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Location, Location, Structure Type: Rent Divergence within Neighborhoods

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Abstract

Housing rents are a large share of household budgets and make a large contribution to overall inflation. We show that, even within the same neighborhoods, rent inflation rates for different types of housing units sometimes diverge. Over the 2010s, apartment rents generally outpaced detached unit rents; this pattern reversed during the COVID-19 pandemic. These rent dynamics imply a segmented housing market, and suggest that rent indexes need to be based on data structurally representative of their measurement objective. Even indexes based on careful geographical sampling, such as the United States Consumer Price Index's (CPI's) Owners' Equivalent Rent component prior to 2023, may be biased by using an unrepresentative mix of apartments and houses. We demonstrate that this bias may be quite large, and offer recommendations – one of which was recently accepted by the CPI.
JEL Codes: R31, R21, E30
Keywords: rental housing, price measurement, owners' equivalent rent

1 Introduction

Accurate measurement of housing rent is important for measuring overall consumption, for understanding affordability, and for accuracy in inflation measurement. This is because housing rents have a huge expenditure weight in household budgets, particularly for low-income renters or renters in cities with growing labor markets. The current (2008) System of National Accounts treats the consumption of owner-occupied housing as a consumption service flow produced by the household (using housing assets), and the value of that service flow is estimated using local market rents; thus rents play a key role in estimating aggregate consumption. Many official statistical agencies, including that of the United States, also use the owners' equivalent rent (OER) approach to measuring the cost of homeownership, so rents are a large component of overall inflation.

In real estate, the famous phrase "location, location, location" refers to the fact that location is almost invariably the most important driver of the value of a property. For measuring rent inflation and OER inflation, the United States Consumer Price Index (CPI), for instance, uses stratified geographic sampling using a fine definition of neighborhood to operationalize the notion that rent growth differs by location. In particular, OER growth for homeowners in a given neighborhood is estimated to equal average rent growth in that same neighborhood. Previous research has always indicated that location is, by a very large margin, the most important determinant of rent growth; see, e.g., Verbrugge et al. [2017].

But in this paper, we demonstrate that even within the same neighborhood, rent inflation for different types of housing units sometimes diverge.

In the United States, apartment rents outpaced detached house rents throughout the 2010s (see Section 2.2). Conversely, over much of the recent COVID-19 pandemic period and its aftermath, this pattern reversed. On the basis of prior research, we might expect that differentials like these are due to location. If the influence of location entirely explains such differentials, then a sample of units of any type can provide the basis for an accurate rent index, as long as there is a representative mix of neighborhoods. But if rents diverge by more than the influence of location can explain, then an unrepresentative mix of housing types (even in a perfectly random mix of neighborhoods) gives rise to an incorrect measurement of rent dynamics. Such mismeasurement would feed into incorrect measurements of consumption, standards of living, and price inflation.

The rental unit microdata from the US Bureau of Labor Statistics (BLS) are ideally suited to a study such as ours. Units were sampled to be both geographically and economically representative, and contain enough information to allow estimation of location and structure type effects. The BLS tracks rents for about 40,000 units for its rent and owners' equivalent rent (OER)[1] indexes. The survey randomly selects small neighborhoods from within a city, then samples a half-dozen rental units from each selected neighborhood (irrespective of structure type or management structure). This procedure ensures that the sample contains units from all parts of the rental market and contains some competing rental units within every selected neighborhood. These sample-randomizing features contrast with the procedures underlying other rental data sources, which often omit significant portions of the rental market or which contain no location data.

We find that, controlling for location and for other observable characteristics, rent dynamics differ in a statistically and economically significant manner across structure types, over long periods. For instance, between the first half of 2017 and the first half of 2018, after controlling for the effects of location, multiunit rent growth exceeded single-family detached rent growth by 0.4 percentage points annually. Over the 2014-2017 period, this differential was closer to a full percentage point (per year). Such differentials result in biases in the CPI that are of a magnitude generally considered to be far too large to ignore.

The different price movements based on structure type imply market segmentation within rental housing. This might be expected from both demand and supply considerations. Burns [2015], Drew [2015], and Lerner [2016] document that tenants who seek apartment rentals differ from tenants who seek single-unit homes in preferences and family situation. In 2013, 43 percent of renters of single-family detached units were families with children, compared to 27 percent of multifamily rentals. Young adults and high-income urban dwellers are less likely to want to live in older single-family detached suburban homes. Different preferences and family characteristics may give renters of single-family detached homes different outside options and different demand elasticities. On the supply side, there are differences as well. Most single detached homes are not professionally managed (though this has been changing). Detached-unit user costs differ from multifamily-unit user costs. For example, Coulson and Fisher [2015] and Halket et al. [2020] find that maintenance costs are systematically different and the land-unit ratio differs as well. Apartment complexes have economies of scope and scale, and different management structures can lead to different bargaining strategies and

[1] OER measures the value of housing services consumed in owner-occupied units. Movements in this implicit rent is imputed from price changes in nearby rental units.

outcomes (Gallin and Verbrugge [2019]). Detached units can easily move into and out of the rental market. Supply changes (such as the surge in supply of single-family detached rentals since 2006) could well result in differential rent dynamics.

However, these considerations do not necessarily imply differential rent dynamics across structure types. Even cost differentials need not map into rent differentials, since rents do not seem to be that closely related to costs; user costs and rents can diverge markedly over extended periods. (Verbrugge [2008], Braga and Lerman [2019])[2] Location has been well-established as the chief determinant of rent growth. What matters for pricing is the marginal renter, not average characteristics or demand elasticities. So long as some pool of renters views apartments and nearby rentable detached homes as substitutes, market forces might be expected to ensure a close relationship between the rent dynamics of different structures.

We show that despite the importance of location for determining rent growth, structure type is also an economically and statistically significant driver of rent growth. This leads to five key takeaways from our research.

First, sample representativeness is an utmost concern when measuring shelter pricing movements (and thus, measuring consumption of shelter services). Accurate United States shelter inflation measurement requires a rental housing sample that is both geographically and structurally representative for the average United States renter. This requirement for representativeness in all these dimensions is contrary to the impression one might have gotten from the recent literature. Most of the new rental data sources that have arisen in recent years (Ambrose et al. [2015, 2018], Nothaft [2018]), which have formed the basis of criticism of the CPI's shelter indexes, are based upon data either from large apartment complexes or from single-family dwellings. Our study demonstrates that these indexes would need to be supplemented, and not merely reweighted, to become representative of the whole rental market. Furthermore, while Zillow's ZORI Clark [2022] is an exception in that it has appreciable data from a broader selection of structure types, all of these alternative indexes are based only upon new tenant rents, not rents facing the average tenant. New tenant rent dynamics can differ sharply from continuing tenant rent dynamics.[3]

[2]The theory of Halket and di Custoza [2015] can explain why detached-unit rentals in high-owner neighborhoods are relatively cheap, but does not directly speak to how such rents might grow more slowly than apartment rents.

[3]For more details on the importance of all-tenant rents for inflation dynamics, and for

Second, our findings have implications for understanding how living standards have changed across income groups. For most in the bottom quintile of the income distribution, housing expenditures take more than 40 percent of income (OECD [2019]), so accurate accounting for housing costs is critical. Comparing income growth to average rent growth can give rise to misleading conclusions, since both location and structure type vary systematically with other socioeconomic indicators. For instance, our results indicate that over the past decade, price inflation for shelter has been overestimated for house-dwellers, in turn leading to an underestimation of growth in their living standards.

Third, our findings enhance our understanding of rental market dynamics. Despite differences in demand and supply influences across structure types, what matters for pricing is the marginal renter. Differential rent dynamics across structure types (after controlling for location) implies important market segmentation.

Fourth, we provide novel evidence regarding the impact of COVID-19 on housing markets. Regarding demand for owned housing, D'Lima et al. [2022] found that house prices fell in densely populated locations, and rose in low density locations (e.g., in suburbs) when shutdowns were enacted. Similarly, Liu and Su [2021] and Gupta et al. [2022] locate evidence for a pandemic-related shift in location preferences from downtown to suburban living, where population density is low (and similarly predict a reversal of rent inflation dynamics going forward). Our results enhance these findings by indicating that *even in the same neighborhoods*, rents rose differentially for different structure types, with demand for detached rental housing rising relative to that for apartment rental housing.

Finally, our findings have important implications for inflation measurement: OER inflation may have been notably mismeasured over the period of our study; section 4 estimates OER inflation to have been overstated by 0.42 percentage points between 2014 and 2017, for instance. Quantitatively, a deviation of this magnitude from the measurement goal is large enough to shift the headline CPI by 0.10 percentage points, of larger estimated mag-

a deeper discussion of the tenant-average tenant rent differential, see Adams et al. [2024] and Gallin et al.. Cotton [2024] and Loewenstein et al. [2024] explore the implications of this differential for all-tenant rent projections. Note that the fact that the CoreLogic SFRI has tracked the new BLS NTR index reasonably well over the 2005-2022 period does not imply that a structurally representative sample is unimportant for CPI accuracy, as we will demonstrate below.

nitude than lower-level substitution bias and as large as new outlets bias Moulton [2018]. Mismeasurement arises because our findings imply that the BLS rental sample is not representative for homeowners. Most homeowners live in detached houses, so we consider the change in the value of the implicit flow of rental services from owned housing is better proxied by the rent changes of nearby detached rental units.[4] But the BLS rental housing sample over the course of our study (and currently) is representative of the rental housing stock, not of the owned housing stock: for the latter, the percentage of detached units in the sample is too low. This implies that apartment rents receive too large a weight in the OER index, compared to detached units. Because apartment rents over our study rose more rapidly than detached unit rents, we argue OER inflation was overestimated. As in earlier versions of this paper, we provided several recommendations to eliminate or mitigate this problem. Section 4.2 discusses the reweighting approach that BLS pursued to address the problem.

[4]The service flow that houses yield to owners might diverge in important ways from the rent commanded by superficially similar houses, for at least two reasons. First, the findings of Halket et al. [2020] imply that owned houses have higher unobserved quality features that are more delicate (such as rose gardens or hot tubs), features that might deteriorate rapidly under the tenure of a renter. (Heston and Nakamura [2009] and Aten [2018] both provide evidence that contract rents understate the flow of rental services to the typical homeowner; Aten and Heston [2020] and Rassier et al. [2021] suggest a data-based method to estimate a premium to rental-equivalence estimates of OER for use in the national accounts.) Second, it may be argued that since most detached homes are not professionally managed, this might lead to mispricing. Detached homes feature far stickier rents than do apartments, and management structure may well influence rent dynamics (see Verbrugge and Gallin [2017], Gallin and Verbrugge [2019]). However, regarding OER, the measurement goal is essentially this: how did the answer to the question "What would your home rent for?" change over the past six months. (In other words, what is the change in the market value of the flow of services your house provided over this period?) Section **??** will assume that the rent movements in nearby apartments less closely proxy this unobserved change than do the rent movements in other, nearby detached homes. In other contexts, differences in observables raise questions about comparability (see the vast literature on causal inference, for example Athey and Imbens [2017]). For exactly this reason, between 1987 and 1998, BLS sampling procedures specified that particular owner units were matched to particular rental units with similar structural attributes.

2 Data

2.1 Data Source

The BLS's Consumer Price Index Housing Survey asks the owners, property managers, and renters the rent charged for approximately 40,000 housing units in the United States. Each unit is surveyed every six months to create a panel data set of rents.

The BLS selects its sample by first selecting approximately 80 areas to be representative of all urban areas in the United States.[5] Each area is divided into contiguous regions labeled "strata," and then further into "segments."[6] Segments are randomly selected from each stratum, using probability-proportional-to-size procedures. Housing units are randomly selected from a list of probable rental units. (See Ptacek and Baskin [1996] for details.) Housing characteristics (including age, type of structure, exact location, number of bedrooms, and what utilities are included in rental payment) are recorded along with rents. The housing survey thus includes apartments and single-family homes, individually managed and corporately managed units, suburban and urban units. It is the most representative and diverse panel of rental housing available for the United States.

In what follows, we alternately focus on one-year periods and on three-year periods. One-year periods are obviously useful since they can be closely aligned with events unfolding in the broader economy; they are also useful because, as we explain below, they generally permit the use of larger samples. However, three-year periods are also useful for several reasons. First, some structure types – particularly large apartment complexes – have more flexible rents than detached units; Genesove [2003] and Gallin and Verbrugge [2019] document that both tenant turnover and rent changes upon lease renewal vary notably by structure type. Hence, rents in large apartments will respond more rapidly to market developments; thus, a differential in the data might simply reflect speed of response, rather than a truly different underlying inflation rate. After three years, however, most units will have experienced a

[5]More precisely, the areas are what the BLS terms primary statistical units (PSUs). Since 2018, PSUs are core based statistical areas following Office of Management and Budget definitions, except with less frequent revision. Previously, they were similarly-sized areas, though not always aligned with other area definitions.

[6]Since 2018, a segment is usually a Census block group, although sometimes it is an amalgamations of neighboring block groups.

rent change, mitigating this responsiveness differential. Second, a three-year differential will be unambiguously important – users of the Consumer Price Index are certain to see a differential over such a lengthy period as essential to correct. Unfortunately, using three-year periods has notable implications for sample sizes. Because of panel rotation and frequent non-response, only around a third of units in any period also have a rent quote three years later.

The Consumer Price Index uses its housing survey to compute a rent index and an owners' equivalent of rent index. While we are using the same data, the results in this study will not be strictly comparable to CPI rent or OER index movements. There are many reasons for this. The rent measures used in rent and OER index construction are not the tenant- or landlord-reported "sticker price" or nominal rents, but instead receive various adjustments necessary for index accuracy. For instance, units age over time, and the BLS corrects for this using an "aging-bias" correction. Also, reported rents often depart from the true market rent of the units, because tenant receive rent discounts in exchange for services rendered to a landlord.[7] Another important adjustment applies only to OER rents. OER is a price-of-shelter concept that does not include utilities, since utilities are measurable out-of-pocket expenses for homeowners. OER index movements are based upon inflation in market rents; but since these rents often include utilities – and utilities costs often greatly exceed 10 percent of the rent – the BLS must estimate the utilities part of each rent, and remove it, before using this rent in constructing OER (see Verbrugge 2012). The resultant (post-utilities-adjusted) rent measure is termed "economic rent." However, in our tables and results, we use nominal rents (except where otherwise noted) for comparability with previous studies.[8] The two indexes also have different weights, which change every month, based on response rates and rent movements. This article's tables and regressions equally weight observations (except as noted), which might otherwise cloud the types of distinctions present in the data. We also drop observations which record rent as $0 or $1.[9]

[7]The rents entering the index may receive other adjustments. An important case is vacancy: rents that are missing owing to vacancies are imputed. We do not include any imputed rents in this study.

[8]See Verbrugge and Poole [2010] for a study detailing the importance of these weights and other differences between the rent and OER indexes. Our main results do not hinge on the particular rent measure used.

[9]Such observations are not uncommon, but typically reflect a rent discount offered to certain tenants in exchange for services provided to the landlord. The BLS data do not

2.2 Data Patterns

Over most of the 2010s, rents in multiunit buildings increased faster than rents for single-family detached houses, as shown in Table 1. Conversely, over the most recent period, this pattern reversed.

Table 2 demonstrates that this pattern is present widely (although not universally), across geography, rental unit size, and rent levels. The second row, for instance, indicates that in areas of low population density, rent inflation experienced by detached rental units was 1.48 percent, while rent inflation experienced by multiunit rentals was 2.07 percent.

3 Regression Analysis

3.1 Location Indicator Regressions

Regressions can help separate structure type effects from neighborhood effects. Our chief interest is whether we can reject the "location, location, location" null hypothesis, namely that rent inflation differentials are driven entirely by location. We initially focus attention on a single-year period, from the first half of 2017 to the first half of 2018. Our sample includes rent quotes for 6,064 single-family detached homes, 2,410 rental units in single-family attached homes, 7,472 rental units in condominiums or apartment buildings, and 354 rented mobile homes or other rental units. We pool these observations and investigate, in particular, the influence of structure type after controlling for location, and then for location, age, and the number of bedrooms. In many periods we observe a differential in rent change by structure type – but also, in some periods, by number of bedrooms, controlling for structure type. Our specification is

$$r_i = a_{j(i)} + b_{\ell(i)} + \beta X_i + \epsilon(i), \tag{1}$$

where the dependent variable r_i is either a one-year or a three-year rent change (in the latter case, it is given by

$$r_i = \big[log(rent_{(i,t)} - log(rent_{i,t-3})\big]) \cdot 100/3, \tag{2}$$

i indexes rental units, $j(i)$ indicates the structure type of unit i, $\ell(i)$ indicates its location, a is the fixed effect for structure type $j(i)$, b is fixed effect for

contain public housing units.

Table 1: Average rent inflation by structure type

Interval	Single detached	Single attached	Multiunit
2011h1 – 2011h2	0.79	1.29	1.92
2011h2 – 2012h1	1.10	1.78	2.15
2012h1 – 2012h2	1.10	1.42	1.98
2012h2 – 2013h1	1.28	1.35	2.84
2013h1 – 2013h2	1.31	1.67	2.64
2013h2 – 2014h1	1.51	1.94	2.44
2014h1 – 2014h2	1.51	1.79	2.94
2014h2 – 2015h1	1.59	1.42	2.91
2015h1 – 2015h2	1.73	2.14	3.22
2015h2 – 2016h1	1.78	1.74	2.11
2016h1 – 2016h2	1.85	1.78	2.52
2016h2 – 2017h1	1.90	0.43	1.62
2017h1 – 2017h2	1.98	1.83	2.57
2017h2 – 2018h1	1.99	1.73	1.39
2018h1 – 2018h2	2.27	2.17	2.54
2018h2 – 2019h1	2.35	2.46	3.19
2019h1 – 2019h2	2.45	2.49	2.61
2019h2 – 2020h1	2.63	2.72	3.37
2020h1 – 2020h2	2.82	2.94	3.13
2020h2 – 2021h1	2.89	2.77	3.30
2021h1 – 2021h2	3.33	4.31	4.69
2021h2 – 2022h1	3.83	3.39	3.16
2022h1 – 2022h2	5.37	5.93	5.25
2022h2 – 2023h1	5.40	4.41	4.79
2023h1 – 2023h2	5.59	5.75	5.54
2023h2 – 2024h1	7.81	6.25	6.56

Results are equally-weighted arithmetic averages of 100 times the annualized log difference in nominal rents for units in the CPI Housing Survey with quotes for both periods that have been converted to percentages. Source: Authors' calculations on BLS Housing Survey data.

Table 2: Average rent inflation, first half 2017 - first half 2018

	Single detached	Single attached	Multiunit
Overall	2.66	2.66	3.09
	(0.11)	(0.17)	(0.10)
County population density			
$< 200/mi^2$	1.48	1.75	2.07
	(0.28)	(0.35)	(0.24)
200 to 5,000/mi^2	2.9	3	3.44
	(0.12)	(0.19)	(0.11)
5,000 to 20,000/mi^2	2.35	0.06	1.79
	(0.52)	(1.56)	(0.28)
$> 20,000/mi^2$	2.16	0.04	1.76
	(0.38)	(1.47)	(0.32)
In a state with rent control			
No	2.52	2.52	3.01
	(0.13)	(0.18)	(0.11)
Yes	3.11	3.4	3.28
	(0.21)	(0.45)	(0.20)
Numbers of bedrooms			
2 bedrooms	2.6	2.47	2.81
	(0.17)	(0.21)	(0.13)
3 bedrooms	2.33	2.59	2.37
	(0.22)	(0.34)	(0.36)
4 or more bedrooms	2.15	1.82	4.92
	(0.46)	(1.21)	(1.75)
Initial rents			
$2 to $649	2.2	2.4	3.26
	(0.92)	(0.55)	(0.32)
$650 to $899	2.77	2.65	3.78
	(0.46)	(0.47)	(0.22)
$900 to $1299	2.58	2.56	3.31
	(0.72)	(0.67)	(0.31)
$1300 or more	2.21	0.79	2.22
	(0.46)	(0.53)	(0.35)
Observations	6064	2410	7472

Result are equally weighted arithmetic averages of 100 times the log differences in nominal rents for units in the CPI Housing Survey with quotes for both Jan-Jun 2017 and Jan-Jun 2018. Standard errors in parenthesis. Source: Authors' calculations on BLS Housing Survey data.

Table 3: Regression of annualized percent rent change, first half 2017 - first half 2018

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.001	0.085	-0.036	0.047
	(0.201)	(0.209)	(0.212)	(0.25)
Mobile Home and Other	-1.116**	-1.559***	-1.281**	-1.46
	(0.508)	(0.528)	(0.533)	(1.68)
Multi Unit	0.431***	0.339**	0.399**	0.255
	(0.144)	(0.15)	(0.156)	(0.186)
Build before 1990				-
Built after 1990				-0.257
				(0.18)
Studio				-
1 bedroom unit				-0.311
				(0.579)
2 bedroom unit				-0.894
				(0.576)
3 bedroom unit				-1.12*
				(0.598)
4 bedroom unit				-0.684
				(0.708)
5 bedroom unit				1.323
				(1.352)
6 bedroom unit				-4.428*
				(2.605)
7 or more bedroom unit				4.335
				(5.966)
Location indicators	None	County	Segment	Segment
Observations	16300	16300	16300	16300
Adjusted R^2	0.001	0.046	0.065	0.075

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 4: Regression of annualized percent rent change, first half 2014 - first half 2017

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.359***	0.638***	0.376***	0.264*
	(0.117)	(0.114)	(0.121)	(0.158)
Mobile Home and Other	-0.27	0.181	-0.14	1.597
	(0.276)	(0.273)	(0.277)	(1.494)
Multi Unit	1.019***	1.235***	0.94***	0.631***
	(0.089)	(0.09)	(0.094)	(0.139)
Build before 1990				-
Built after 1990				0.238**
				(0.109)
Studio				-
1 bedroom unit				-0.344
				(0.345)
2 bedroom unit				-0.718**
				(0.344)
3 bedroom unit				-1.143***
				(0.36)
4 bedroom unit				-0.615
				(0.421)
5 bedroom unit				-1.445**
				(0.655)
6 bedroom unit				3.594**
				(1.499)
7 or more bedroom unit				8.042***
				(2.957)
Location indicators	None	County	Segment	Segment
Observations	13244	13244	13244	13244
Adjusted R^2	0.012	0.176	0.097	0.129

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 5: Regression of annualized percent rent change, first half 2017 - first half 2020

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.012	-0.053	0.171	0.166
	(0.152)	(0.155)	(0.159)	(0.168)
Mobile Home and Other	-0.235	-0.276	-0.578	-0.24
	(0.383)	(0.39)	(0.41)	(0.915)
Multi Unit	0.183*	0.146	0.256**	0.132
	(0.103)	(0.107)	(0.111)	(0.117)
Build before 1990				-
Built after 1990				-0.101
				(0.118)
Studio				-
1 bedroom unit				-0.003
				(0.365)
2 bedroom unit				-0.248
				(0.363)
3 bedroom unit				-0.52
				(0.379)
4 bedroom unit				-1.04**
				(0.465)
5 bedroom unit				0.78
				(0.923)
6 bedroom unit				-2.326
				(2.543)
7 or more bedroom unit				-2.682
				(4.046)
Location indicators	None	County	Segment	Segment
Observations	8223	8223	8223	8223
Adjusted R^2	0.0005	0.127	0.148	0.148

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 6: Regression of annualized percent rent change, first half 2020 - first half 2023

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	-0.164	-0.035	-0.123	-0.322
	(0.209)	(0.212)	(0.218)	(0.23)
Mobile Home and Other	-2.17***	-2.519***	-2.297***	0.425
	(0.47)	(0.487)	(0.481)	(1.438)
Multi Unit	-0.373**	0.073	-0.178	-0.322*
	(0.155)	(0.154)	(0.166)	(0.176)
Build before 1990				-
Built after 1990				0.792***
				(0.155)
Studio				-
1 bedroom unit				1.217**
				(0.505)
2 bedroom unit				1.444***
				(0.503)
3 bedroom unit				0.488
				(0.521)
4 bedroom unit				-0.341
				(0.627)
5 bedroom unit				0.559
				(1.046)
6 bedroom unit				10.636***
				(2.158)
7 or more bedroom unit				-3.353
				(5.488)
Location indicators	None	County	Segment	Segment
Observations	7949	7949	7949	7949
Adjusted R^2	0.003	0.168	0.149	0.170

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

location $\ell(i)$, X_i is vector of other characteristics of unit i, and ϵ_i is an idiosyncratic econometric error term.

Column 1 of Table 3 presents indicator coefficients in a specification without any location or number-of-room controls. An ordinary least squares regression with one set of category indicators is equivalent to taking averages, so the coefficients in Column 1 are the differential average rent changes by structure type. Nominal rents increased by 2.66 percentage points for detached single-family homes and 2.66+0.43=3.09 percent for apartments in multiunit buildings. The 0.43 percentage point differential is both economically and statistically significant.

Columns 2 and 3 of Table 3 report specifications that add location indicators. If location drove the entire structure-type rent divergence, then coefficients on structure type indicators would become statistically insignificant as location controls are added. But as the indicator variables for location represent finer and finer geography, the coefficients on structure type typically change only modestly, and often remain significantly different from zero – and so reveal the significant influence of structure type. During this period, rent growth for multiunit exceeded that of single-family detached housing by 0.40 percentage points (annualized) even after controlling for location with block group indicators (Column 3, Table 3). Upon inclusion of 7 different number-of-bedroom dummy variables, the coefficients on structure type indicators become statistically insignificant, while remaining quantitatively economically meaningful. In this particular regression, we view these weaker results as reflecting the strong collinearity between structure type and number of bedrooms.[10]

We next turn to several tables that use the same specification over three-year intervals: the first half of 2014 to the first half of 2017 (Table 4); the first half of 2017 to the first half of 2020 (Table 5); and the first half of 2020 to the first half of 2023 (Table 6). Over the 2014-2017 period, even after controlling for neighborhood, there is clear evidence for segmentation across both structure type and number of bedrooms. The inflation differential is in the 0.6-0.9 percentage points range.

[10]Tables in the Appendix repeat Table 3 for all the other one-year changes in our sample. There are a total of 13 of these, and in seven of them, we find statistically-significant rent differentials across structure types either controlling only for location (column 3), or controlling for both location and age and number of bedrooms (column 4). Thus, if anything, the 2017-2018 period is somewhat atypical in providing somewhat *less* evidence for a rent differential across structure types than most of the rest of the sample.

Over the 2017-2020 period, evidence is weaker, partly reflecting the far smaller average differential over this period. Only when location is fully controlled for (in column (3)), does compelling evidence arise for segmentation by property type. And then, as in the one-year results in Table 3, said evidence appears to vanish upon inclusion of the bedrooms covariates (column 4) – though only one of these seven covariates enters significantly.

Over the 2020-2023 period, during the COVID-19 pandemic, the differential reversed: apartment rent inflation came in below detached unit rent inflation. Here, evidence for segmentation by property type is most compelling when age and bedroom controls are included, rather than excluded. Contrary to what one might have expected (but possibly in line with the owned-housing findings of D'Lima et al. [2022]), rent inflation is not monotonic in space, as measured by number of bedrooms: we see statistically significant (and positive) rent inflation differentials only for one-bedroom, two-bedroom, and six-bedroom units. Regardless of how these are interpreted, however, the "location, location, location" null hypothesis is rejected.

3.2 Robustness

The rent survey has outliers. The standard deviation of log rent change between the first halves of 2017 and 2018 was 8.25 percent. Of the 16,300 observations, 821 had rent changes more than 2 standard deviations from the average. Column 1 of Table 7 copies column 3 of Table 3. Column 2 repeats the same regression, only dropping the 821 outliers. The structure type coefficients are still the difference in rent growth by structure type after controlling for location with segment indicators. The estimated difference between single-family detached and multiunit rent increases to 0.563 percentage points (instead of 0.399) when outliers are excluded.

All regressions reported thus far use the nominal rent that respondents report. But the rent divergence by structure type is also seen in the rent measures that enter the rent index ("economic rent," which corrects for subsidies and work reductions, and includes adjustments for aging and other quality adjustments), and that enter the OER index ("pure rent," which adjusts economic rent by removing the utilities portion of the rent; see Verbrugge [2012]). The different inflation rates are not driven by to the presence of utilities or other adjustments differing by structure type. Column 3 repeats the regression of Column 1, except using economic rent change instead of nominal rent change as the dependent variable. Column 4 uses pure rent rate

Table 7: Regression of annualized percent rent change, first half 2017 - first half 2018

	(1)	no outliers (2)	economic rent (3)	pure rent (4)	no logs (5)
Single-family detached	-	-	-	-	-
Single-family attached	-0.036	0.164	0.139	-0.183	-0.137
	(0.212)	(0.124)	(0.221)	(0.237)	(0.261)
Multiunit	0.399**	0.563***	0.467***	0.597***	0.317
	(0.156)	(0.091)	(0.163)	(0.174)	(0.192)
Mobile home and other	-1.281**	-0.644	-1.389	-1.337	-1.545
	(0.533)	(0.309)	(0.557)	(0.596)	(0.656)
Location indicators	Segment	Segment	Segment	Segment	Segment
Observations	16300	15479	16300	16300	16300
R^2	0.066	0.081	0.066	0.068	0.070

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

change as the dependent variable. The coefficient on multiunit indicates a 0.399 to 0.597 percentage point difference from single-family detached rents, depending on the rent measure. Finally, Column 5 uses the ratio of rents minus 1 rather than log difference in rents as the dependent variable. Instead of Equation 2, the difference in rents in calculated by

$$r_i = \left(\frac{rent_{(i,t)}}{rent_{i,t-3}} - 1 \right) \cdot 100. \quad (3)$$

Outliers influence the rent change measure more, and so standard errors are larger, but coefficient estimates are similar to the log-difference specifications.

4 Implications for Housing Indexes

4.1 Index Bias

The divergence in rents by structure type would not be a problem for an index calculated from a sample that was both geographically and structurally representative for the index in question. The CPI sample and its mix of structure types is fairly representative of urban rental housing, so differences in rent inflation between housing types cause no major bias in the CPI rent index. However, the CPI's OER calculations use fewer detached houses and more multiunit buildings than would be representative of owner-occupied housing. This is not a problem unique to the BLS sample. Most other rent indexes and rent datasets incorporate an even smaller proportion of single detached homes, and none is both geographically and structurally representative.

What is the implication of the not-fully-representative sample for OER inflation? To estimate this, suppose, as in the regression reported in Table 3, rent growth in expectation (denoted g_i for unit i) is the sum of a structure-type effect (a_h for structure type h) and a neighborhood effect (b_ℓ for location ℓ). Thus, $g_i = a_j + b_\ell$. Expected OER growth in location ℓ (G_ℓ) is the sum of rent growth for each structure type, weighted by the structure type's share of OER in that location (denoted $s_{j,\ell}$ for structure type j in location ℓ): $G_\ell = \sum_{i \in \ell} g_i = \sum_j s_{j,\ell}(a_j + b_\ell)$. Overall rent inflation (G) is weighted sum over locations, where w_ℓ is the weight for location ℓ:

$$G = \sum_\ell w_\ell \cdot G_\ell \tag{4}$$

$$G = \sum_\ell \sum_j w_\ell s_{j,\ell}(a_j + b_\ell) \tag{5}$$

$$G = \sum_j a_j \sum_\ell w_\ell s_{j,\ell} + \sum_\ell w_\ell b_\ell \underbrace{\sum_j s_{j,\ell}}_{=1} \tag{6}$$

$$G = \sum_j a_j \sum_\ell w_\ell s_{j,\ell} + \sum_\ell w_\ell b_\ell \tag{7}$$

Let $W_j = w_\ell s_{j,\ell}$. This weight is mismeasured; let $\tilde{W}_j$ denote the incorrect value of W_j used. Then, the resulting measurement error for rent growth is $\sum_j a_j(W_j - \tilde{W}_j)$. The regression coefficients for structure type indicators in Table 4 give an estimate for a_j over the period from the first half of 2014 to the first half of 2017. The structure-type weight W_j should be the share of owner-occupied housing services produced by that housing type j. For calculations here, the implied expenditures by housing type from the Consumer Expenditure Surveys (CE) will be assumed to measure W_j accurately. The shares measured by CE differ greatly from the OER weights. CE estimates 86.6 percent of owner-occupied rental equivalence came from single-family

Table 8: Mismatch of structure types in OER weights

	Rental equivalence share (Jul-Dec 2016 CE %) (1)	Share of OER weight (Jul-Dec 2016, %) (2)	Structure effect estimate (3)	Estimated contribution to OER mismeasurement (%) (4)
Single detached	86.6	33.6	0	0
Single attached	5.6	18.4	0.38	0.05
Multiunit	5.2	44.6	0.94	0.37
Other	2.6	3.4	-0.14	-0.00
Total	100	100		0.42

Source: Authors' calculations on BLS Housing Survey, Census American Community Survey, and BLS Consumer Expenditure Surveys data.

detached homes in the second half of 2016. (Similarly, the Census's American Community Survey estimated 82.6 percent of owner-occupied housing units are single unit detached.) However, single-family detached housing had only 33.6 percent of the weight in the CPI's OER calculations. Multiunit housing accounted for 5.2 percent of owner-occupied housing services in the CE data (combining the building type categories of 3-plex or 4-plex, garden, high-rise, and apartment or flat) but represented 44.6 percent of OER weight (combining the structure type categories multiunit with elevator and multiunit without elevator).

Table 8 presents our calculations. The difference between columns 1 and 2 gives an estimate of $W_j - \tilde{W}_j$. Column 4 is that difference, multiplied by a_j from Column 3. The under-weighting of single detached units and the over-weighting of all other housing resulted in an overestimate of OER inflation by 0.42 percent annually from 2014 to 2017.

OER has a relative importance in the CPI of 0.23, so sampling that accounts for structure type effects would have decreased the all items CPI by $0.42 \times 0.23 = 0.096$ percentage points annually. To give a sense of its significance, this is roughly the same magnitude as the aging bias adjustment in the CPI shelter indexes, universally thought to be far too large to ignore. (Randolph [1988], Gallin and Verbrugge [2007]) It is bigger than Moulton [2018] estimates for the CPI bias from lower-level substitution, as big as the bias from new outlets, and a quarter of the size as from new products and quality change, all price index measurement issues to which great attention is given.

In other periods the magnitude of the mismeasurement differs, but it is often considerable. The structure effect estimates for 2017 to 2020 (given in column 3 of Table 5) imply a mismeasurement of 0.12 percentage points annually for OER and 0.03 percentage points for all items. The structure effect estimates for 2020 to 2023 (given in column 3 of Table 6) imply 0.10 percentage point mismeasurement in OER and 0.02 percentage points for all items in the other direction. Similarly, using different specifications changes the estimated magnitude of the mismeasurement, but in alternative specifications the mismeasurement remains concerning; using structure effects estimates from column 4 of Table 5 imply 0.29 percentage points for OER and 0.07 percentage points for all items.

4.2 Index Methodology Changes

Avoiding this bias in an OER index is challenging. An earlier version of this article, Adams and Verbrugge [2021], listed three possible methodology changes to mitigate this bias: introducing a stratified sample procedure, a reweighting of the existing sample, and the creation of a subcategory indexes for each structure type. In January 2023, the BLS implemented the second approach.(Bureau of Labor Statistics [2022]) Weights for the OER index are now calculated at the unit-level rather than the segment-level. Unit-level weights now include a structure-type adjustment factor that gives more weight to units of underrepresented structure types in a segment and less weight to units of overrepresented structure types in a segment. Because of variance concerns, a cap limits how much added weight an unit will be given. (See Bureau of Labor Statistics [2024] for details.) Thus, if the sample the is mostly apartments in a segment with mostly detached homes, the detached homes may still be have less weight than would be representative of that segment, even though the few detached homes in the segment's sample receive high weight. This reweighting currently is all done within a segment, so in segments with no detached homes in the sample, no reweighting occurs. The reweighting as implemented thus only partially mitigates the bias. A different reweighting scheme might use detached homes from a different segment as a proxy or might reweight at a higher level of geographic aggregation. These could make the index more representative of the structure types, but it would be at the cost of geographic representativity.

A sample that is both geographically- and structurally-representative for owner-occupied housing would be ideal for an OER index, but such a sample would be expensive to construct. Identifying rented houses is usually more difficult than identifying rental units. Historically, houses have also exited the sample at a higher rate – possibly reflecting houses entering and exiting the rental market more frequently – necessitating expense to replace units as they drop out of the sample. A sample that contains some minimum number of responses for each structure type, even if not fully representative, would make the BLS's new reweighting procedure more effective.

Another long-term possibility is for rent indexes to be constructed by combining separate geographically representative indexes for each structure type. These structure-type indexes could even make use of different data sources. The BLS has been investigating non-survey data sources for different parts of the housing market, but has yet to find sources that meet its standards for timeliness and accurate representativity. Separate structure type indexes from survey data have all the disadvantages of stratified sampling. Indeed, separate indexes are an extreme case of stratified sampling.

5 Conclusion

Location is the chief determinant of rent growth. Yet despite this, we establish that controlling for location, structure type is also an economically and statistically significant driver of rent growth. During most of the 2010s, apartment rental units experienced higher inflation than detached rental units. During the COVID-19 period, possibly reflecting changing relative demand for space (given infection risk and enhanced working from home opportunities) and for isolated HVAC systems, this pattern reversed.

There are several important implications. First, this finding is an important step forward for our understanding of rental market dynamics, since differential rent dynamics across structure types implies important market segmentation. Second, the importance of structure types for rent inflation provides an additional reason to suspect that alternative rental data sources, which are not structurally representative, are of limited use for drawing implications about the accuracy of BLS rent indexes. Third, the finding implies that understanding changes in housing costs facing various income groups must rely upon data that are able to take into account both the locational and structural characteristics of this population's housing.

Finally, it implies that there was a measurement problem in the CPI's

OER index – one that has been long suspected in the price index community, but never proved. To mitigate this mismeasurement, the BLS implemented one of the methodology changes suggested in the working paper version of this article, Adams and Verbrugge [2021]. In particular, weights for the OER index are now calculated at the unit level, including a structural adjustment factor that gives more weight to units of underrepresented structure types. A sample that is both geographically- and structurally-representative for owner-occupied housing would be ideal for an OER index, but such a sample would be expensive to construct.

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Appendix: Regressions from Additional Periods

We duplicate the regressions presented in Tables 3, 4, 5, and 6 for yet more periods. Each of the appendix tables applies the regression equation of Equation 1 to a different period.

Table 9: Regression of annualized percent rent change, First half 2011 to First half 2012

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.346*	0.48**	0.373*	0.309
	(0.194)	(0.199)	(0.2)	(0.215)
Mobile Home and Other	-0.347	-0.258	0.03	0.161
	(0.523)	(0.54)	(0.537)	(1.704)
Multi Unit	1.383***	1.292***	1.402***	1.163***
	(0.156)	(0.165)	(0.164)	(0.195)
Build before 1990				-
Built after 1990				0.652***
				(0.168)
Studio				-
1 bedroom unit				-0.099
				(0.446)
2 bedroom unit				-0.584
				(0.444)
3 bedroom unit				-0.46
				(0.466)
4 bedroom unit				-1.128**
				(0.562)
5 bedroom unit				0.45
				(1.056)
6 bedroom unit				2.082
				(2.05)
7 or more bedroom unit				-5.962
				(3.949)
Location indicators	None	County	Segment	Segment
Observations	22871	22871	22871	22871
Adjusted R^2	0.005	0.045	0.043	0.052

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 10: Regression of annualized percent rent change, First half 2012 to First half 2013

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.315**	0.437***	0.272	0.209
	(0.16)	(0.163)	(0.167)	(0.191)
Mobile Home and Other	-0.506	-0.296	-0.56	2.309
	(0.424)	(0.438)	(0.433)	(1.59)
Multi Unit	1.034***	0.917***	0.892***	0.784***
	(0.126)	(0.134)	(0.136)	(0.175)
Build before 1990				-
Built after 1990				-0.013
				(0.146)
Studio				-
1 bedroom unit				0.061
				(0.414)
2 bedroom unit				-0.372
				(0.412)
3 bedroom unit				-0.355
				(0.431)
4 bedroom unit				-0.213
				(0.504)
5 bedroom unit				-0.787
				(0.863)
6 bedroom unit				-0.546
				(1.671)
7 or more bedroom unit				7.751***
				(2.999)
Location indicators	None	County	Segment	Segment
Observations	24688	24688	24688	24688
Adjusted R^2	0.005	0.056	0.054	0.062

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 11: Regression of annualized percent rent change, First half 2013 to First half 2014

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.553***	0.561***	0.536***	0.635***
	(0.163)	(0.167)	(0.17)	(0.203)
Mobile Home and Other	-0.861**	-0.387	-0.866**	-2.365
	(0.407)	(0.425)	(0.415)	(1.687)
Multi Unit	1.131***	1.121***	1.037***	1.062***
	(0.127)	(0.136)	(0.139)	(0.187)
Build before 1990				-
Built after 1990				0.267*
				(0.153)
Studio				-
1 bedroom unit				-0.012
				(0.466)
2 bedroom unit				-0.053
				(0.463)
3 bedroom unit				0.109
				(0.483)
4 bedroom unit				0.526
				(0.551)
5 bedroom unit				0.795
				(0.866)
6 bedroom unit				-1.158
				(1.725)
7 or more bedroom unit				1.375
				(3.366)
Location indicators	None	County	Segment	Segment
Observations	25173	25173	25173	25173
Adjusted R^2	0.004	0.041	0.059	0.07

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 12: Regression of annualized percent rent change, First half 2014 to First half 2015

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.263*	0.429***	0.175	-0.061
	(0.153)	(0.157)	(0.161)	(0.2)
Mobile Home and Other	0.7**	0.967***	0.753**	0.983
	(0.354)	(0.37)	(0.361)	(1.547)
Multi Unit	1.092***	1.123***	0.864***	0.599***
	(0.117)	(0.124)	(0.127)	(0.179)
Build before 1990				-
Built after 1990				-0.032
				(0.147)
Studio				-
1 bedroom unit				-0.789*
				(0.445)
2 bedroom unit				-1.126**
				(0.443)
3 bedroom unit				-1.352***
				(0.462)
4 bedroom unit				-1.522***
				(0.532)
5 bedroom unit				-1.935**
				(0.858)
6 bedroom unit				-0.183
				(1.801)
7 or more bedroom unit				1.892
				(2.732)
Location indicators	None	County	Segment	Segment
Observations	24829	24829	24829	24829
Adjusted R^2	0.004	0.047	0.07	0.089

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 13: Regression of annualized percent rent change, First half 2015 to First half 2016

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	-0.164	0.057	-0.185	-0.319
	(0.166)	(0.167)	(0.174)	(0.215)
Mobile Home and Other	-0.629	-0.045	-0.368	-0.054
	(0.389)	(0.396)	(0.398)	(1.738)
Multi Unit	0.96***	1.158***	0.862***	0.572***
	(0.124)	(0.128)	(0.134)	(0.184)
Build before 1990				-
Built after 1990				0.531***
				(0.156)
Studio				-
1 bedroom unit				-0.245
				(0.502)
2 bedroom unit				-0.589
				(0.499)
3 bedroom unit				-0.815
				(0.519)
4 bedroom unit				-1.243**
				(0.593)
5 bedroom unit				-0.61
				(0.912)
6 bedroom unit				9.341***
				(2.119)
7 or more bedroom unit				-3.285
				(4.282)
Location indicators	None	County	Segment	Segment
Observations	24428	24428	24428	24428
Adjusted R^2	0.004	0.08	0.073	0.091

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 14: Regression of annualized percent rent change, First half 2016 to First half 2017

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	-0.053	0.28	-0.036	-0.19
	(0.171)	(0.173)	(0.176)	(0.213)
Mobile Home and Other	-1.271***	-0.468	-1.104***	-0.042
	(0.424)	(0.429)	(0.427)	(1.644)
Multi Unit	0.651***	1.006***	0.63***	0.276
	(0.127)	(0.13)	(0.133)	(0.171)
Build before 1990				-
Built after 1990				0.204
				(0.155)
Studio				-
1 bedroom unit				-0.034
				(0.508)
2 bedroom unit				-0.273
				(0.504)
3 bedroom unit				-0.991*
				(0.522)
4 bedroom unit				-0.317
				(0.612)
5 bedroom unit				-0.454
				(0.98)
6 bedroom unit				-0.78
				(2.545)
7 or more bedroom unit				19.287***
				(5.963)
Location indicators	None	County	Segment	Segment
Observations	22952	22952	22952	22952
Adjusted R^2	0.002	0.083	0.054	0.069

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 15: Regression of annualized percent rent change, First half 2018 to First half 2019

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	-0.252	-0.088	-0.185	-0.204
	(0.194)	(0.204)	(0.205)	(0.228)
Mobile Home and Other	-0.236	0.149	-0.708	-0.15
	(0.469)	(0.49)	(0.49)	(1.497)
Multi Unit	0.243*	0.322**	0.188	0.062
	(0.137)	(0.144)	(0.15)	(0.168)
Build before 1990				-
Built after 1990				0.002
				(0.161)
Studio				-
1 bedroom unit				1.144**
				(0.539)
2 bedroom unit				1.111**
				(0.536)
3 bedroom unit				0.616
				(0.555)
4 bedroom unit				0.532
				(0.651)
5 bedroom unit				0.083
				(1.086)
6 bedroom unit				-2.645
				(2.163)
7 or more bedroom unit				17.514***
				(4.666)
Location indicators	None	County	Segment	Segment
Observations	16840	16840	16840	16840
Adjusted R^2	0.0	0.043	0.077	0.081

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 16: Regression of annualized percent rent change, First half 2019 to First half 2020

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.116	0.221	0.138	0.15
	(0.252)	(0.265)	(0.259)	(0.273)
Mobile Home and Other	0.004	0.279	-0.093	1.176
	(0.584)	(0.614)	(0.596)	(1.714)
Multi Unit	0.559***	0.724***	0.581***	0.293
	(0.175)	(0.185)	(0.186)	(0.198)
Build before 1990				-
Built after 1990				0.211
				(0.188)
Studio				-
1 bedroom unit				-1.064*
				(0.608)
2 bedroom unit				-1.28**
				(0.605)
3 bedroom unit				-1.735***
				(0.626)
4 bedroom unit				-2.743***
				(0.725)
5 bedroom unit				-0.893
				(1.225)
6 bedroom unit				-10.778***
				(2.317)
7 or more bedroom unit				-0.168
				(6.409)
Location indicators	None	County	Segment	Segment
Observations	14741	14741	14741	14741
Adjusted R^2	0.001	0.044	0.132	0.149

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 17: Regression of annualized percent rent change, First half 2020 to First half 2021

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	-0.945***	-1.21***	-0.991***	-0.68*
	(0.361)	(0.381)	(0.373)	(0.39)
Mobile Home and Other	-2.022**	-2.623***	-1.683**	-1.181
	(0.822)	(0.877)	(0.841)	(2.317)
Multi Unit	-0.368	-0.293	-0.394	-0.498*
	(0.266)	(0.28)	(0.282)	(0.294)
Build before 1990				-
Built after 1990				0.364
				(0.27)
Studio				-
1 bedroom unit				3.083***
				(0.871)
2 bedroom unit				2.762***
				(0.866)
3 bedroom unit				1.973**
				(0.896)
4 bedroom unit				2.319**
				(1.065)
5 bedroom unit				1.888
				(1.798)
6 bedroom unit				11.285***
				(3.735)
7 or more bedroom unit				2.285
				(5.992)
Location indicators	None	County	Segment	Segment
Observations	14370	14370	14370	14370
Adjusted R^2	0.001	0.039	0.126	0.145

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 18: Regression of annualized percent rent change, First half 2021 to First half 2022

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	-0.702*	-0.526	-0.83**	-0.711
	(0.388)	(0.405)	(0.41)	(0.444)
Mobile Home and Other	-1.844*	-1.748*	-1.87*	0.952
	(0.959)	(0.994)	(0.986)	(2.719)
Multi Unit	-0.446	0.23	-0.288	-0.272
	(0.3)	(0.312)	(0.324)	(0.351)
Build before 1990				-
Built after 1990				2.118***
				(0.307)
Studio				-
1 bedroom unit				2.479**
				(0.969)
2 bedroom unit				2.58***
				(0.964)
3 bedroom unit				1.794*
				(1.0)
4 bedroom unit				0.255
				(1.199)
5 bedroom unit				1.396
				(2.124)
6 bedroom unit				4.328
				(4.405)
7 or more bedroom unit				-0.718
				(8.788)
Location indicators	None	County	Segment	Segment
Observations	13945	13945	13945	13945
Adjusted R^2	0.001	0.073	0.084	0.094

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 19: Regression of annualized percent rent change, First half 2022 to First half 2023

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	-0.913**	-0.491	-1.067**	-1.334***
	(0.413)	(0.436)	(0.427)	(0.452)
Mobile Home and Other	-4.745***	-5.104***	-4.999***	-6.807***
	(1.002)	(1.05)	(1.021)	(2.561)
Multi Unit	-0.701**	-0.08	-0.619*	-0.726**
	(0.317)	(0.333)	(0.335)	(0.358)
Build before 1990				-
Built after 1990				1.243***
				(0.308)
Studio				-
1 bedroom unit				-1.537
				(0.972)
2 bedroom unit				-0.841
				(0.967)
3 bedroom unit				-2.05**
				(0.998)
4 bedroom unit				-4.667***
				(1.189)
5 bedroom unit				-4.326*
				(2.217)
6 bedroom unit				-1.57
				(4.389)
7 or more bedroom unit				-9.022
				(15.203)
Location indicators	None	County	Segment	Segment
Observations	14221	14221	14221	14221
Adjusted R^2	0.002	0.05	0.08	0.08

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 20: Regression of annualized percent rent change, First half 2023 to First half 2024

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.713**	0.545	0.783**	1.003***
	(0.352)	(0.374)	(0.358)	(0.382)
Mobile Home and Other	2.28***	2.02**	2.108***	6.571***
	(0.79)	(0.85)	(0.798)	(1.931)
Multi Unit	0.599**	0.434	0.66**	0.758**
	(0.27)	(0.286)	(0.28)	(0.301)
Build before 1990				-
Built after 1990				-0.27
				(0.258)
Studio				-
1 bedroom unit				0.533
				(0.835)
2 bedroom unit				0.187
				(0.83)
3 bedroom unit				0.084
				(0.854)
4 bedroom unit				0.061
				(0.995)
5 bedroom unit				-2.991*
				(1.777)
6 bedroom unit				-0.881
				(3.614)
7 or more bedroom unit				1.997
				(9.303)
Location indicators	None	County	Segment	Segment
Observations	14816	14816	14816	14816
Adjusted R^2	0.001	0.03	0.1	0.083

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 21: Regression of annualized percent rent change, First half 2011 to First half 2014

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.305**	0.352***	0.254**	0.215
	(0.121)	(0.122)	(0.125)	(0.137)
Mobile Home and Other	-0.078	0.27	-0.045	1.474
	(0.305)	(0.312)	(0.315)	(1.122)
Multi Unit	0.936***	0.918***	0.83***	0.647***
	(0.097)	(0.101)	(0.102)	(0.124)
Build before 1990				-
Built after 1990				0.332***
				(0.103)
Studio				-
1 bedroom unit				0.521*
				(0.289)
2 bedroom unit				0.213
				(0.288)
3 bedroom unit				0.169
				(0.301)
4 bedroom unit				0.493
				(0.36)
5 bedroom unit				-0.101
				(0.65)
6 bedroom unit				-1.79
				(1.285)
7 or more bedroom unit				2.415
				(1.865)
Location indicators	None	County	Segment	Segment
Observations	13491	13491	13491	13491
Adjusted R^2	0.011	0.119	0.091	0.096

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.

Table 22: Regression of annualized percent rent change, First half 2021 to First half 2024

	(1)	(2)	(3)	(4)
Single Family Detached	-	-	-	-
Single Family Attached	0.214	0.458*	0.221	0.324
	(0.225)	(0.238)	(0.236)	(0.246)
Mobile Home and Other	0.114	-0.452	0.043	-1.44
	(0.522)	(0.553)	(0.543)	(1.523)
Multi Unit	-0.064	0.343*	-0.053	-0.07
	(0.176)	(0.183)	(0.188)	(0.196)
Build before 1990				-
Built after 1990				0.493***
				(0.168)
Studio				-
1 bedroom unit				0.24
				(0.526)
2 bedroom unit				0.332
				(0.523)
3 bedroom unit				-0.328
				(0.543)
4 bedroom unit				-0.62
				(0.662)
5 bedroom unit				0.896
				(1.238)
6 bedroom unit				-0.543
				(2.139)
7 or more bedroom unit				-8.942**
				(4.413)
Location indicators	None	County	Segment	Segment
Observations	7918	7918	7918	7918
Adjusted R^2	0.0	0.11	0.075	0.089

Standard errors in parenthesis. Significant at *10%, **5%, ***1%. Source: Authors' calculations on BLS Housing Survey data.