Retail on the Ground and on the Books: Vacancies and the (mis)Match between Retail Activity and Regulated Land Uses

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Abstract

While demand for living near urban amenities has grown over the past two decades, retail vacancies continue to plague many urban areas. In this paper, we first leverage longitudinal data on retail leases to depict patterns of retail market activity in a sample of seven moderate-to-large U.S. cities. Second, we use property-level data on land use regulation to investigate whether institutional context, specifically zoning, has played a role in patterns of urban retail vacancy over the past two decades. We show that over this period retail rents are flat or declining and the average retail space has not grown and may have shrunk. Our New York and Los Angeles microdata document that, during roughly this same period, the amount of land zoned for retail has increased, and that the building square footage zoned for retail has increased even more so. Indeed, during the same decades when retail leasing slowed and rents declined, the total amount of land and square footage regulated for retail use increased.

Thus, our research indicates that, in addition to market forces, land use decisions drive the current oversupply of retail space. This also suggests an important role for planning in solving the problem of vacancies. If certain commercial uses become obsolete due to sector trends beyond the city or neighborhood contexts, zoning and comprehensive planning should respond accordingly. As cities emerge from the pandemic and adjust to new work-live patterns, planning for the volume and spatial distribution of retail will remain an important task for urban planners and managers.

1. Introduction

While demand for living near urban amenities has grown over the past two decades, retail vacancies continue to plague many urban areas (Grant, 2018; Kapner and Fung, 2019; Goolsbee, Austan, 2020; Kickert and Talen, 2022). During this same period, retail consumption has shifted online, and media and industry forecasters have warned of a "retail apocalypse" (Kickert and Talen, 2022). This attention to retail demand has left out an important factor—how cities plan for and mandate the supply of retail space. The retail landscape, namely the proliferation of retail vacancies, is influenced by the alignment of retail market realities and the retail regulatory context. Can a disconnect between retail market demand on the ground and land use planning for retail on the books explain patterns of urban retail vacancy over the past two decades?

Cities have zealously planned for commercial uses for at least a century. Homer Hoyt (1933) observed and documented this for Chicago in his seminal book, *100 Years of Land Values*, and cities have always relied on commercial uses to enhance tax revenues, since they can usually be taxed at higher rates. However, such strategies face new challenges in the wake of recent retail transformations, including market consolidation and the rise of e-commerce.

This paper has two goals. First, we empirically evaluate the conventional wisdom around urban retail demise over the past two decades. By leveraging data with information on the terms and timing of retail leases for a sample of seven U.S. cities, we depict patterns of retail market demand across a range of urban contexts.

Second, we test if regulated urban land use aligns with these market realities, and specifically evaluate if zoning has facilitated urban retail vacancies over the past two decades. To do so, we use longitudinal microdata on parcel characteristics and land use classifications in New York City (NYC) and Los Angeles.

Our longitudinal analysis of lease data confirms that urban retail has been on the decline since at least the mid-2010s. During the mid-2000s and through 2012, both the number of retail leases and the amount of square footage dedicated to retail activity grew rapidly (both in aggregate and for the typical leased space). Since then, retail lease take-up has slowed, retail spaces have sat longer without tenants, and the size of the typical space has declined slightly, especially for relatively larger retail spaces. Over the same period, average retail rents either declined or plateaued in the cities in our sample.

When we bring in information on land use regulations for NYC and Los Angeles, we find evidence of a misalignment between the space zoned for retail and the amount of retail lease activity. Over the same period that retail market activity plateaued, these two cities exhibited a net gain in square footage zoned for retail use. This result, along with declining and flattening rents, suggests that retail vacancies have indeed increased over time for both municipalities.

It may be the case that declines in retail rents and activity are related to changes in the value of retail clustering. We find that the benefits of clustering retail parcels depend on location. There is a clear rent premium for more clustered retail areas in NYC, that increased and then declined during the more recent plateauing of retail activity. However, there is no clear rent premium for clustering in Los Angeles. If clustering indeed generates positive spillovers for retailers, then, all else equal, rents should be higher

to reflect their value. However, if the number of vacancies is increasing (or if co-location with other retail uses has lost its importance over time due to other factors), clustered parcels may generate fewer agglomerative benefits for retailers.

Our analysis considers citywide patterns and does not consider variation in market and land use alignment at the neighborhood level. Nevertheless, our research documents the interaction between regulation and markets and informs land use planning around retail and mixed uses that is grounded in local contexts but responsive to broader sector trends. If certain commercial uses become obsolete over time, zoning and comprehensive planning should respond accordingly. For example, planners may wish to consider changing the allocation of space towards commercial uses or modifying the size and design requirements for first floor spaces. Talen (2022) has a similar intuition, raising the prospect of "smart shrinkage", or the strategic compression, rather than usual reinvention, of retail space in cities in the face of increasing online commerce and market consolidation. As cities emerge from the pandemic and adjust to new live-work patterns, planning for the volume and spatial distribution of retail remains an important task for urban planners and managers. Retail may present a useful opportunity for cities to pivot. Indeed, physically modifying spaces currently regulated as retail into commercial or residential uses is likely less costly than more commonly considered office-to- residential conversions.

2. A Framework for Urban Retail Vacancies

In this section, we lay out the fundamentals that drive retail location and rents, and then consider frictions in the retail market that may drive retail vacancy.

2.1. Retail Market Fundamentals

We classify retail establishments as those that provide consumer-facing goods and services. Put differently, a retail establishment is one that facilitates the in-person transaction or exchange between the seller and consumer, presumably in a storefront location. Therefore, the market for retail goods and services is the fundamental driver of storefront occupancy. Establishments stay operational when the benefits from exchanges are net positive, or when revenues meet or exceed business costs. On the cost side, rent is usually the largest fixed expense, especially for enterprises that are not capital intensive, such as retailers. Whereas a business can adjust labor costs to a point (by employing fewer people, for example), rent is usually fixed for the term of the lease. Moreover, rents and the supply of space vary across neighborhoods within the same city, presumably capturing variation in the costs and benefits of operating in those particular locations, and therefore yielding different occupancy rates. This intra-city variation contrasts with labor costs, for example, which vary substantially less within the same city for comparable jobs.

The retail market is also affected by demand fundamentals. All else equal, retailers prefer to locate closer to a consumer base, or a location of "maximal demand" (Sevtsuk 2014). Shifts in the density or composition of the consumer base impact the viability of retail. For example, demand for a business's services or products can change when other consumption alternatives, such as e-

commerce vendors, become relatively more appealing or convenient. Even after the end of COVID-related lockdowns, new employment and residence patterns continue to affect where and how consumers patronize brick-and-mortar stores. If a business cannot remain profitable in the face of such shifts, closure may be the only option.

Finally, the presence of nearby establishments can bring agglomerative benefits, such as shared customer bases and lower search costs through comparison shopping, when store- fronts are active (Brown 1987; Nelson 1958). However, in the presence of concentrated vacancies, this same clustering can attenuate agglomeration externalities, and further threaten demand.

2.2. Frictions in the Retail Market

The retail market also has frictions that can impede retail occupancy. These frictions tend to fall into two categories: information and institutions. First, retail occupancy, and specifically vacancies, can be impacted by imperfect information between retailers, landlords and consumers (Moszkowski and Stackman, 2023). For example, businesses may find it hard to read the consumer profile of neighborhoods undergoing socioeconomic changes. Alternatively, landlords may assume they can draw higher rents than what commercial tenants are actually willing to pay due to general uncertainties in the retail market. Where landlords and tenants have different beliefs about the market, commercial spaces may sit vacant longer.

Beyond such information challenges, rental market institutions and norms may be important. For example, investor-based requirements for minimum rental income may constrain landlords. This is problematic when such required rents exceed what the current market supports. Or landlords may desire long-term commitments, often at higher rents, whereas retail tenants may prefer shorter, more flexible terms.

In addition, and our focus in this paper, both retailers and consumers make location decisions within the context of land use regulations that dictate where establishments can operate (what Ahlfeldt et al. (2015) consider locational fundamentals). Zoning regulation can also influence how far consumers reside or work from the retail services (Datta and Sudhir, 2013) and dictate the size of retail spaces.

Importantly, unlike information asymmetries, which may be idiosyncratic or market driven, institutional frictions, such as zoning, are locally and spatially concentrated and are within a planner's purview. Indeed, land use regimes can determine the allocation and intensity of retail across neighborhoods within a city. Even in the face of the market forces discussed above, clustering could remain unchanged if land use frictions prevent the physical consolidation of retail space. On the other hand, if retail markets contract more rapidly than regulated space, there may be an oversupply of retail spaces leading to unused and empty storefronts.[1]

3. What We Know About Urban Retail Activity and

[1] Apart from regulation, retail location may also be determined by the uneven spatial demand of residents and workers, who systematically locate in segregated areas for reasons other than retail access (Leonardi and Moretti, 2022).

Vacancies

Literature on the extent and determinants of retail vacancies is quite thin, likely due to the scarcity of publicly available data, the expense of privately collected data, and the difficulty of tracking retail activity back in time.

Much of the existing research is in the form of single case studies, using retail data collected at a single point in time.[2] For example, Talen and Park (2022) solicit the perspectives of business organization leaders in Chicago to understand retail vacancies. These accounts mention the usual demographic changes and leasing speculation (holding out for higher paying tenants) as vacancy determinants.

NYC Department of City Planning (2019) conducted one of the most comprehensive analyses to date of retail vacancies across space and time. They use proprietary data on properties and vacancies and surveys conducted by the agency to compare vacancies between 2008-2009 and 2017-2018. They note that vacancy rates at small geographies are noisy and hard to pin down. They also find that the causes of vacancies are varied, including broader shifts in the retail sector (consistent with Benjamin et al. (2000)), regulations, and the general conditions of the properties and corridors. Increasing rents was only one of several reasons offered. Finally, rather than being a citywide phenomenon, they find that high vacancy rates are prevalent in areas with both "hotter" and "cooler" retail markets.

While not specifically focused on retail vacancies, a handful of papers explore the conditions around retail survival and closure. These studies generally confirm the volatility and neighborhood-based context of retail change. For example, Meltzer and Capperis (2017) find that retail turnover is less frequent among necessity services and in neighborhoods with bigger households, higher shares of white residents and slower population growth. Meltzer (2016) documents retail turnover in the context of gentrification. While she finds similar rates of establishment exits across gentrifying and non-gentrifying areas, she observes longer vacancy intervals in gentrifying areas. Kickert and Vom Hofe (2018) study retail agglomeration and the likelihood of store closure. Across several urban settings, they find that that retailers are quite sensitive to the clustering of nearby establishments, especially those that are complementary.

Finally, a subset of studies investigates the interaction between retail viability and institutional or structural factors (such as a location's natural advantage or proximity to transit; Behrens and Robert-Nicoud (2015)'s "locational fundamentals"), features of the building where the activity takes place, competitive environment, or governing regime (Alcácer, 2006; Rosenthal and Strange, 2001, 2003; Potter and Watts, 2010; Neffke et al., 2011, Sevtsuk 2014). Two studies in particular test for the interaction between zoning and retail activity. First, Leonardi and Moretti (2022) exploit the abolishment of an Italian nationwide restriction on the location of restaurants to test for the binding effect of zoning regulation and the role of "naturally occurring" agglomeration economies in unrestricted markets. Using data from Milan, the authors find that when zoning restricts the minimum distance between restaurants, the distribution of restaurants is fairly even. When those

[2] One longitudinal exception is Warnaby and Medway (2021), who conduct a retrospective case study of King Street, Manchester in the UK.

restrictions are removed, restaurant clustering intensifies, indicating both the distortionary effect of the zoning law and the importance of agglomeration economies.

Cheshire et al. (2022) also focus on the intersection between zoning and retail activity, using the implementation of the Town Centre First Policy (TCFP) in England to test for the impact of land use restrictions that "force concentration" on the supply and clustering of retail. While the policy did have the intended effect of redirecting grocery stores to the town centers, it did not result in more shoppers or increased employment among those stores (consistent with Haskel and Sadun (2012), Cheshire et al. (2015) and Sadun (2015)). In the current analysis, we document the correspondence between market and regulatory factors, over multiple decades, and evaluate whether it explains the proliferation of urban retail vacancies.

4. Data

We combine several data sources to credibly identify retail occupancy and land use over time. A core challenge to tracking retail establishment characteristics and operating spaces is that the most useful information is not centrally recorded. Critically, in order to comprehensively document the stock and flow of retail occupancy, we need to observe commercial activity, such as tenant types, lease terms and rents, as well as the characteristics of the physical commercial spaces where the establishments operate.

Our primary data source for documenting retail activity "on the ground" is CoStar, a private data vendor that aims to collect the near universe of commercial leases in the U.S. Their coverage tends to be more robust in mid-to-large markets, such as the cities in our sample. We obtain lease-level information dating back to 2000 with information on rents (asking, gross, and effective, the first of which is usually the most populated and the one we use throughout), lease terms and the size of the leased space, all of which are updated on a monthly basis. CoStar identifies retail leases based on the use designation of the property and additional tenant research to verify the classification.[3] We geocoded all of the addresses using Google's location API.

Based on an assessment of the integrity of the CoStar data (presented in Appendices A and B), we are most confident in the city-level characterizations of the data for the years 2005 and later. Because leases are sparse at geographies below the city level, we cannot conduct credible neighborhood-level analyses.

In order to capture property-level information on physical structures and land use, we obtain data on the universe of parcels in NYC and Los Angeles County. For New York, for years 2002 to 2022, we obtain data from their PLUTO database, which includes more than seventy fields derived from data maintained by multiple city agencies. In addition to structural features, such as square footage, we use the information on zoning district classifications. For Los Angeles, we use the

[3] CoStar inconsistently reports the NAICS code for leases. Therefore, we rely on Costar's retail classification in our work. It is possible that CoStar's retail leases apply to businesses that are not consumer-facing, but we know for certain that they do not include office, corporate or industrial establishments. We recognize that using formal leases to track retail activity may miss certain classes of establishments. We most likely undercount smaller and newer establishments, which are harder for CoStar to document.

Assessor's Secured Basic File for years 2006, 2010, 2014, 2018 and 2022. This file is the County's most complete public property record. Because the county does not maintain accurate zoning information for all 88 incorporated municipalities and the unincorporated area, we focus on the five largest jurisdictions for which the County does accurately track zoning: the City of Los Angeles, the incorporated municipalities of Glendale, Long Beach, and Santa Clarita, and the unincorporated area. Land use in the unincorporated area is under the County's jurisdiction (see Appendix Figure 5 for maps of all locations). These five areas constitute about 58 percent of the county's population and 79 percent of its land mass.[4] As with the NYC data, we use variables that describe the size of the lot, the size of the structure, the zoned used of the lot, and the actual use of the lot as determined by the Assessor.

5. Methodology

In this section, we introduce our sample cities and discuss how we measure retail "on the ground" and "on the books."

5.1. Sample Selection and City Features

We use CoStar data to analyze leasing and occupancy trends over time and across the seven cities in our sample: New York, Los Angeles, Chicago, Miami, Boston, Houston and Washington, D.C.[5] We chose these cities to capture variation in the volume and spatial distribution of commercial and residential densities.

For example, NYC is by far the densest place, with Los Angeles moderately dense and Houston at the low end (see Appendix Table 3 for summary statistics for our sample of cities using Census data). NYC is also the most racially diverse, but Washington D.C. has the highest rents, with Boston, Los Angeles, and NYC close behind. Household incomes are highest in Boston and Washington, D.C., and these cities, along with NYC and Los Angeles, also have the highest housing costs. These rankings change little over the course of the study period.

Some demographic features have changed over the study period. Residents became dramatically more educated over the course of the study period, particularly in Washington D.C. and Boston. The population has also skewed older over time, especially in Los Angeles (age statistics are not displayed here). Chicago and Houston are the two cities to retain their younger population share (about one-third).

Finally, cities differ in how people move within them, which has implications for the location of retail services. Specifically, the reliance on a car for getting around (proxied by travel to work) is highest in Houston and Miami, and goes up during the study period only for Houston, Los Angeles and Miami. The longest commutes (not shown) are consistently in New York and Washington D.C.

[4] The population does not include the very small city of Avalon and the land total does not include Avalon or the coastal island of Catalina.

[5] By "city" here, we mean Los Angeles County for Los Angeles, the five boroughs of New York for New York, and the relevant metropolitan statistical area for the remaining cities.

5.2. Metrics

We rely on three main metrics for tracking retail activity over time. We track retail market activity, or the actual storefronts in operation "on the ground," as well as the regulated retail activity "on the books," or the amount of built space zoned for retail use. We examine whether patterns in these two measures move together or diverge over time. Comparing retail lease activity with the extent of regulated retail land use allows us to infer patterns of retail vacancy.

Our first metric is the extent of retail activity, which we measure with a count of the number of new leases using CoStar data. For the extent of regulated retail space, we use land use data. For NYC, we define retail as those parcels zoned for commercial or mixed use and that have non-zero square footage designated for retail use (this comes from the Department of Finance's tax assessment and appraisal rolls and is then inputted into the PLUTO database).

For Los Angeles, we use a similar two-stage process for identifying retail land and parcels. We first select only parcels zoned non-office commercial. Within this set, we identify parcels that are documented as having retail uses, as measured by the Assessor's use code. We use this combination—commercially zoned parcels with documented retail uses—as our retail land use classification.[6]

Our second retail metric is the intensity of retail activity, which we measure by the square footage of the leased space and the built square footage dedicated to retail uses. We also supplement with other indicators of retail occupancy over time, such as rents per square foot, length of the lease term and the number of months that the retail space sits on the market before being leased, also from CoStar. Together, these retail market metrics paint a picture of retail demand in the sample cities.

Finally, we construct a measure of retail clustering for retail-classified parcels. For each retail parcel *i*, we count the number of (not *i*) parcels (and the aggregate square footage) also classified as retail within 500 feet.[7] Thus, we calculate parcel specific measures of retail concentration in terms of parcel counts and building size. Since we calculate this concentration metric for every parcel in our sample, we can document how retail clustering varies across space for the entire city.[8]

We note a key limitation with the CoStar data that has made the documentation and analysis

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[6] While we use zoning classifications to filter out industrial and office properties, we expect that our classification of retail is likely over inclusive and results in an over-estimation of the number of retail-zoned parcels. For example, we capture structures classified as retail use, allowed due to grandfathering in a parcel and not zoned for retail. Therefore, for Los Angeles, we replicate our analysis using alternative definitions of retail, using parcels classified as (i) only retail use (classification of the actual activity in the parcel rather than what the land use code designates) and (ii) parcels zoned for general commercial/mixed use (without any consideration of the recorded retail use in the property). These replications do not change the substantive findings and provide reassurance that the retail-within-commercial land use classification is a reasonable proxy for retail land use.

[7] Although not our main metric, we also calculate the average retail square footage within 500 feet of parcel *i*. In NYC, 500 feet is, on average, one or two city blocks. In Los Angeles, this distance is approximately 4 to 6 contiguous lots. Therefore, our choice of clustering radius is the scale of retail co-location. Furthermore, we have replicated the clustering metric at various radii and the presented patterns remain consistent (500 feet is only slightly larger than the optimal radius used by Sevtsuk (2014)).

[8] This parcel-level cluster metric is novel, as it shows the distribution of retail clustering at small geographic scales. Most of the existing agglomeration indices have focused on capturing clustering among production-oriented firms (e.g., manufacturing) and are usually implemented at larger state- or national-level scales (see for example, Ellison et al. (2010); Ellison and Glaeser (1997); Duranton and Overman (2005)).

of occupancy challenging. While we have the signing and starting dates of the near universe of leases, we do not consistently observe the duration of the leases. Without a lease's end date, we cannot with confidence identify intervals of retail vacancies at the property level. However, we can document trends in new leases, rents, and the amount of leased space to infer citywide trends of occupancy over time. For a subset of leases, we can better fill out the occupancy picture by tracking term lengths and the number of months it takes for a space to be leased.

6. Findings

We first present citywide analyses for the seven cities in our sample using the CoStar lease data to establish patterns of retail activity and occupancy on the ground. We then drill down in New York and Los Angeles to compare trends in retail leases with changes in regulated retail land use between 2006 and 2022.

6.1. Using Lease Data to Document Retail Market Activity Over Time and Across Cities

We first consider changes in the prevalence of new leases over time. Figure 1 shows that the volume of new leases plateaued in the past decade, after a precipitous rise in the early 2010s. This trajectory appears in all seven cities, with varying strength.[9] In addition, while the total amount of retail square footage leased per year increased through the mid-2010s, it also then started to decline and plateau. This decline coincides with the flattening of the number of new leases (see Figure 2).

To assess how much of the change in aggregate space leased is due to a decline in the size of the individual spaces leased, we plot the median (dark blue), and 25th and 75th percentiles (light blue) of newly leased square footage by year and market (see Appendix Figure 6). Over the period when the number and total square footage of leases declined, the median square footage leased also declined, although modestly in most places. Therefore, citywide declines are largely driven by declines in the biggest spaces; the trajectory at the bottom of the distribution is generally flat.[10]

For a subset of leases, we can document changes in the length of time for which the lease is given (term length) and the number of months a space is on the market from vacancy to new leasing (months-on-the-market). These measures capture the demand for retail space. If we observe term lengths going down and months-on-the-market going up, then demand for retail, relative to available space, is declining. We regress these lease-level outcome separately onto time (year) fixed effects and plot the year fixed-effect coefficients in Figure 3 (for months on the market) and Appendix Figure 7 (for term length). For each year relative to the first year, these coefficients report the average months-on-the-market and term length. In almost all markets, the average lease term declines until roughly 2005. Since 2005, we observe little change in average lease length, coincident with the period during which we believe CoStar data are representative. Therefore, there is no indication of leases

[9] Again, we consider the CoStar data the most reliable from around 2005 and later; but the rise in leases and square footage is still observable during the second half of the 2000s.
[10] The only exception is Washington D.C., which exhibits relatively consistent sizes over time.

systematically getting shorter or longer over time. This could be due to underlying constraints or norms in the lending or investor markets that make it difficult to materially adjust lease lengths.

Average months-on-the-market, on the other hand, does trend up over time. This suggests that spaces have been sitting vacant for longer over time.[11] This finding is informative: it weakens the counter-argument that the flattening of new lease activity is caused by a limited supply of leaseable retail space. If retail spaces have been taking longer to rent, this is evidence against the existence of a supply cap on the number, type, or size of spaces during this time period. Instead, it suggests a slowdown in demand.

Finally, we track rents over the same time period to further disentangle the role of constrained supply or decreased demand for retail services. If rents decline, then, all else equal, we can tentatively interpret the above trends as a slowing demand for retail space driving retail vacancies. If, instead, new leases declined because of a limit on available retail space, rents should increase.

Over the past two decades, we observe rents declining and plateauing to varying degrees across the cities in our sample. Figure 4 shows the median real rent in dark blue, with the 25th and 75th percentiles in light blue.[12] In more recent years, Los Angeles, Boston and Houston have seen a modest uptick in rents, largely driven by rents at the top of the distribution. When we control for time trends, the decline in rents flattens, and is most discernible for NYC (Appendix Figure 8).

To confirm that retail rents do not simply capture broader economic fluctuations, we plot retail rents against several benchmarks. First, Appendix Figure 9 shows CoStar's retail rents alongside residential rents (accessed via Zillow). Although the trends (and the completeness of the data) vary, most markets show residential rents increasing while retail rents are more likely to stay the same. Second, we compare CoStar rents to housing prices (also accessed via Zillow), which are more available and are a decent proxy for overall consumption and economic well-being over this time period (see Appendix Figure 10). There is again a divergence between housing prices and retail rents. Finally, we plot rents for industrial and office spaces relative to retail rents in our markets (using aggregate data obtained from CBRE; see Appendix Figure 11). Here retail rents decline relative to industrial and office rents. Altogether, these patterns suggest that the decline in retail rents over time (especially in recent years) are specific to that sector.

6.2. Do Changes in Retail Market Activity Align with Changes in Regulated Retail Land Use?

With this picture of retail demand in hand, we now turn to evidence on the supply of retail space.

[11] We run these regressions, as well as the one for rents referenced below, on two samples–the full set of leases with the dependent variables populated and the subset of leases that are attached to parcels with repeat leases over the study period. We also replace the regression for the repeat-parcel sample with a set of parcel fixed effects. Estimates from all three of these iterations (not shown) generally track closely with each other.

[12] We also see in years prior to 2000 that rents grow when the number of leases is flat or slowly rising and then start to fall when the number of leases grows rapidly. This could be capturing the expansion of retail space to which some attribute the recent retail woes—the supply of retail exceeded its demand, triggering what many labeled a "retail apocalypse."

In particular, we consider supply frictions imposed by local land use regulations for retail use. For this part of the analysis, we focus on NYC and Los Angeles. These two cities are similar in certain economic and demographic aspects—for example, they both have high costs of living and diverse populations—but have different land use and mobility patterns. Specifically, NYC is about eight times denser than Los Angeles and its residents rely more heavily on walking and public transit to move around the city (see Appendix Table 3). Given that, we may expect different spatial allocations of retail land use and market retail activity.

6.2.1. Tracking Trends for Regulated Retail Space Over Time Against those for Retail Leases

We use the administrative data on land use to track the amount of built space zoned for retail over time. Appendix Figure 12 displays the number of parcels that continue with retail zoning, those newly zoned as retail, and those zoned out of retail over time. Entry into or exit out of retail land use could be caused by physical construction, destruction of a structure, or parcel re-zoning.[13] For both New York and Los Angeles, most parcels do not change regulated land use and continue to be designated retail over the two decades of our study. However, we can see a slight rise in the number of parcels zoned for retail over time, as the new designation or development of buildings exceeds those that are zoned out of retail. This excess is more pronounced in NYC.

The number of parcels zoned for retail use, however, does not measure change in the amount of space zoned for retail. Figure 5 focuses only on parcels that enter or exit retail use (i.e., the top purple and green lines from Appendix Figure 12) and plots the total building square footage for these entries and exits. Over the entire period, total entries into regulated retail use exceed exits. While this difference declines over time for Los Angeles, the pattern holds for both cities. This net gain in space zoned for retail, above and beyond the persistent growth in retail parcels, suggests that the amount of land and square footage dedicated to retail is growing in both NYC and Los Angeles. This growth in regulated retail space is in marked contrast to the slowdown of market retail activity we observe over the same time period in the lease analysis.

We compare changes in the number of parcels zoned for retail use with changes in total square footage for regulated retail use over time in Figure 6. The figure shows growth in retail square footage that far outpaces the growth in retail parcels, suggesting that additional regulated retail space is bigger, or that new parcels are more entirely dedicated towards retail use. This pattern holds for both NYC and Los Angeles.

Therefore, while leased retail activity has slowed for at least five years, parcels and square footage zoned for retail showed a net gain. Although some of this difference might be due to a lagged land use adjustment, we see no recent decrease in growth of regulated retail space.

We cannot pinpoint exactly what is driving this excess in retail supply, but we expect that it is a combination of regulatory requirements and developer preferences. Municipal land use officials

[13] We do see that land use changes for existing buildings are relatively rare. For example, over the course of two decades, just over 40,000 parcels changed uses in NYC, or an average of two percent of the total building stock per year. The majority of these land use changes were for residential uses.

often mandate ground floor retail in new residential developments. On the market side, developers may also prefer to have retail services on site. In addition, in New York for example, revenue from commercial tenants is often a meaningful contribution to overall building income for mixed-use developments. Therefore, there are financial incentives for developers to include retail, assuming they can fill the space. While it seems implausible for developers to be uninformed about retail market dynamics (as they often rely on market analyses to inform project underwriting and planning), they do have to make space decisions years out from lease-up, and may have reasons to be overly optimistic about future retail demand.

6.2.2. Testing if Market Rents Reflect the Value of Regulated Retail Clustering

As a final exercise, we use the land use data to test if the spatial concentration, or clustering, of regulated retail space helps to explain the disconnect between the softening retail lease activity and growing retail land use designation. As we discuss in Section 2, a motivating factor for retail location decisions is the presence of other nearby establishments. Perhaps changes in retail rents and new leases are correlated with changes in retail clustering.[14]

We combine information on retail rents and parcel-level retail clustering to assess the relationship between rents and retail co-location. If retail co-location yields advantages for businesses in clustered properties, these benefits should be reflected in rent premia for more clustered properties. What we have observed so far does not necessarily support this: we document declining or flattening rents over the same period when retail clustering is increasing in NYC and is largely stable in Los Angeles. Increases in retail clustering could coincide with flattening or declining rents if retailers either no longer value co-location in choosing where to operate, or there is a discount from being near other retail uses if those spaces are indeed vacant.

For both NYC and Los Angeles, we first take each parcel with a recorded retail rent per square foot and retain the measure of retail clustering associated with that parcel. We place each parcel into one of four quartiles by the intensity of retail clustering. For each quartile of clustering, we compute the median rent. Finally, we compare these median rents across the four quartiles to test if there are differences in retail rents for different amounts of retail clustering (displayed in Figures 7 and 8).

Here, we observe different patterns across the cities. In NYC, there is a clear rent hierarchy, where more clustered parcels have higher rents.[15] Therefore, rents seem to capture the benefits from retail clustering. Further, the concentration premium has increased over time among only the most retail-concentrated areas (although the median rents return to levels very close to where they started prior to

[14] We establish that our concentration measure captures variation in retail clustering across space. We disaggregate NYC into the five boroughs that comprise it—Manhattan, the Bronx, Brooklyn, Queens and Staten Island—and plot the distribution of retail clustering (see Appendix Figure 13). While the boroughs all contain a diverse range of neighborhoods, they are also broadly characterized by different land use and retail landscapes. The distributions reflect this.

[15] This pattern holds with the exception of a two years: 2012 and 2016. Still, rents are relatively flat, if not slightly declining, over the study period.

a brief spike).

Similar analyses of Los Angeles, on the other hand, do not show the same hierarchy in rent premia related to retail parcel clustering. The value of rents by quartile of concentration is hard to distinguish (and the pattern is more jagged given the lower frequency of the Los Angles land use data), with a small dip in rents during the middle of the study period that largely recovers by 2022. The lack of any clear pattern suggests that, for Los Angeles, either other factors may determine the value of retail location apart from typical agglomerative spillovers, or that the larger lots in Los Angeles, with multiple establishments in a single parcel, already capture most of the gains from concentration without much additional benefit from neighboring retail parcels.

7. Synthesis and Conclusion

From the early 2000s through 2012 we observe rapid growth in the number of retail leases and amount of retail square footage dedicated to retail activity (both in aggregate and for the typical leased space). Since then, retail lease take-up has slowed, retail spaces sit on the market longer, and retail rents have declined or flattened in real terms. These patterns are evident across the seven major cities in our sample. Furthermore, we show that the decline in rents is particular to the retail sector and not simply a reflection of broader economic trends.

When we consider land use regulations for New York City and Los Angeles, we find evidence of a misalignment between the quantity of land and space regulated for retail use and the amount of retail market activity. Over the decades when market retail activity slowed, regulated retail square footage continued to grow. This disconnect likely contributes to the proliferation of retail vacancies in NYC and Los Angeles. Furthermore, we find that rent does not always reflect the benefit of retail clustering. While rents are higher for more clustered parcels in NYC, we see no clear rent premium for concentration in Los Angeles. Even though clustering is a benefit for retailers that, all else equal, should be reflected in higher rents, it may be the case that the clustered parcels generate fewer agglomerative benefits for retailers if there is an increasing number of vacancies among those clusters. Less walkability between shopping areas in Los Angeles relative to NYC may also limit the local benefits from clustering in Los Angeles.

Our analysis shows that while local planning can mandate retail spaces, it cannot create actual retail activity on the ground. Cities often have broad goals for local commerce and retail services, but any municipal- and neighborhood-level strategy must incorporate the realities of national, and even global, sector-specific dynamics. While cities should take a tailored approach to addressing retail vacancies and designing a plan for managing local retail services, any approach must seriously grapple with macro-conditions that are largely out of the control of any one municipality. No one city, even the largest one, can bend the retail sector to its local priorities. Therefore, municipalities need to be able to generate and reference for decision-making credible citywide and national trends of retail services and density. Planners not only need to include market analysis in their toolbox, but also pay close attention to how changing consumer and retailer behavior, even if it takes place online, can disrupt the demand for physical commercial space in cities.

Most important, our analysis points towards levers for planning and policy reform. There is no

indication that the softening of the retail market will reverse, especially in light of persistent patterns of hybrid work and online commerce. While a street with ground floor retail is preferable to one without it, a street with vacant ground floor retail may not be preferable to a street with residential space on the ground floor. Therefore, cities have an incentive to reckon with the oversupply of retail space that we document here, and they will need to plan for strategies to re-purpose or convert existing retail square footage that would otherwise remain unproductive.

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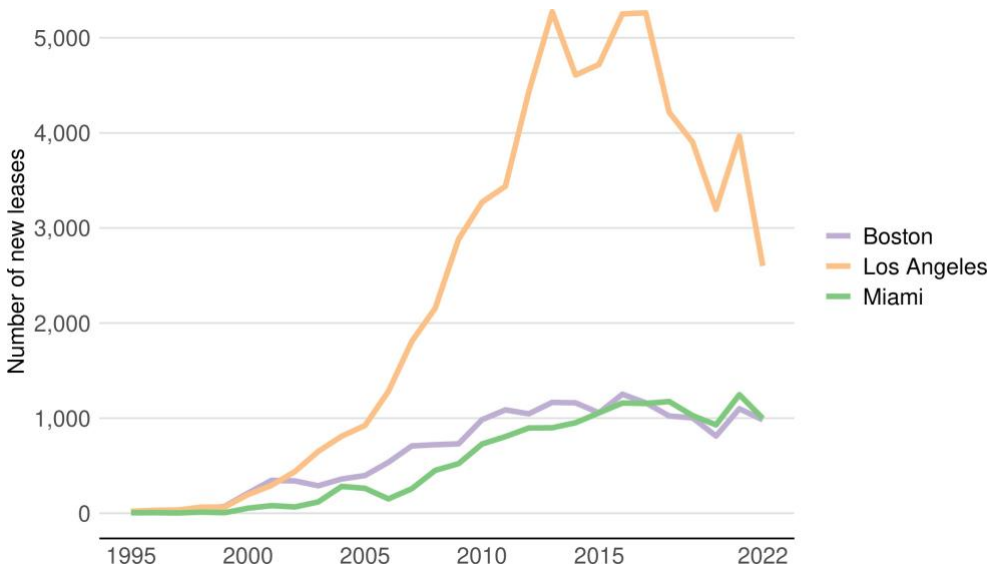
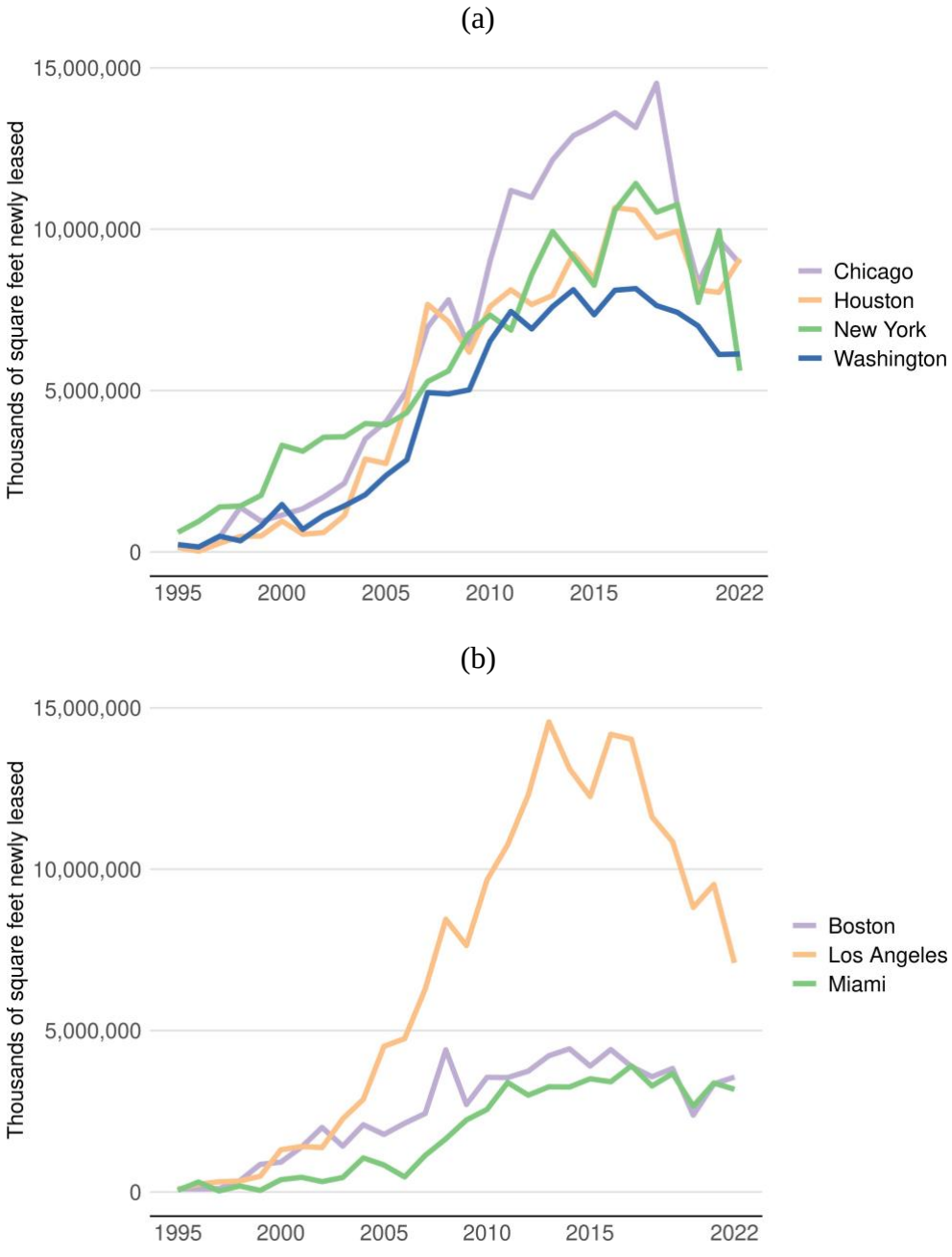
Figure 1: Total Number of New Leases by Market and Year (a)

(b)



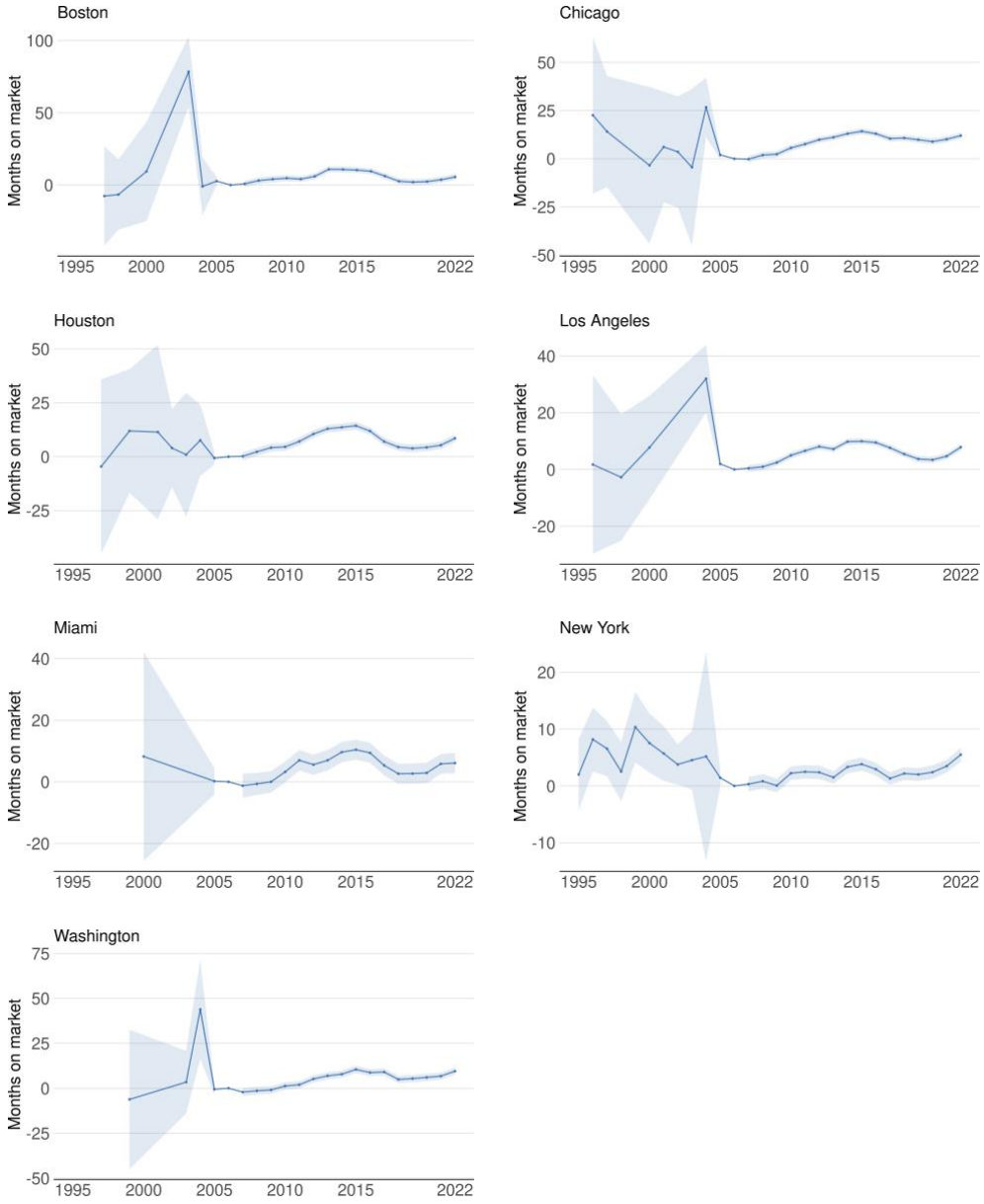
Note: This figure uses CoStar lease data and reports the total number of new leases by market and year.

Figure 2: Total New Leased Square Footage by Market and Year



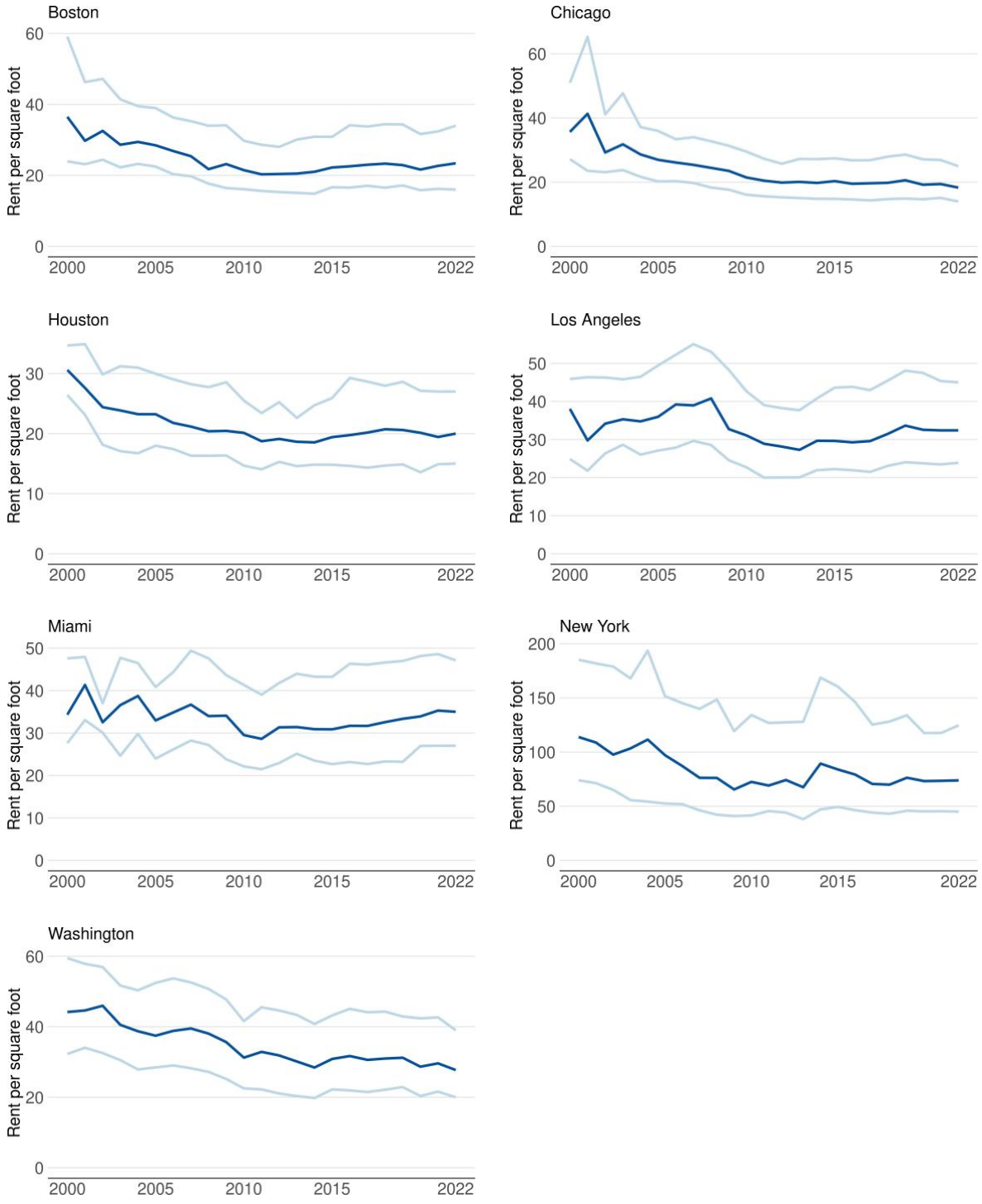
Note: This figure uses CoStar lease data and reports the total amount of square footage newly leased by market and year.

Figure 3: Average Months on the Market by Year and Market



Note: This figure uses CoStar lease data to report the months on the market for leases over time. This figure plots the year coefficients from regressions of lease-level months-on-the-market on year fixed effects, along with their standard errors (shown by the shading around the line), separately for each market. All values are relative to 2006, which we report as zero. The coefficient of roughly zero for Boston in 2017 means that the average 2017 lease had about the same average months-on- the-market as the average 2006 lease. The large positive coefficients for Boston before 2006 mean that the average CoStar lease recorded before 2006 had much longer months-on-the-market than the average 2006 lease.

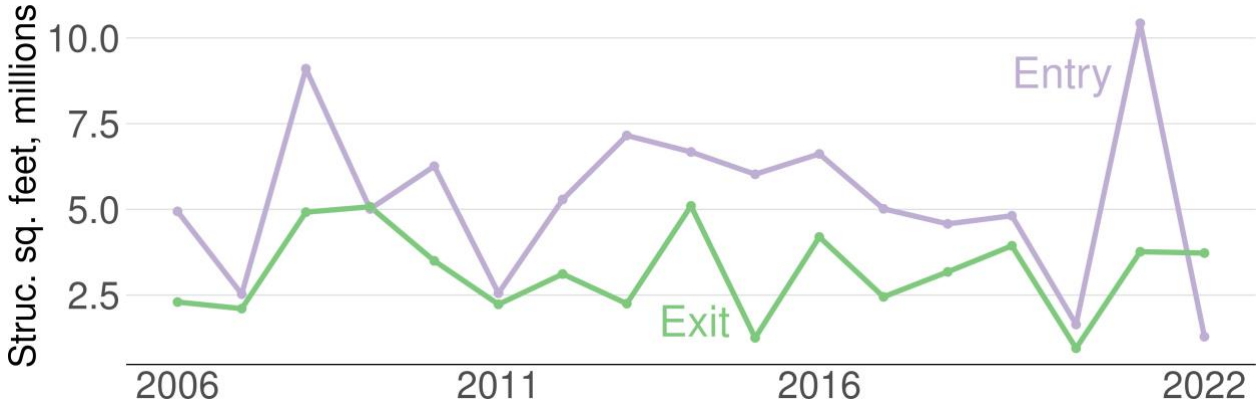
Figure 4: Distribution of Rent per Square Foot for New Leases by Market



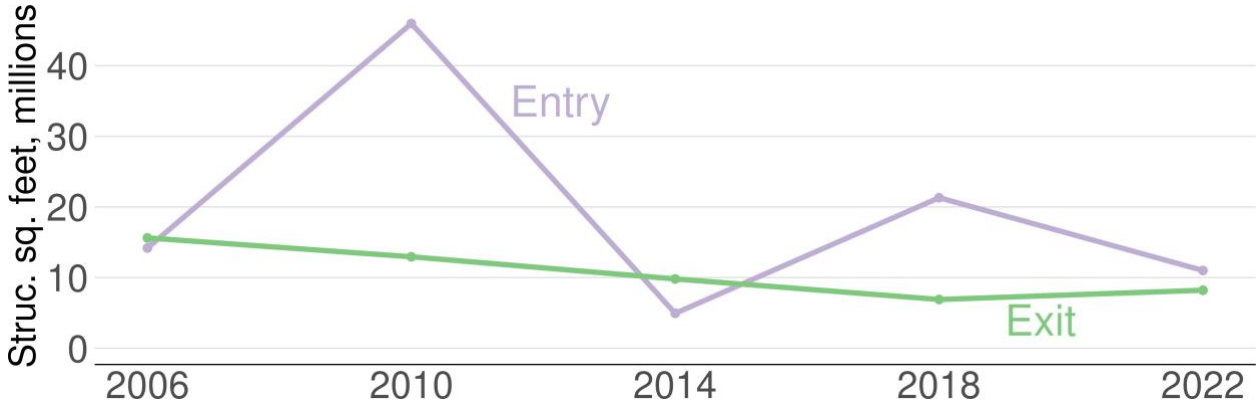
Note: This figure uses CoStar lease data and reports the median (dark blue), 25th percentile and 75th percentile (both in light blue) of asking rent per square foot in 2022 dollars by market and year.

Figure 5: Sq. Footage of Retail Parcels Newly Zoned to Retail and Converted out of Retail

(a) New York



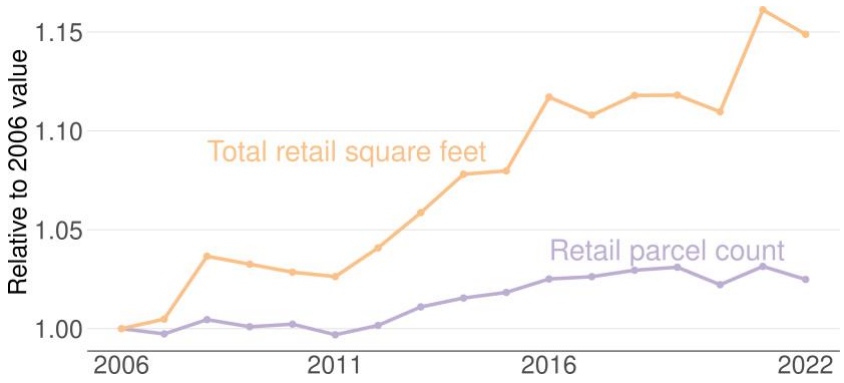
(b) Los Angeles



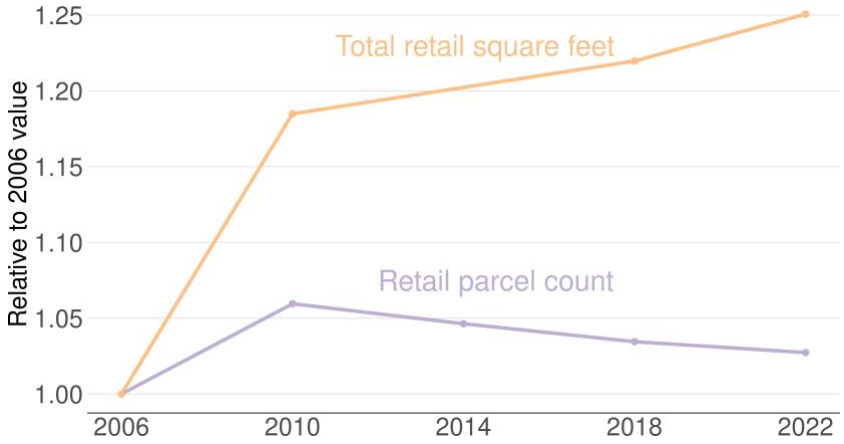
Note: New York: Land use data are from NYC's PLUTO database. The figure reports the total square footage of lots that are newly zoned retail (purple) and are converted away from retail zoning (green) in a given year. Los Angeles: Land use data are from the County Assessor, recording decisions by municipal planning departments from the City of Los Angeles, Glendale, Santa Clarita, Long Beach and the unincorporated area of Los Angeles County. The figure reports the total square footage of lots that are newly zoned retail (purple) and are converted away from retail zoning (green) in a given year. For Los Angeles parcels, "retail" is identified by commercially zoned properties in retail use.

Figure 6: Number of Parcels Flat Over Time But Total Retail Square Footage is Increasing

(a) New York

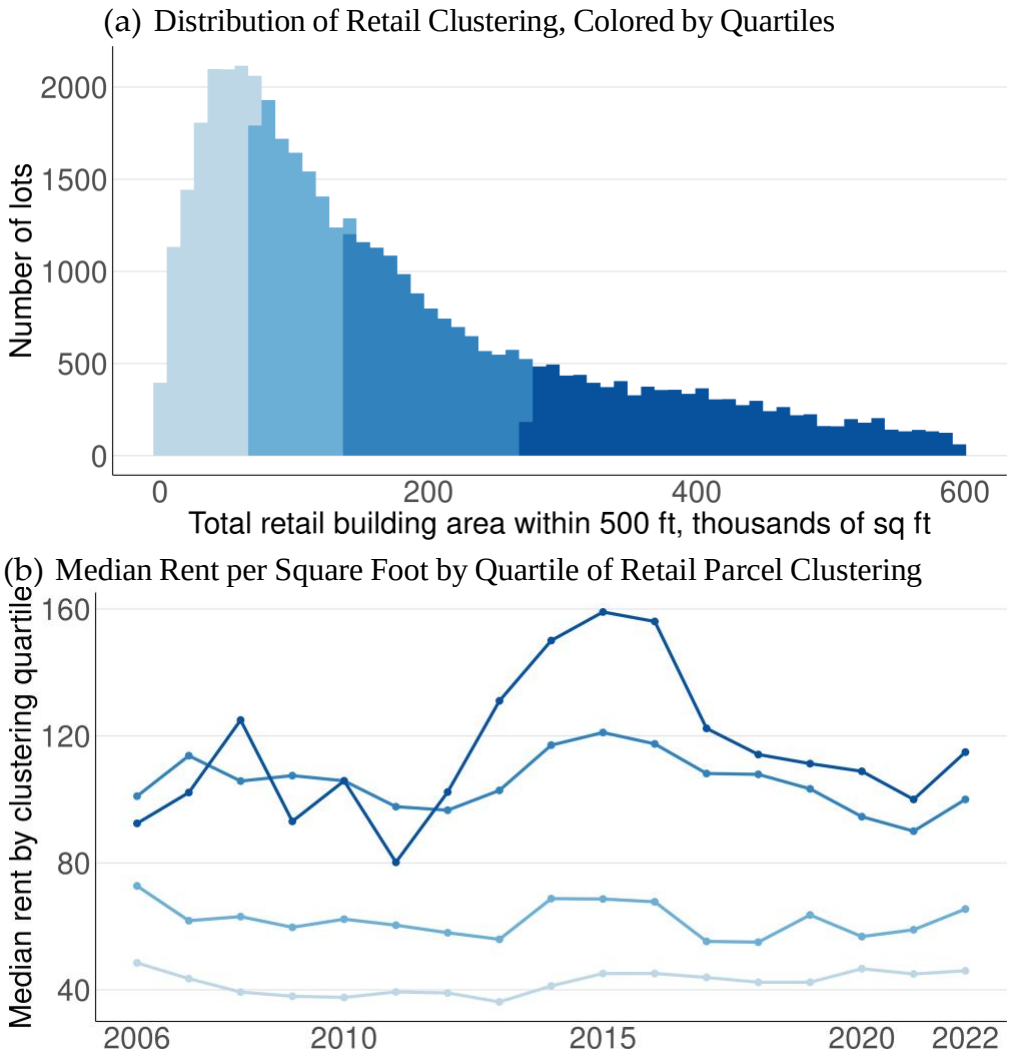


(b) Los Angeles



Note: New York: This figure uses NYC land use data to show the total number of retail parcels (purple) and total retail square footage (orange) for any given year from 2006 onward. All values are scaled relative to 2006, so that a value of, for example, 1.05, indicates a five percent growth from 2006. Los Angeles: This figure shows the total number of retail parcels (purple) and total retail square footage (orange) by 4-year periods from 2006 onward. All values are scaled relative to 2006, so that a value of, for example, 1.05, indicates a five percent growth from 2006. We use only lots in the city of Los Angeles, the unincorporated area of Los Angeles County, the incorporated municipalities of Glendale, Long Beach and Santa Clarita. For Los Angeles parcels, ”retail” is identified by commercially zoned properties in retail use.

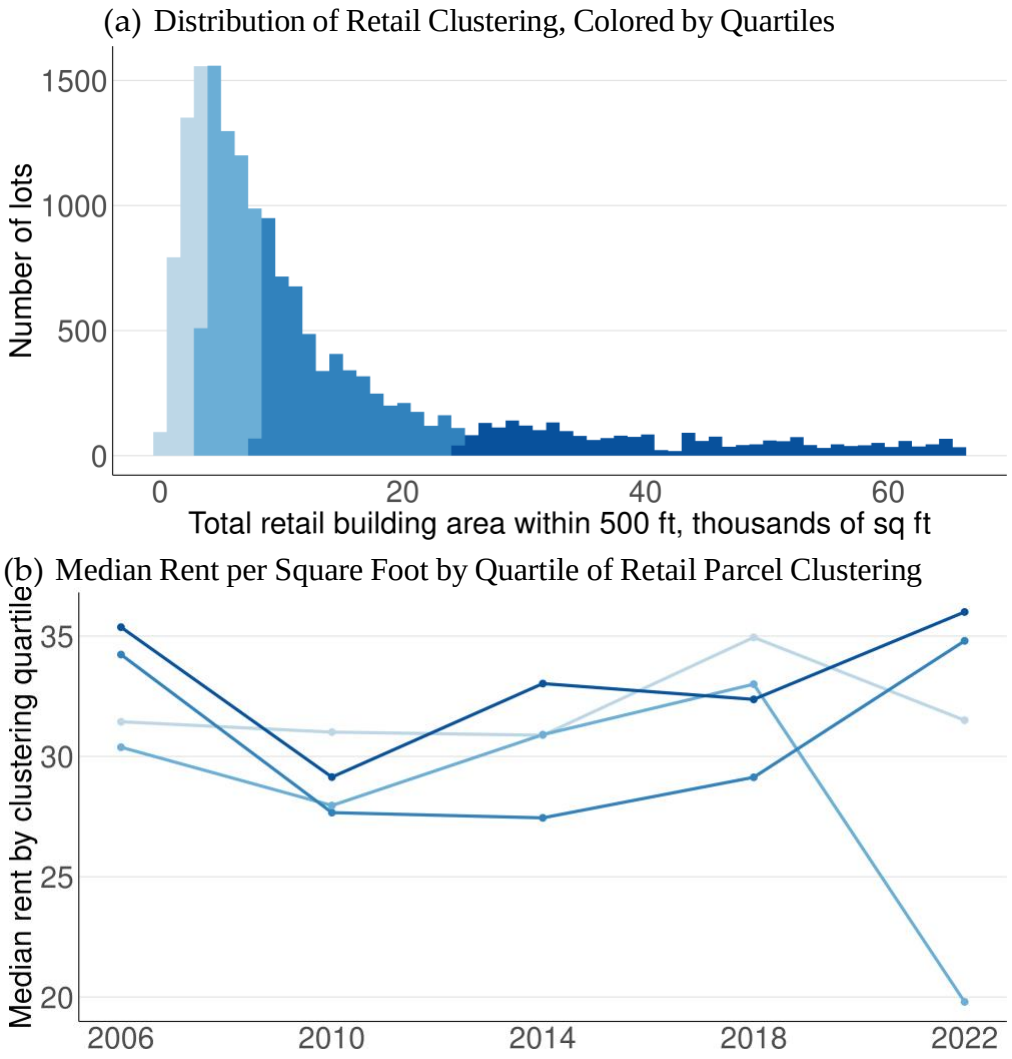
Figure 7: New York: Higher Rents for More Clustered Lots



Note: Land use data are from NYC's PLUTO. Subfigure (a) shows the distribution of retail clustering in New York City for all parcels in years 2006 to 2022, and colored by the quartile of the distribution. Retail concentration is measured as the total amount of square footage zoned retail within 500 ft. of a retail-zoned parcel. For visibility, we omit the top 5th percentile of values. Subfigure (b) shows median rent per square foot by quartile of retail clustering and year. We use a constant quartile definition for all years, as in Subfigure (a).

Sources: New York City PLUTO database and authors' calculations.

Figure 8: Los Angeles: Little Association Between Rents and Lot Clustering



Note: Land use data are from the Los Angeles County Assessor. These figures use parcels in the city of Los Angeles, the unincorporated area of Los Angeles County, the incorporated municipalities of Glendale, Long Beach, and Santa Clarita. Subfigure (a) shows the distribution of retail clustering across all retail parcels in Los Angeles municipalities in years 2006, 2010, 2014, 2018, and 2022. Colors indicate the quartile of the distribution. Retail concentration is measured as the total amount of square footage zoned retail within 500 ft. of a retail-zoned parcel. For visibility, we omit the top 5th percentile of values. Subfigure (b) shows median rent per square foot by quartile of clustering and year. We use a constant quartile definition for all years, as in Subfigure (a).

Appendix

A CoStar Data Validation

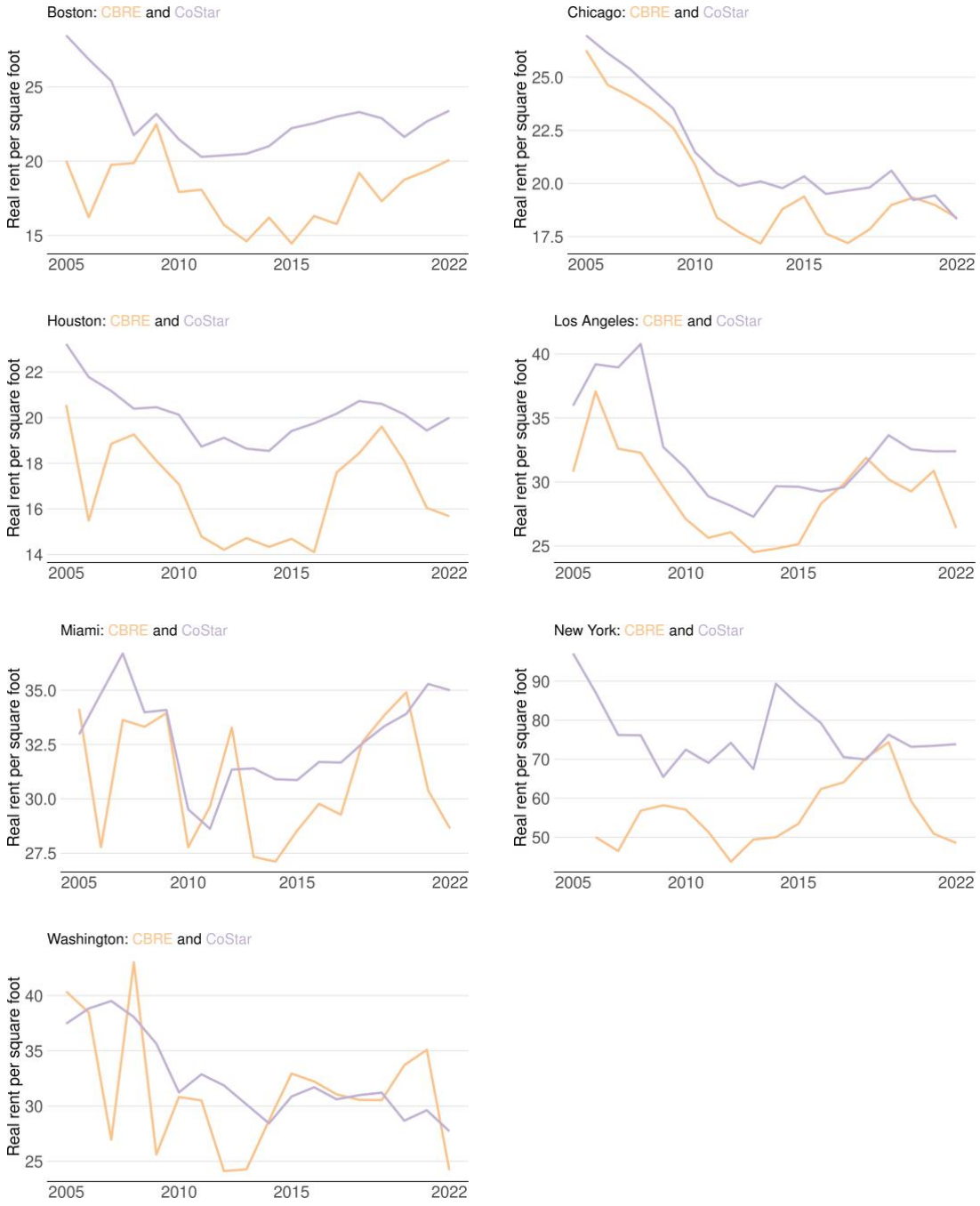
As a first attempt at validating the coverage and content of the CoStar data, we compare them to three alternative data sources. First, we consult CBRE, a global real estate services company that collects data on retail lease rates over time. CBRE makes data on rents available at aggregate levels (i.e., citywide and sub-municipal markets), and we compare CoStar and CBRE rents over time in Appendix Figure 1. While both datasets use "gross asking rents," the levels are different; this is likely due to different sources or definitions of what is included in the asking rent figure. However, we are reassured by the similar trends and orders of magnitude across the two datasets over time.

Second, for two of our cities, we confirm that the coverage of CoStar is comprehensive, when compared to the number of establishments reported in public Census products. For example, in New York and Los Angeles, CoStar (as of early 2020) tracks 156,839 and 256,846 commercial leases, respectively. These figures are for all types of commercial, including those beyond retail. The Census' publicly available 2018 County Business Patterns aggregated data report approximately 214,000 and 260,000 customer-facing establishments respectively in New York and Los Angeles. Since these metrics are tracking slightly different phenomena (e.g., some establishments may not have leases or the timing of the aggregate establishments may not line up with the lease terms), they will not be identical; however, we are reassured by the consistent orders of magnitude.

Finally, we compare the number of leases in CoStar data with the number of establishments in each county, as measured by DataAxle.[15] Appendix Table 1 shows that while the number of leases (unsurprisingly) represents only a very small share of all of the establishments in each city, the share is relatively consistent across cities. Boston and Chicago are slightly less covered than the other cities. When we track the lease coverage over time, we also see that the rapid growth in CoStar leases seems to slow down and stabilize in the late 2000s (see Appendix Figure 2). This trend, which is consistent across all of our cities, suggests that the CoStar data is likely most reliable from around 2007.

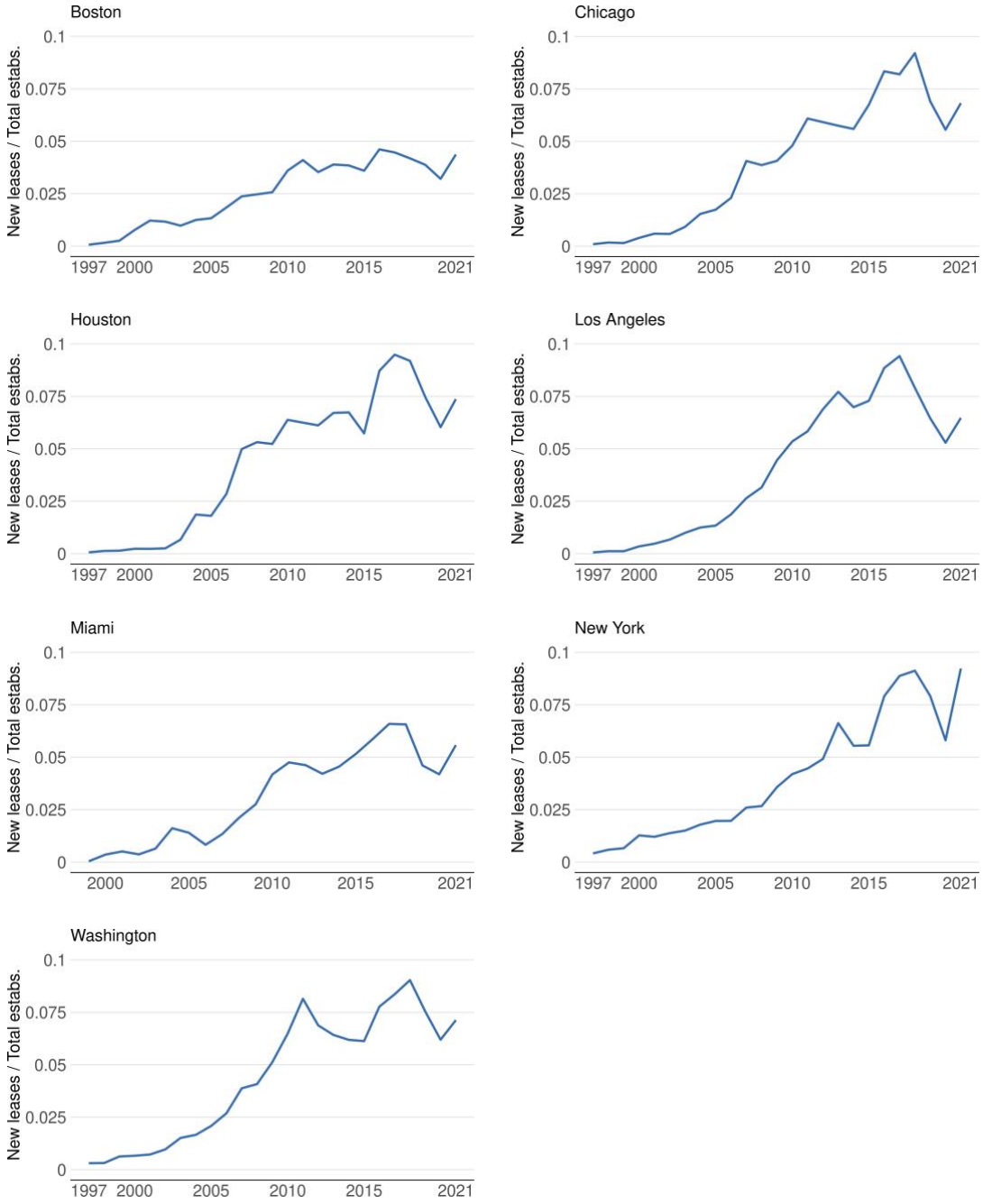
[15] We access these data from via a Wharton Research Data subscription provided by [XX] University.

Appendix Figure 1: CBRE and CoStar Rent per Square Foot, 2022 Dollars



Note: This figure shows median CoStar retail rent per square foot (largely asking rent, but in some cases effective or starting rent) in 2022 dollars in orange and CBRE mean retail gross asking rent per square foot in purple. CBRE and CoStar use different underlying samples to create median/mean values.

Appendix Figure 2: New Leases as a Share of NAICS 44-45 Establishments by Year and Market



Note: This figure uses CoStar lease data and DataAxle/InfoUSA establishment data. For each market, each sub-figure reports the number of new CoStar leases in the year on the horizontal axis divided by the number of establishments in NAICS codes 44-45 (retail) in that same year.

Appendix Table 1: Comparison of CoStar Leases and InfoUSA Establishments

Market	Average Annual Totals			Lease Share of Estabs.	
	Estabs.	Consumer-Facing Estabs.	New Leases	Consumer-Facing	All
Boston	70,651	27,861	940	0.034	0.013
Chicago	210,231	47,109	2,588	0.055	0.012
Houston	80,976	33,968	2,148	0.063	0.027
Los Angeles	145,600	63,147	3,296	0.052	0.023
Miami	40,967	19,731	815	0.041	0.020
New York	123,201	50,730	2,599	0.051	0.021
Washington	71,130	25,779	1,562	0.061	0.022

Notes: This table reports CoStar lease data and InfoUSA establishment data for 2005 to 2021. Displaying the average number of establishments per year (for InfoUSA data), or the average total number of new leases per year (for CoStar data). Consumer-facing establishments are all establishments in NAICS sectors 44-45, 71, 72, 81 and 311811 (retail bakeries).

B CoStar Data Orientation

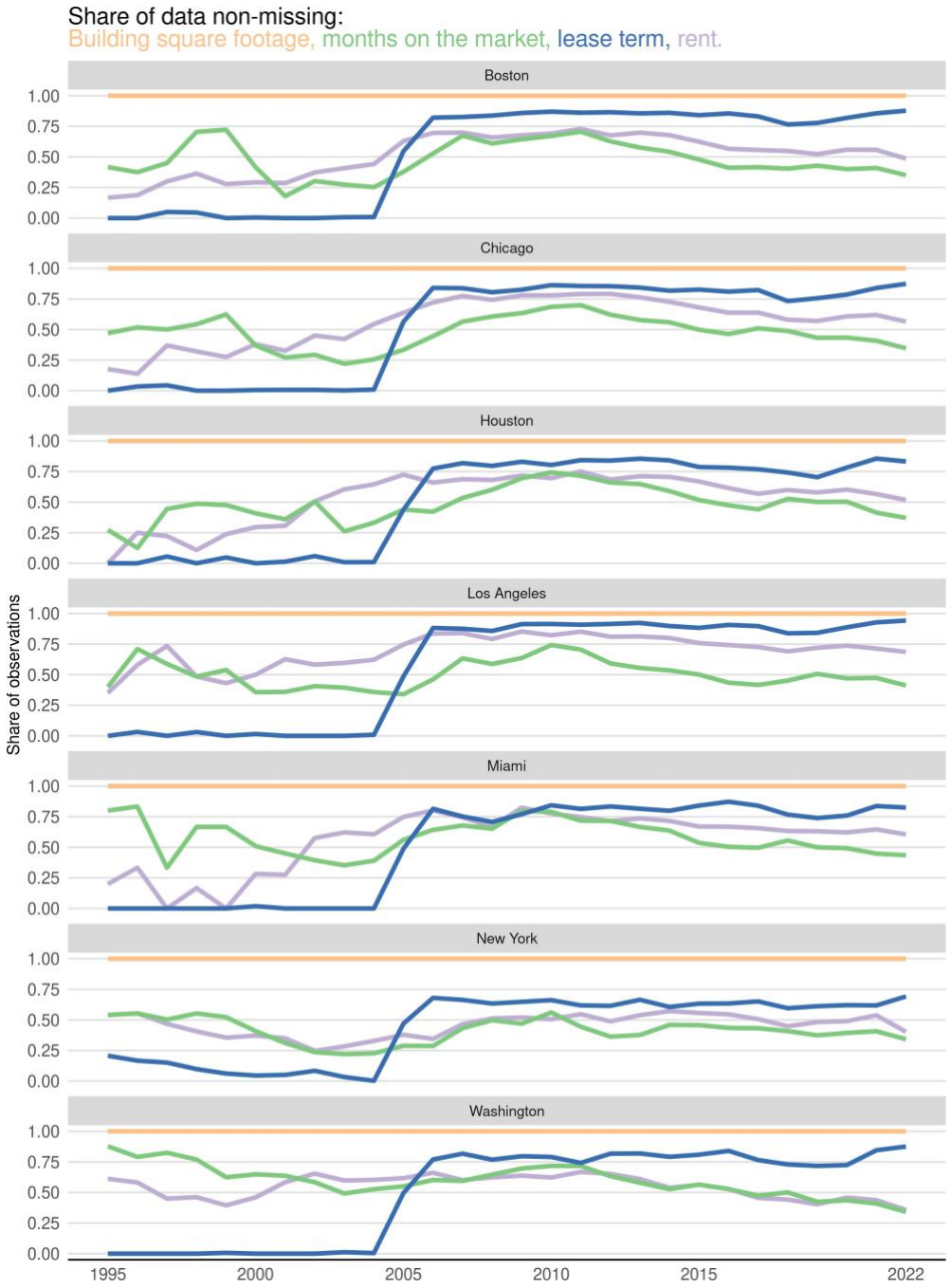
We now present summary statistics documenting retail leases from the CoStar data. First, we note that other than square footage, the coverage of information on rents and lease terms is not complete. In Appendix Figure 3 we report the share of observations by year that are missing data on the square footage of the lease, the rent on the lease, the lease location and the lease term (length). CoStar does not have complete coverage for all variables because it relies on self-reports from brokers. Brokers are particularly hesitant to share rent and lease length, as it may pose a risk of losing clients to competing brokers (information on square footage does not hold a similar premium). Coverage improves for all of our markets since the mid-2000s.

In addition, we track the spatial expansion of the CoStar coverage over time by regressing the lease-level distance to City Hall on time (years) for each market. These estimates are plotted in Appendix Figure 4. Again, we see a stabilization in the average distance across leases after 2005, following increases for most of the markets in earlier years (with the exception of Los Angeles).

Altogether, these patterns, along with the comparisons to establishment counts above, indicate that around 2005-2007 CoStar's coverage becomes closer to the near-universe of leases.

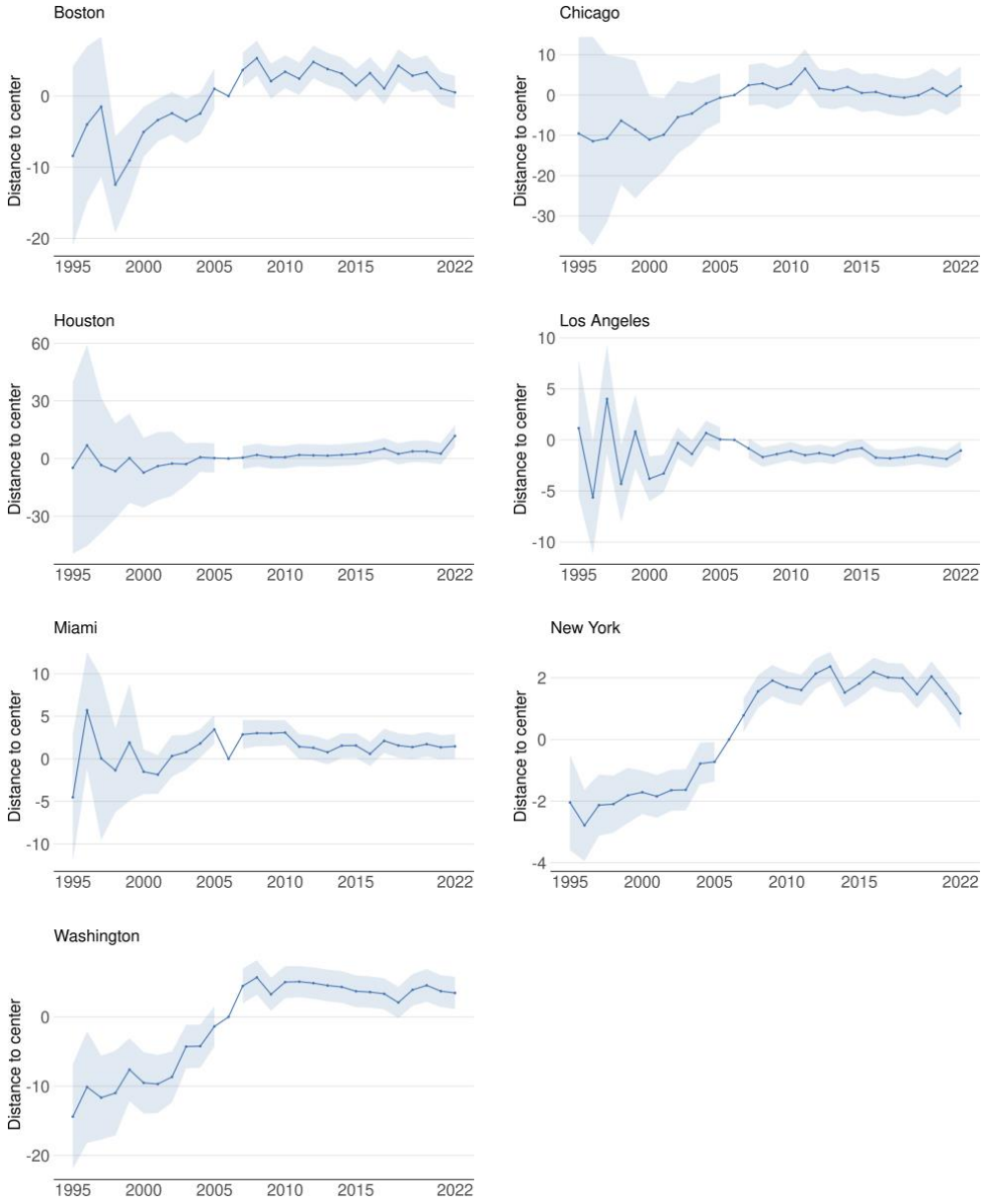
We also assess the CoStar data and its coverage with respect to the main variables of interest. Since the key contribution of the CoStar data is the information on rents, we divide the sample of leases into those with the (asking) rent field populated and those with that field missing. We show summary statistics in Appendix Table 2. For each market, we report the number of leases and mean measures of property characteristics based on whether we observe gross asking rent per square foot. While the mean lease start year is similar regardless of rent information status, leases with rents populated tend to record lower leased square footage, fewer months on the market, and shorter term lengths.

Appendix Figure 3: Missing Data Shares by Year and Variable



Note: This figure uses CoStar lease data and reports the share of leases with missing information by market and year.

Appendix Figure 4: Average Distance to Center Evens Out After Roughly 2006



Note: We use geocoded CoStar lease data to calculate the distance between each lease and City Hall of the relevant market. For each market, we then regress this measure of distance on a set of year fixed effects, where we omit year 2006. This figure plots the coefficients on these year fixed effects, along with their standard errors (shown by the shading around the line). All values are relative to 2006, which we report as zero. The coefficient of roughly 1 for Boston in 2021 means that the average lease was 1 mile further from Boston's City Hall in 2021 than in 2006. The large negative coefficient for Boston in 1995 means that the average lease in 1995 is almost ten miles closer to City Hall than in 2006.

Appendix Table 2: Comparison of Leases With and Without Rent Information

	Boston		Chicago		Houston		Los Angeles	
	w/ rent	w/o rent	w/ rent	w/o rent	w/ rent	w/o rent	w/ rent	w/o rent
Number of Leases	10,510	6,414	31,866	14,717	24,719	13,949	48,626	14,570
Share of Leases	0.62	0.38	0.68	0.32	0.64	0.36	0.77	0.23
Mean Rent per SF, $2022	28.9	.	25.9	.	22.2	.	37.9	.
Lease Start Year	2013.8	2015.1	2014	2015.4	2014.4	2015.5	2014.4	2015.5
Start Year Non-Missing	1	1	1	1	1	1	1	1
Months on Market	15.2	18.2	19.1	20.7	18.7	18.9	13	15.8
Months on Market Non-Missing	0.9	0.73	0.9	0.64	0.87	0.66	0.94	0.72
Lease SF	2,566	5,435	2,799	6,072	3,144	4,725	2,319	4,642
Lease SF Non-Missing	1	1	1	1	1	1	1	1
Term Length	46.5	68	47.5	77.2	48.3	58.9	41.6	54.9
Term Length Non-Missing	0.65	0.28	0.64	0.27	0.66	0.33	0.59	0.3

	Miami		New York		Washington, DC	
	w/ rent	w/o rent	w/ rent	w/o rent	w/ rent	w/o rent
Number of Leases	10,010	4,663	23,740	23,271	15,146	12,963
Share of Leases	0.68	0.32	0.5	0.5	0.54	0.46
Mean Rent per SF, $2022	39.4	.	108.9	.	37.5	.
Lease Start Year	2015.1	2016.1	2014.8	2014.8	2013.7	2015.3
Start Year Non-Missing	1	1	1	1	1	1
Months on Market	15.7	17.7	10.4	12.9	17.3	20.1
Months on Market Non-Missing	0.87	0.66	0.64	0.62	0.85	0.7
Lease SF	2,774	4,500	2,548	3,531	3,183	5,124
Lease SF Non-Missing	1	1	1	1	1	1
Term Length	46.7	58.7	91	95.6	63.3	83.4
Term Length Non-Missing	0.69	0.34	0.49	0.34	0.75	0.31

Notes: This table reports summary statistics for CoStar leases for years 2005 onward. The first row reports the number of leases in each sub-sample and the remaining rows report means. The number of observations in the first two columns may not apply to all calculations in that market; not all leases with rent also contain information on the other variables.

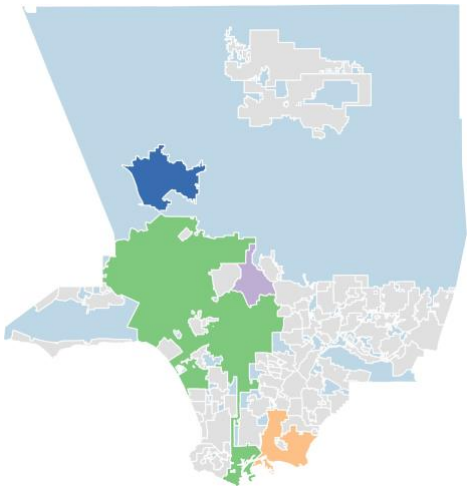
C Additional Figures and Tables

Appendix Figure 5: Maps of New York City and Los Angeles County

(a) New York City

(b) Los Angeles Analysis Areas

Glendale in Purple, Long Beach in Orange, City of Los Angeles in Green, Santa Clarita in Dark Blue, Unincorporated Area in Light Blue, Other Incorporated Areas in Grey

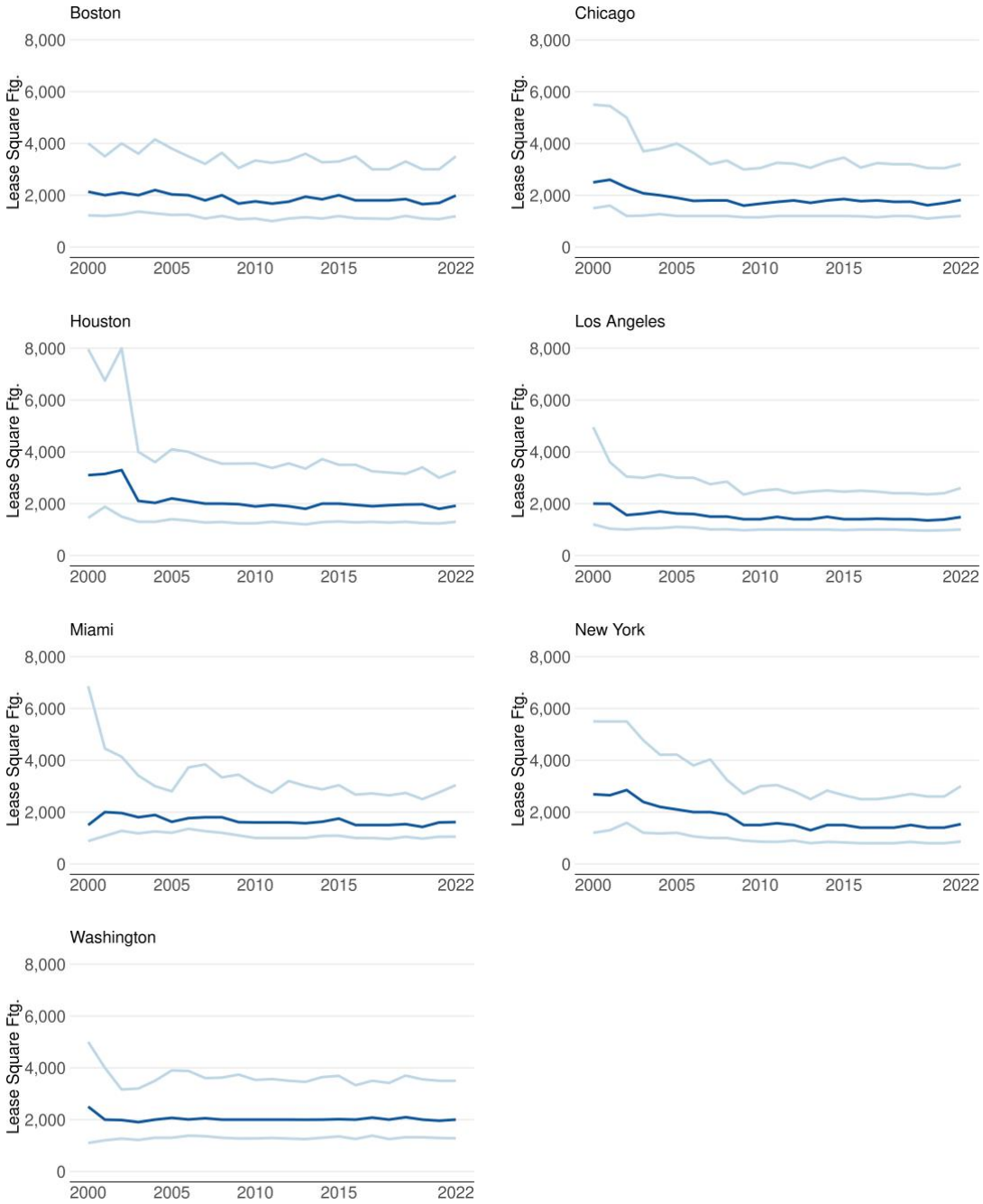


Note: The top figure shows the five boroughs of the city of New York in blue. The bottom figure shows the County of Los Angeles (omitting the offshore islands), with the areas we include in our analysis shown in color (those not included are shown in gray). We include the incorporated municipalities of the City of Los Angeles, Glendale, Santa Clarita, and Long Beach, as well as the large unincorporated area shown in light blue.

Sources: City outlines from US Census Bureau place shapefiles, downloaded from NHGIS (Manson et al., 2022). County outline for Los Angeles from Los Angeles City GIS website (City of Los Angeles, 2022).

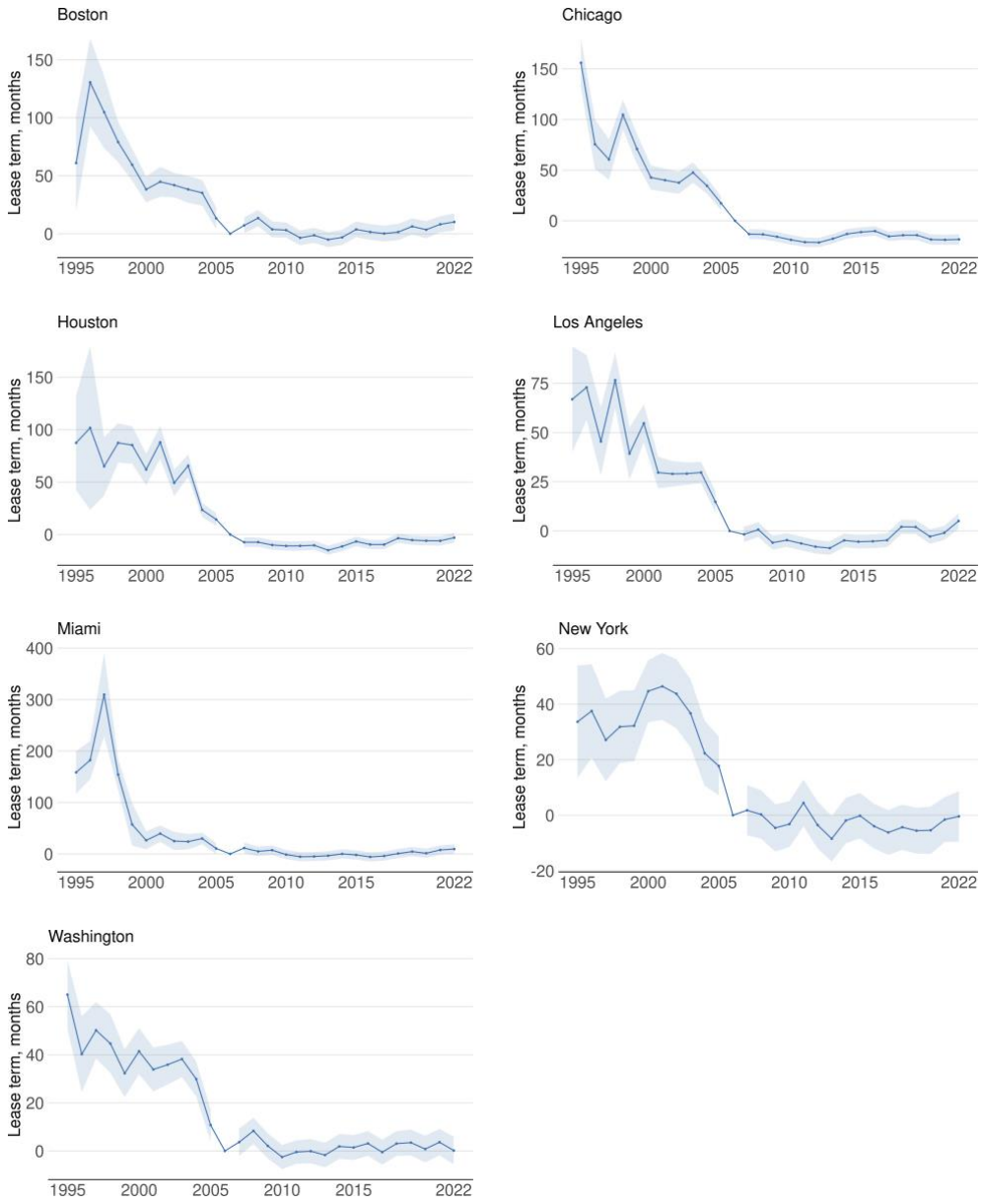
Appendix Figure 6: Distribution of New Square Footage Leased By Market

Median in dark blue; 25th and 75th percentiles in light blue



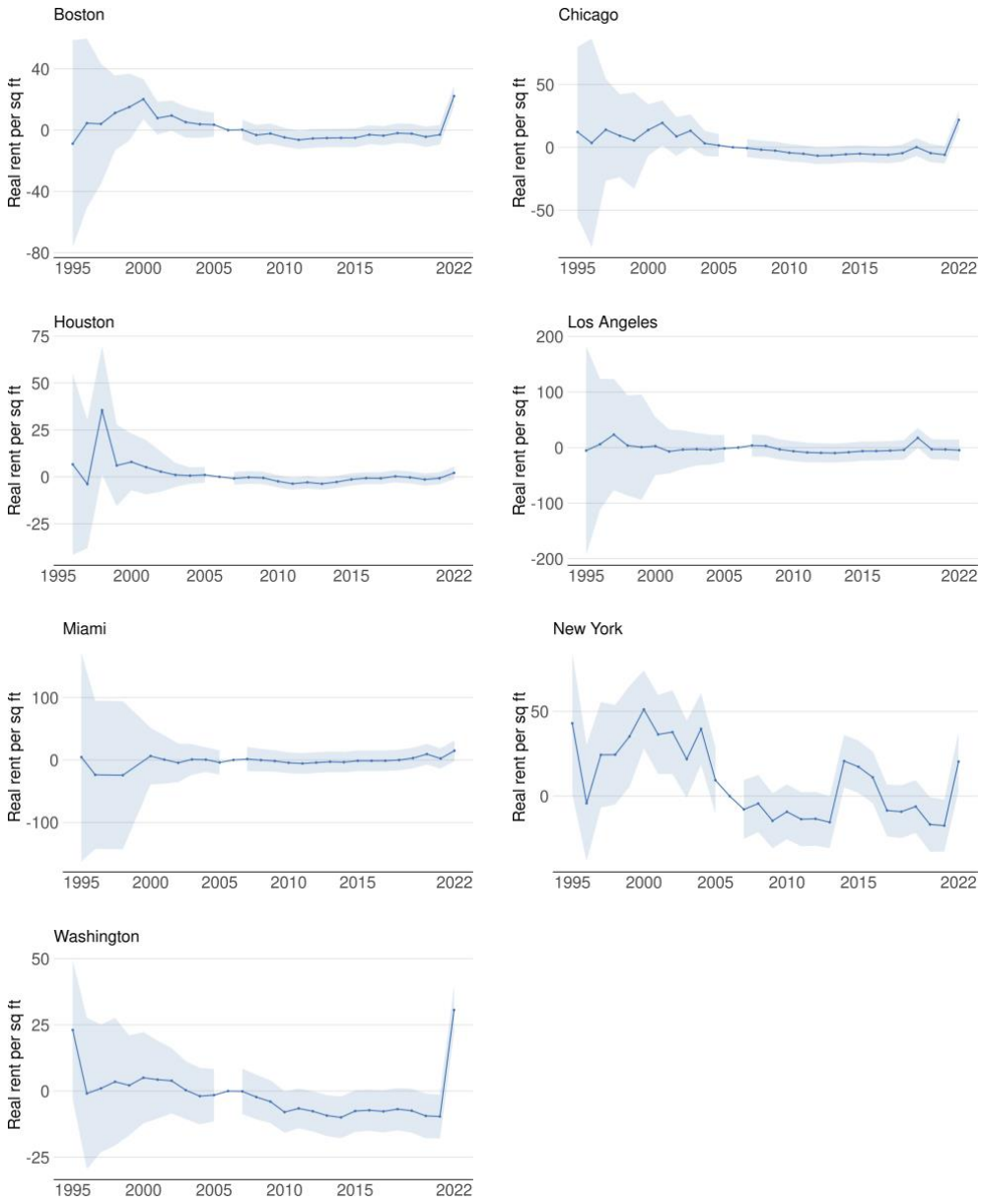
Note: This figure uses CoStar lease data and reports the median (dark blue), 25th percentile and 75th percentile (both in light blue) of leased square footage by market and year.

Appendix Figure 7: Average Length of Lease Roughly Constant 2006 Onward



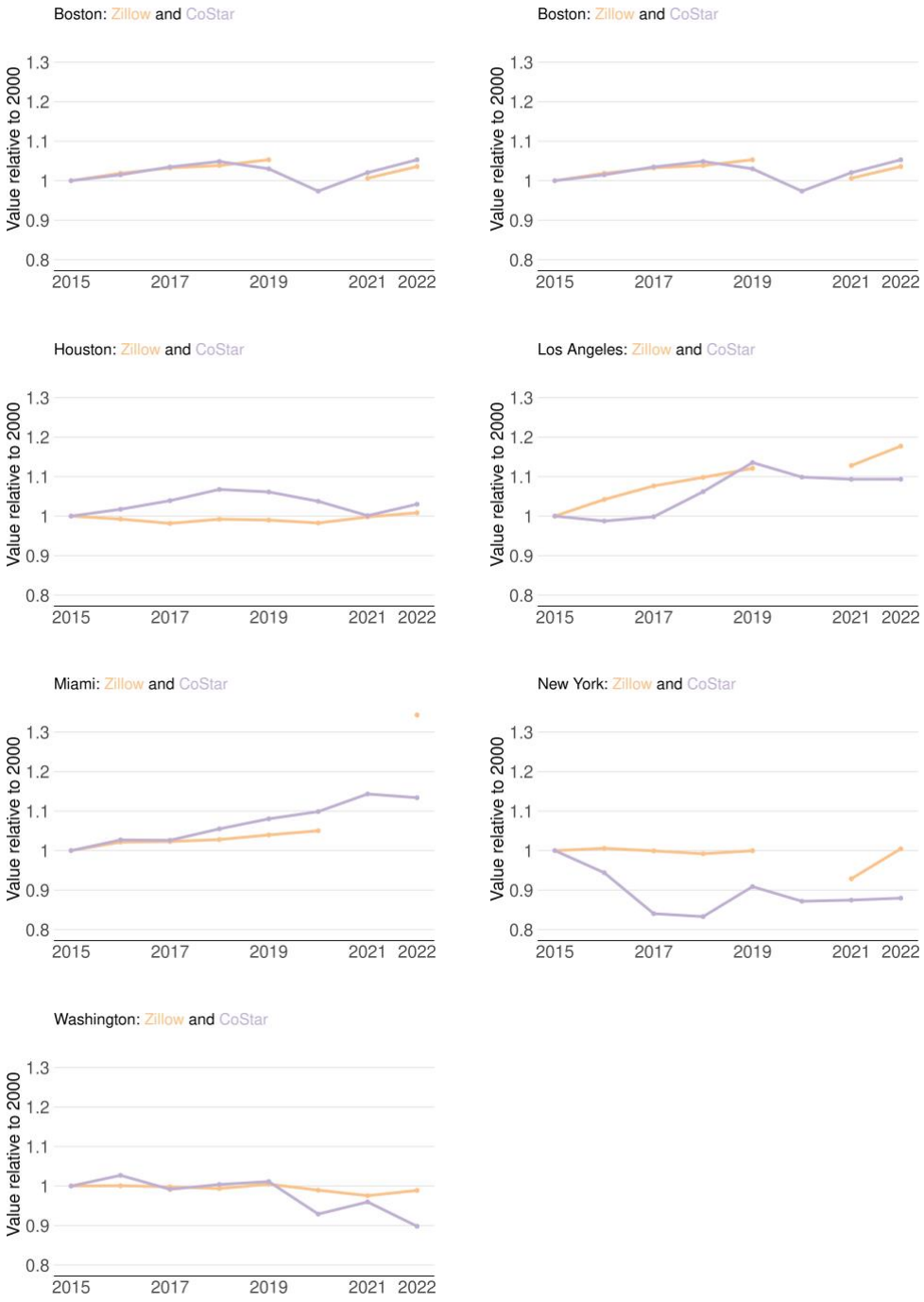
Note: We use geocoded CoStar lease data to regress a lease's term length in months on a set of year fixed effects, where we omit year 2006. This figure plots the coefficients on these year fixed effects, along with their standard errors (shown by the shading around the line). All values are relative to 2006, which we report as zero. The coefficient of roughly zero for Boston in 2017 means that the average 2017 lease had about the same average term length as the average 2006 lease. The large positive coefficients for Boston before 2006 mean that the average CoStar lease recorded before 2006 had much longer terms than the average 2006 lease.

Appendix Figure 8: Average Rent by Year and Market



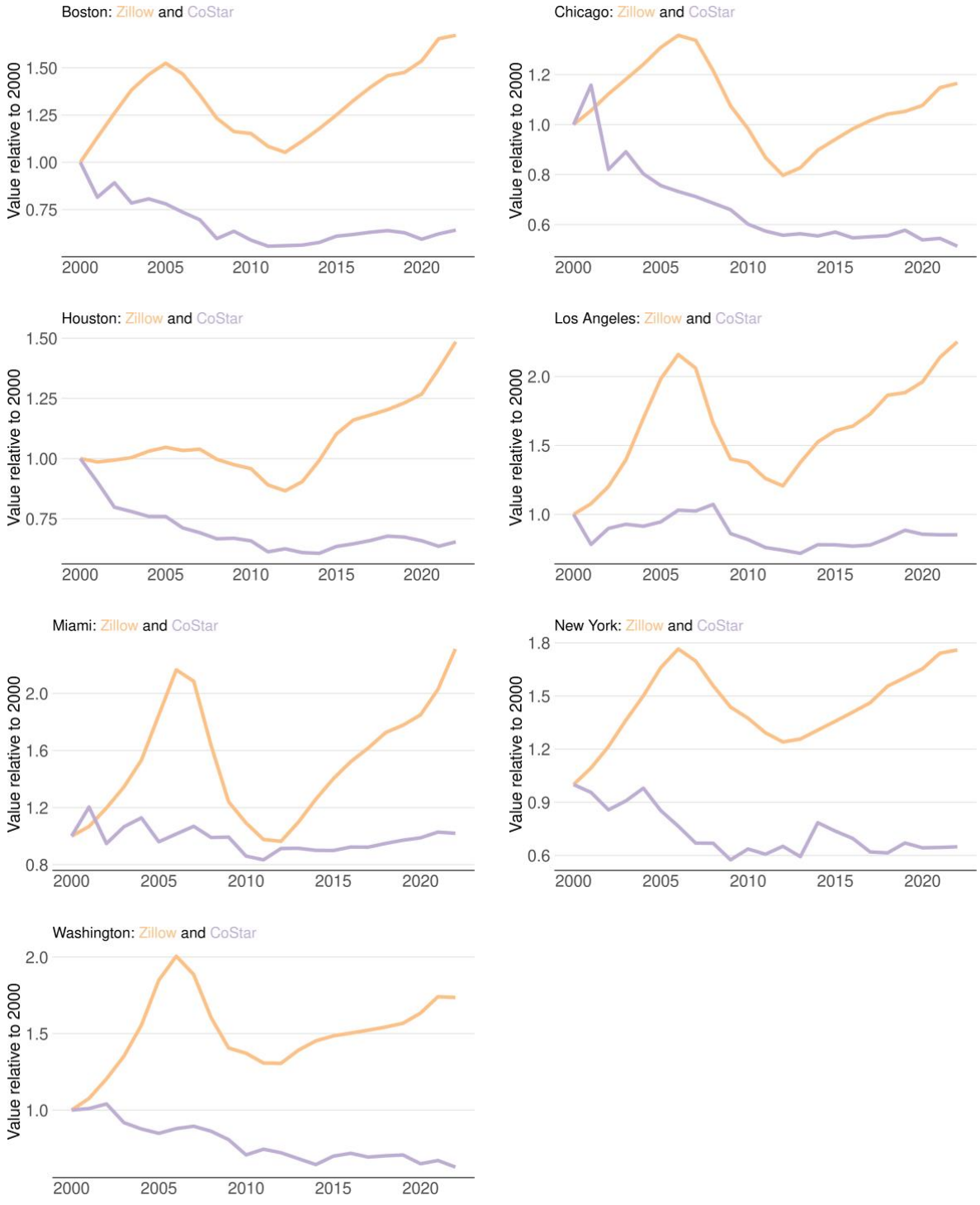
Note: This figure uses CoStar lease data to report the average asking rent per square foot for leases over time. This figure plots the year coefficients from regressions of lease-level rents on year fixed effects, along with their standard errors (shown by the shading around the line), separately for each market. All values are relative to 2006, which we report as zero. The coefficient just below zero for Boston in 2017 means that the average 2017 lease has rent slightly lower than the average 2006 lease. The larger positive coefficient for Boston around 2000 means that the average CoStar lease recorded in 2000 had higher rent than the average 2006 lease.

Appendix Figure 9: CoStar Retail and Zillow Residential Rent per Sq. Foot, 2022 Dollars



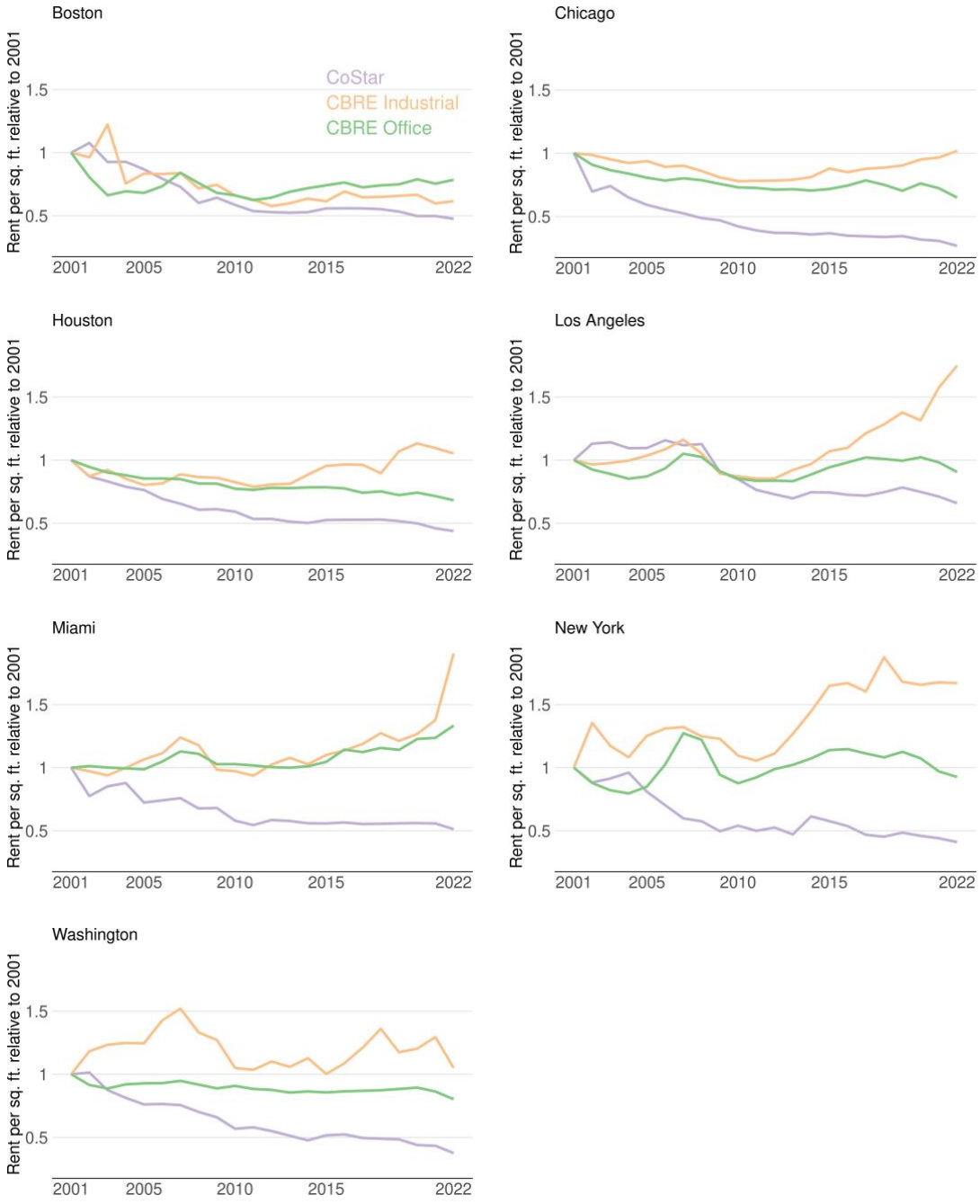
Note: This figure compares CoStar median retail rent per square foot in 2022 dollars (purple) to a Zillow residential rental price index (orange), also in 2022 terms. We normalize both indices to 1 in 2015. Because Zillow does not report a rental index for all markets and years, there are gaps in the orange series.

Appendix Figure 10: Real Home Prices vs. CoStar Rents, Relative to 2000



Note: This figure shows the median CoStar retail rent per square foot by market and the mean Zillow home price index. We adjust both series for inflation to 2022 dollars, and normalize both series to 1 in 2000.

Appendix Figure 11: CoStar Rents versus CBRE Office and Industrial Rents, Relative to 2001

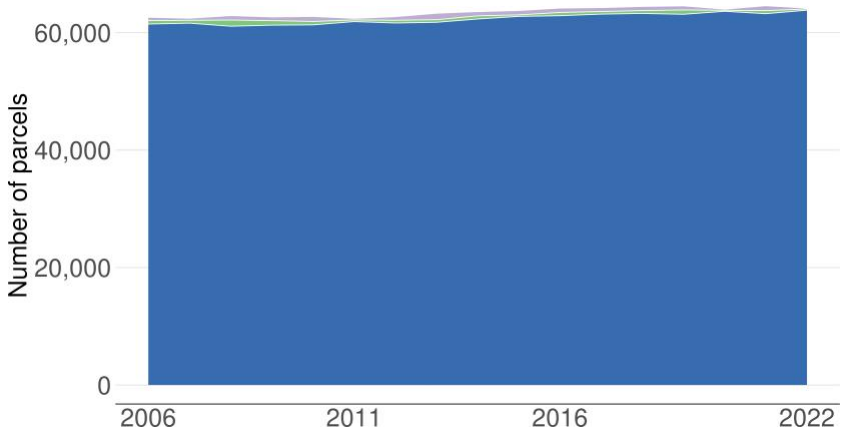


Note: This figure shows median CoStar retail rent per square foot (purple), and mean CBRE gross asking rent for office (green) and industrial properties (orange), all by market and year. We adjust both series for inflation, and normalize all values to one in 2001 when our data series are complete for all metro areas.

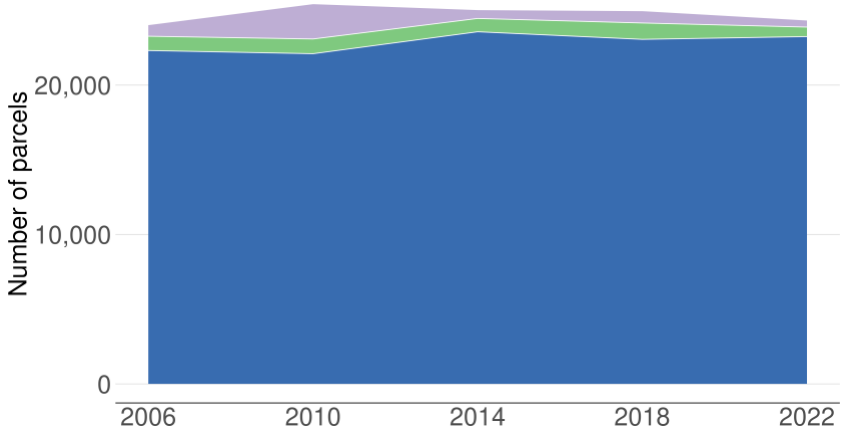
Appendix Figure 12: Most Retail Parcels Do Not Change Zoning Classifications

Parcels that Exit Retail Zoning, Parcels that Enter Retail Zoning, Parcels that Remain Zoned Retail

h (a) New York

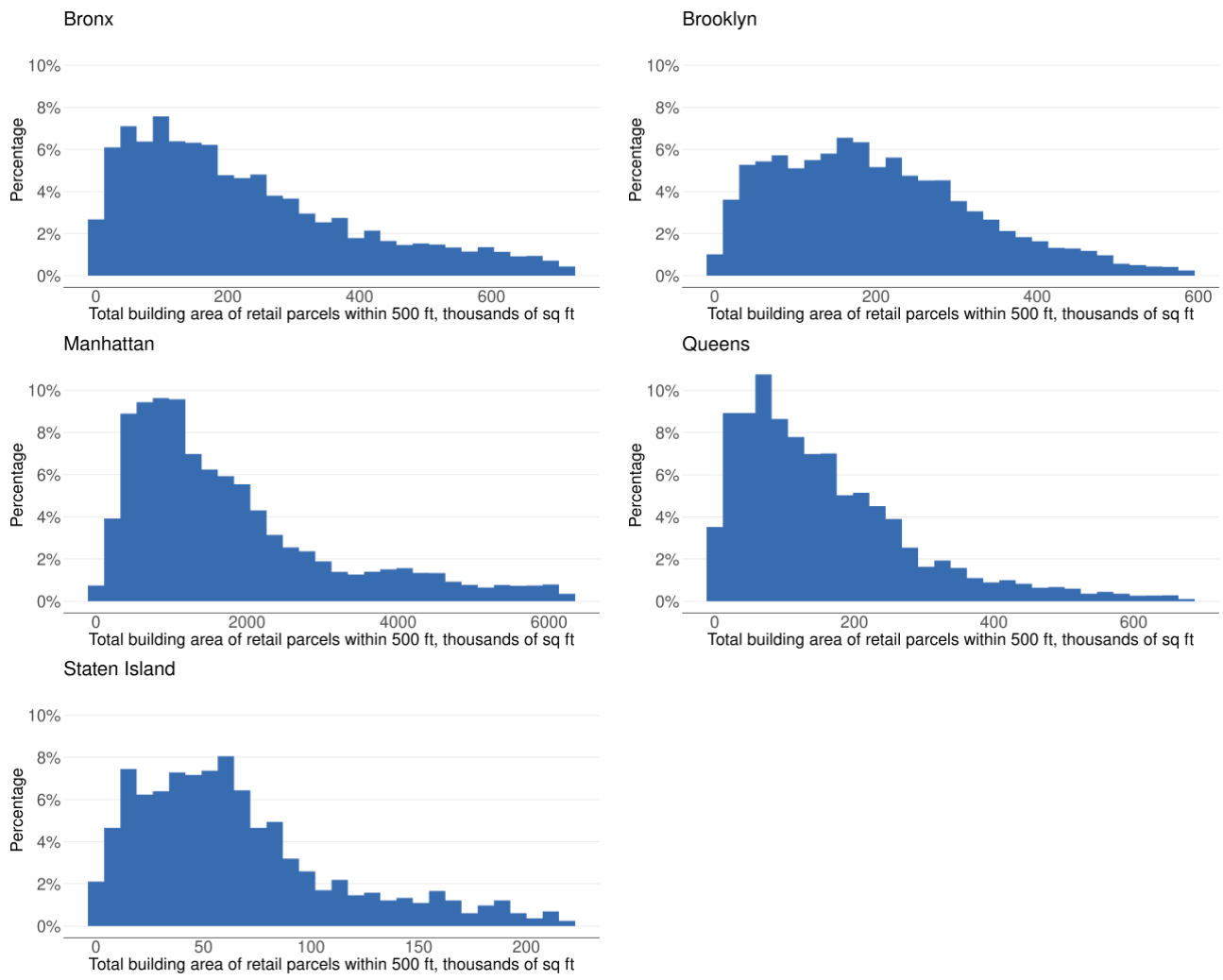


(b) Los Angeles



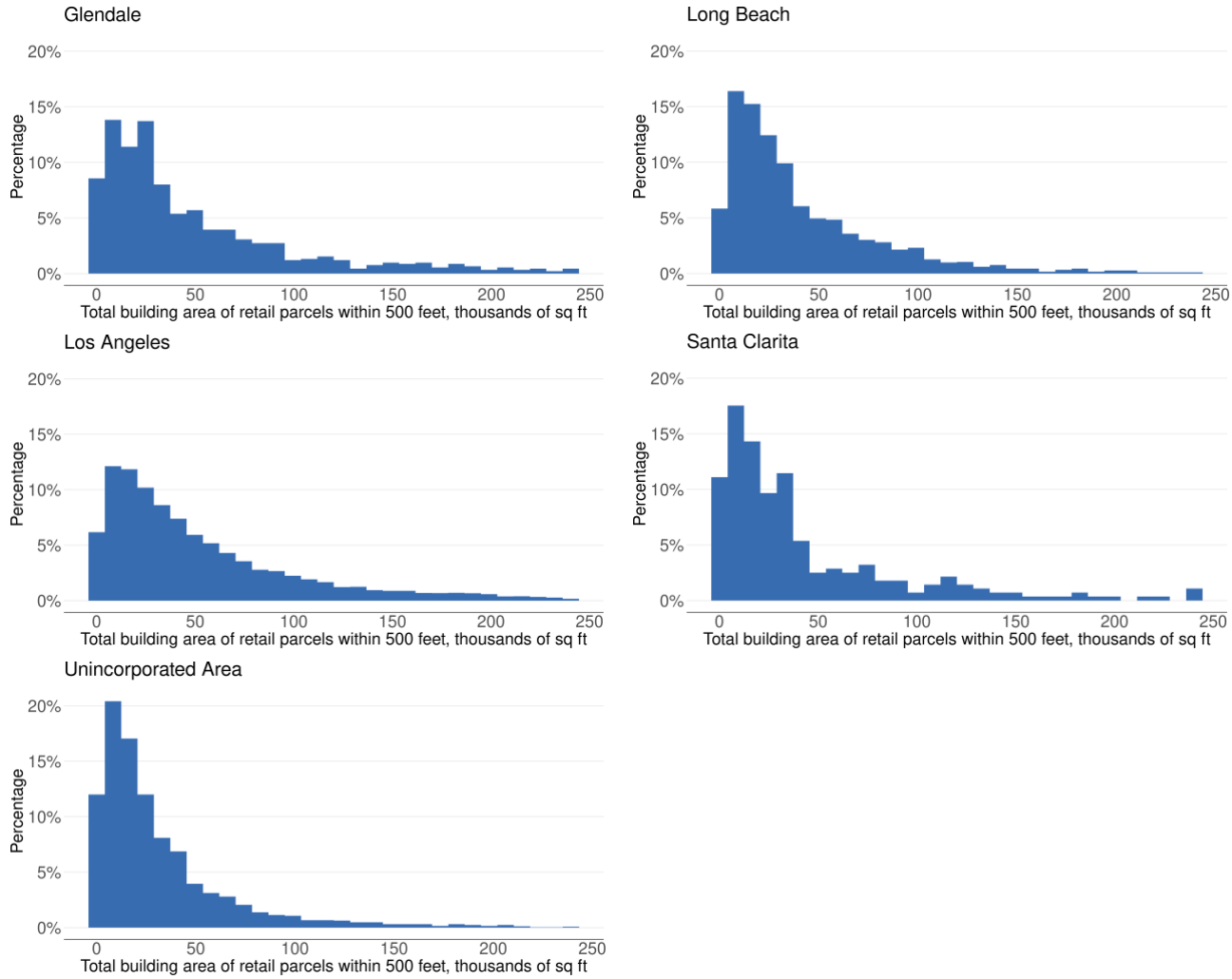
Note: New York: Land use data are from NYC's PLUTO database. The figure reports the total number of lots that remain zoned as retail (blue), are newly zoned retail (purple), and are converted away from retail zoning (green) in a given year. Los Angeles: Land use data are from the municipal planning departments overseeing the City of Los Angeles, Glendale, Santa Clarita, Long Beach, and the unincorporated area of Los Angeles County. The figure reports the total number of lots that remain zoned as retail (blue), are newly zoned retail (purple), and are converted away from retail zoning (green) in a given year. For Los Angeles parcels, "retail" is identified by commercially zoned properties in retail use.

Appendix Figure 13: Distribution of Total Retail Square Footage Concentration, New York



Note: Land use data are from NYC's PLUTO. Retail concentration is measured as the total amount of square footage zoned retail within 500 ft. of a retail-zoned parcel. The figure shows concentration of total square footage of parcels zoned for retail in all five boroughs in 2022. For visibility, we omit the top 5th percentile in each borough. Note that the horizontal axes for Manhattan and Staten Island differ from the other boroughs. The distributions show variation across the boroughs. Manhattan, the smallest and most densely built borough, displays the highest peak and the widest distribution of retail clusters (note that x-axis values for Manhattan are ten times larger than those for the other boroughs). This indicates that it has many small retail clusters (in terms of square footage), but that it is also retail-dense throughout the borough. The other boroughs have shorter peaks and slightly thicker tails. These boroughs have a range of residential and commercial densities and the thicker tails indicate a prevalence of bigger retailers and/or bigger retail clusters. Staten Island is the least dense borough, and mainly consists of smaller retail clusters with a few bigger clusters out in the right tail (the x-axis values are much smaller than the other boroughs.

Appendix Figure 14: Distribution of Total Retail Square Footage Concentration, Los Angeles



Note: We use only lots in the city of Los Angeles, the unincorporated area of Los Angeles County, the incorporated municipalities of Glendale, Long Beach, and Santa Clarita. For Los Angeles parcels, "retail" is identified by commercially zoned properties in retail use. Retail concentration is measured as the total amount of square footage zoned retail within 500 ft. of a retail-zoned parcel. The figure shows concentration of total square footage of parcels zoned for retail in four municipalities and the unincorporated area in 2022. For visibility, we omit the top 5th percentile of values. The distributions are relatively consistent across the cities, with the highest peaks in Long Beach and part of the unincorporated areas (where there are higher concentrations of smaller retail clusters). The City of Los Angeles has the thickest distribution, indicating a wider range of retail clusters and its diversity in land use patterns within the municipality.

Appendix Table 3: Housing and Demographic Summary Statistics by Market

	(1)	(2)	(3)	(4)	(5)	(6)
A. Demographics						
	Share White		Share Black		Share Hispanic	
	2000	2020	2000	2020	2000	2020
Boston	0.807	0.696	0.059	0.074	0.064	0.113
Chicago	0.593	0.524	0.185	0.162	0.164	0.222
Houston	0.48	0.355	0.168	0.168	0.288	0.374
Los Angeles	0.309	0.259	0.096	0.078	0.446	0.483
Miami	0.207	0.135	0.201	0.156	0.573	0.681
New York	0.35	0.319	0.264	0.214	0.27	0.289
Washington	0.553	0.445	0.263	0.248	0.089	0.16
B. Density and Value						
	Population Density		Median Rent		Median Home Value	
	2000	2020	2000	2020	2000	2020
Boston	376	416	773	1,547	212,436	480,659
Chicago	367	382	669	1,166	155,905	250,923
Houston	192	285	595	1,161	86,082	206,318
Los Angeles	774	816	704	1,534	201,400	615,500
Miami	364	437	647	1,373	113,200	310,700
New York	6,545	6,848	720	1,536	239,862	685,002
Washington	307	395	837	1,700	181,933	477,031
C. Income, Education and Driving						
	Av. Household Income		Share, BA or more		Share Drive to Work	
	2000	2020	2000	2020	2000	2020
Boston	72,196	127,262	0.37	0.489	0.711	0.644
Chicago	67,437	103,463	0.29	0.39	0.704	0.683
Houston	61,050	99,268	0.265	0.336	0.77	0.789
Los Angeles	61,811	103,220	0.249	0.335	0.704	0.721
Miami	52,753	82,379	0.217	0.307	0.738	0.757
New York	58,505	107,000	0.274	0.391	0.249	0.223
Washington	80,642	139,109	0.425	0.52	0.675	0.632

Sources: Decennial Census, 2000 and American Community Survey, 5-year data, 2016-2020. Notes: All data are at the county level. When necessary, we aggregate to the CoStar market level. Population density is people per square kilometer. Income, rent, and house value are in nominal 1999 and 2019 dollars. Share White and share Black are based on the number of White and Black non-Hispanic people. In 2020, we use only those who indicate "Black Alone." Rent is "median gross rent." We use markets as defined by CoStar, which in most cases approximate a county or aggregates of counties.