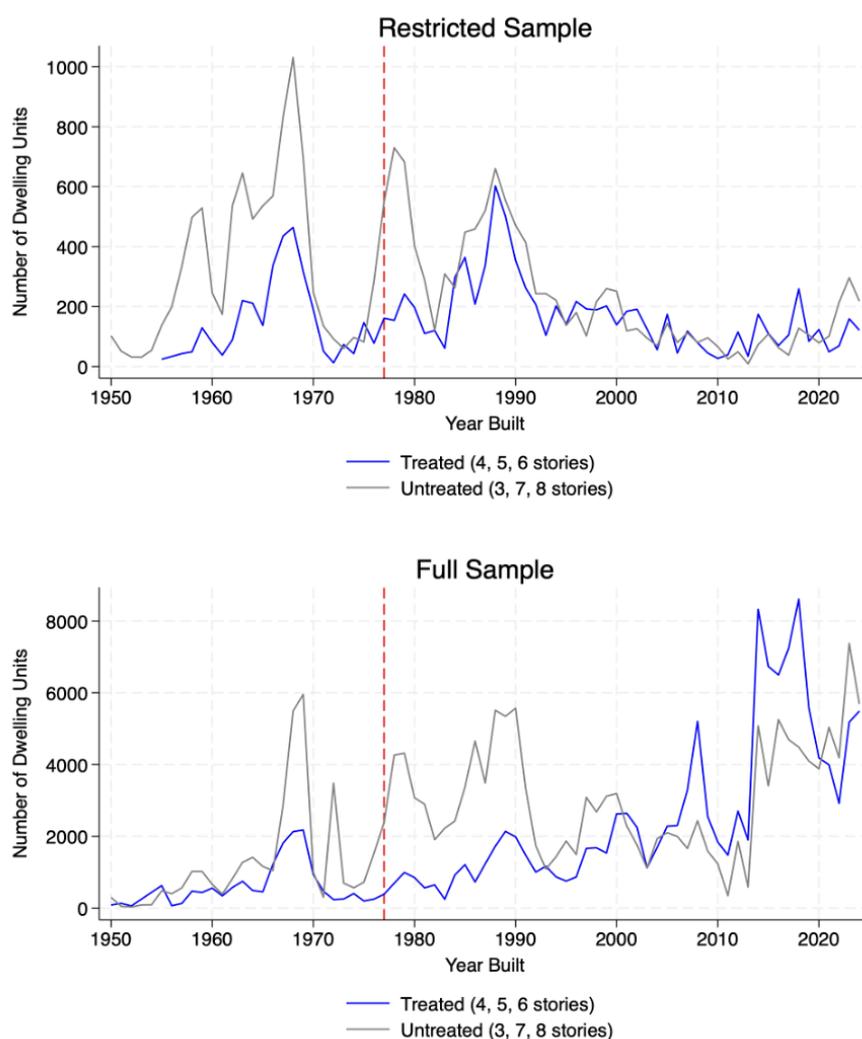
Note: Two-way fixed effects regression results are presented for number of dwelling units at the aggregated at the year-story level. The full sample used in columns (4)-(6) and the restricted sample used in columns (1)-(3) are defined as in Table (2). Columns (1) and (4) use the raw count of dwelling units as the response variable, Columns (2) and (5) use the logged count of dwelling units, and columns (3) and (6) use Poisson pseudo-maximum likelihood (PPML) estimation. The interaction variable TreatedStories×1977 takes a value of 1 if the number of stories is 4, 5, or 6 and the year built is 1977 or later. Year built and story fixed effects are included in all specifications. Robust standard errors are shown in parentheses.

Figure 2: Event Study, Number of Units



Note: The number of dwelling units aggregated at the year-story level is regressed on interactions between individual year built dummies and the treated stories dummy (for stories 4, 5, and 6). The restricted sample as defined in Table (2) is used. The graph shows point estimates and 95% confidence intervals for the coefficient on the interaction term for each year built between 1950 and 2020, with the exception of the reference year 1976. Estimated coefficients before 1955 are not shown since there are no properties with 4-6 stories from those years in the data.

Figure 3: Timeseries, Number of Units



Note: Line graphs are presented for the number of dwelling units in buildings by vintage and number of stories. The gray line represents units in untreated buildings (3, 7, or 8 stories), while the blue line represents units in treated buildings (4, 5, or 6 stories). The year of PAB legalization, 1977, is labeled as a red dashed line. The full and restricted samples are defined according to Table (2).

Table 4: Property-Level Density and Value

Variables	Restricted Sample		Full Sample	
	(1)	(2)	(3)	(4)
	ln(Units/Lot Size)	ln(Value/Units)	ln(Units/Lot Size)	ln(Value/Units)
TreatedStories× Post1977	0.188*** (0.033)	0.031 (0.025)	0.355*** (0.049)	0.054** (0.023)
Average Unit Size	-0.737*** (0.072)	0.859*** (0.047)	-0.603*** (0.140)	1.040*** (0.047)
ln(Lot Size)	-0.066*** (0.025)		-0.036*** (0.012)	
Story Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	2660	1529	4474	2469

*** p<0.01, ** p<0.05, * p<0.1

Note: Property-level two-way fixed effects regression results are presented for density and assessed per unit property value. The full and restricted sample, interaction variable, and fixed effects are defined in the same way as in Table (3). In columns (1) and (3), the logged number of dwelling units per lot acre is regressed on the interaction variable, with a control for average unit size in thousands of square feet. In columns (2) and (4), the logged assessed value of the property in 2024 per unit is regressed on the interaction variable, with controls for logged lot size in acres and average unit size in thousands of square feet. Robust standard errors are shown in parentheses.

Table 5: Unit Restriction Robustness

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	5 units	10 units	15 units	20 units	25 units	50 units
TreatedStories× Post1977	-0.030 (0.336)	1.028 (1.992)	4.229 (3.972)	7.988 (6.661)	13.685 (9.225)	54.990*** (16.565)
Story Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Property Count	554	1575	2142	2531	2866	3548
Treated	54	235	428	613	793	1263
Untreated	500	1340	1714	1918	2073	2285

*** p<0.01, ** p<0.05, * p<0.1

Note: Two-way fixed effects regressions following the specification in column (4) of Table (3) are presented, with the response variable as the number of dwelling units aggregated at a year-story level. The dataset used in each column consists of the subset of the full sample in Table (2) which has less than 5, 10, 15, 20, 25, and 50 units respectively. No additional restrictions on the full sample are applied. The total number of properties in each subsample, along with the number of treated (4, 5, or 6 stories) and untreated (3, 7, 8 stories) properties in the subsample, are shown at the bottom of the table. Robust errors are shown in parentheses.

Table 6: Lot Size Restriction Robustness

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	0.15 acres	0.25 acres	0.33 acres	0.50 acres	0.75 acres	1.00 acre
TreatedStories × Post1977	65.444*** (9.649)	137.286*** (17.888)	158.642*** (21.344)	215.100*** (27.893)	268.196*** (32.221)	301.671*** (35.009)
Story Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Property Count	1536	2772	3255	3829	4097	4228
Treated	425	898	1146	1470	1629	1707
Untreated	1111	1874	2109	2359	2468	2521

*** p<0.01, ** p<0.05, * p<0.1

Note: Two-way fixed effects regressions following the specification in column (4) of Table (3) are presented, with the response variable as the number of dwelling units aggregated at a year-story level. The dataset used in each column consists of the subset of the full sample as defined in Table (2) which is on a lot of less than 0.15, 0.25, 0.33, 0.5, 0.75, and 1 acre respectively. No additional restrictions on the full sample are applied. The total number of properties in each subsample, along with the number of treated (4, 5, or 6 stories) and untreated (3, 7, 8 stories) properties in the subsample, are shown at the bottom of the table. Robust errors are shown in parentheses.

Table 7: Treated Stories Robustness

Variables	Treated as 5 to 6 Stories			Treated as 5 to 7 Stories		
	(1) count	(2) ln(count)	(3) PPML count	(4) count	(5) ln(count)	(6) PPML count
TreatedStories × Post1977	17.537*** (2.927)	1.057*** (0.292)	1.758*** (0.282)	12.921*** (2.270)	1.000*** (0.310)	1.742*** (0.274)
Story Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	3675	143	375	3675	143	375

*** p<0.01, ** p<0.05, * p<0.1

Note: Regressions following the specifications in columns (1)-(3) of Table (3) are presented, but with adjustments to the way in which treated stories are defined to test for robustness. The dataset used is the restricted sample in Table (2) but with all 4-story properties removed. In columns (1)-(3) the treated stories are 5 and 6, while in columns (4)-(6) the treated stories are 5, 6, and 7. Robust standard errors are shown in parentheses.