Working Paper

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

Although investment and the demand for living near urban amenities has grown over the past two decades, retail vacancies have continued to plague many urban areas. In this paper, we leverage rich data on retail leases and property-level land uses to test this proposition. First, we depict patterns of retail proliferation and contraction across a sample of seven moderate-to-large cities in the U.S. Second, we investigate whether institutional context, and specifically zoning, has played a role in patterns of urban retail vacancy over the past two decades. We show that retail rents are flat or declining and that the size of retail spaces are also flat or shrinking. We then turn to rich land use microdata from New York and Los Angeles to document that the amount of land zoned for retail has increased over the last 15 years, 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, we find increased retail zoning designation and more built retail space. This misalignment between retail market activity and regulated retail space suggests an oversupply of retail space and offers some explanation for the recent proliferation of retail vacancies.

Findings from our research suggest that, in addition to market forces, land use decisions may drive the current oversupply of retail space. This also suggests an important role for planning in solving the problem of vacancies. If the utility of certain commercial uses is changing over time, then zoning and comprehensive plans 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

Although investment and the demand for living near urban amenities has grown over the past two decades, retail vacancies have continued to plague many cities (Grant, 2018; Kapner and Fung, 2019; Goolsbee, Austan, 2020). This divergence between urban living premia and retail struggles has become only more complicated since the pandemic. While some accounts suggest that urban retail vacancy rates are as high as during the 1970s, there is little to no empirical evidence upon which to validate this claim.

This paper has two goals. First, we empirically evaluate the conventional wisdom around urban retail demise. We leverage rich data on retail leases for a sample of seven U.S. cities to depict patterns of retail expansion and contraction across a range of urban contexts.

Second, we investigate how institutional context, and zoning specifically, has moderated urban retail vacancy over the past two decades. Using rich microdata on parcels and land use in New York City (NYC) and Los Angeles, we correlate land uses with retail leases over time and across space to understand how well retail market activity aligns with regulated land uses. Our study sheds light on the role of land use regulation in perpetuating retail vacancies.

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, the number of retail leases and amount of square footage dedicated to retail activity both grew rapidly (both in aggregate and for the typical leased space). Since then, retail lease take-up has slowed, time on the market for retail spaces has increased, 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 across 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 time period that retail market activity plateaued, the cities in our sample had a net gain in square footage zoned for retail use. This trend, along with declining and flattening rents, suggests that retail vacancies have indeed increased over time.

Furthermore, we find that the clustering of retail parcels has increased over time in NYC (clustering in Los Angeles was relatively stable). Clustering benefits retailers and, all else equal, should be reflected in higher rent. 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 elucidate variation in market and

land use alignment at the neighborhood level. Nevertheless, findings from our research document the interaction between regulation and markets and inform land use planning around retail and mixed uses. If the utility of certain commercial uses changes over time, then zoning and comprehensive planning should respond accordingly. For example, planners may consider changing the allocation of space towards commercial uses or modifying the size and design requirements for first floor spaces. 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. Converting from retail to other uses, such as alternative commercial uses or residential, 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

The market for retail goods and services is the fundamental driver of storefront occupancy. Establishments stay operational when revenues meet or exceed business costs. On the cost side, rent is usually the most significant budget item, 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 is in contrast to 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. The viability of retail is affected when the density or composition of that consumer base shifts. 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 these 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 storefronts are active. However, in the presence of concentrated vacancies, this same clustering can attenuate agglomeration externalities, further threaten demand, and increase costs.

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. 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.

In addition, landlords may be constrained by investor-based requirements for minimum rental income. 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.

Second, 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 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 higher vacancy rates are more prevalent in certain 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, she observes longer vacancy intervals in gentrifying areas. Finally, Kickert and Vom Hofe (2018) study retail

[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).

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

agglomeration and the likelihood of store closure. They find, across several urban settings, 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; Behrens and Robert-Nicoud (2015)'s "locational fundmentals"), competitive environment, or governing regime (Alcácer, 2006; Rosenthal and Strange, 2001, 2003; Potter and Watts, 2010; Neffke et al., 2011). 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 ocurring" agglomeration economies in unrestricted markets. Indeed, 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 restrictions are removed, restaurant clustering intensifies, indicating both the distortionary effect of the zoning law and the importance of agglomeration economies.

A second paper, by Cheshire et al. (2022), uses 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)).

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 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 claims 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.[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. The number of leases is sparse and inconsistent at geographies below the city level, and therefore 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 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."

[3]CoStar inconsistently collects information on the type of goods or services provided by NAICS classification. Therefore, we use all leases classified by CoStar as retail. 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.

[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.

5.1 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 in order to capture variation in the degree and spatial distribution of commercial and residential densities.

For example, NYC is by far the densest place, with Los Angeles moderately dense and Houston on the low end (see Appendix Table 2 for summary statistics for our sample of cities). 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.

Demographics vary across the sample cities, and have changed to different degrees 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.

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 retail land use allows us to infer patterns of retail vacancy.

Our first metric to track retail activity is to count the number of new leases using CoStar data. For regulated retail activity, we use land use data. For NYC, we define retail as those

[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.

parcels zoned for commercial or mixed use and that have non-zero square footage designated for retail use (this information is pulled from the Department of Finance's tax assessment and appraisal rolls and 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 commercial. Within this set, we identify parcels that are documented as having retail uses. Therefore, we use this combination—commercially zoned parcels with documented retail uses—as our retail land use classification.[6]

Our second retail metric measures the intensity of retail activity by the square footage of the leased space and by the built square footage dedicated to retail uses. Using the CoStar data, we can 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. Together, the retail market metrics from CoStar 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 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

[6]While we use the 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. We may be capturing retail square footage designated as retail use that is grandfathered in to a non-retail zoned parcel. For Los Angeles, we replicate the metrics and analyses with 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) 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 used as our main metric, we also calculate the average retail square footage within 500 feet of parcel i.

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

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 get 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 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 is consistent across all seven cities, with varying degrees of intensity.[9] In addition, while the total amount of retail square footage leased per year increased through the mid-2010s, it then started to decline and plateau, coinciding with the flattening of the number of new leases (see Figure 2).

To assess how much of the change in space leased is due to a decline in the average square footage 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 square footage of the median lease 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 term length and months-on-the-market. This information captures the demand for retail. 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 those estimates in Appendix Figure 7 and Figure 3. In almost all markets, the average

[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.

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 systematically getting shorter or longer over time. This could be due to underlying constraints 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 there have been increasingly longer stretches of spaces sitting vacant.[11] This finding is informative: it weakens the argument that flattening new leases is due to restrictions on leaseable retail space. Longer months-on-the-market suggests that there is not a supply cap, but rather 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 and a possible factor behind retail vacancies. If the decline in new leases and square footage represented a limit on available retail space, then we should see rents 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 are not simply capturing 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 flatter. 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

[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."

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 declines in retail rents over time (especially in recent years) are particular to that sector.

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

Until now we have not taken into account the supply frictions imposed by local land use regulations. To contextualize the softening retail demand observed in lease data, we consider changes in the supply of retail space.

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 with residents that 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.

We use the administrative data on land use to track built retail space 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 land use and continue as retail over the two decades of our study. However, we can see a slight rise in the number of retail parcels over time, as the new zoning or development of buildings exceeds those that are zoned out of retail. This excess is more pronounced in NYC.

The number of parcels, however, does not measure change in the size or amount of the retail buildings or spaces. 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 retail use exceed exits. While this difference declines over time for Los Angeles, the pattern holds for both

[13]We do see that land use changes within the existing building stock are relatively rare. Over the course of two decades, just over 40,000 parcels changed uses, or on average two percent of the total building stock per year; and the large majority of these land use changes pertain to residential uses.

cities. This net gain in retail space, above and beyond the persistent growth in retail parcels, suggests that the land and square footage dedicated to retail is growing in both NYC and Los Angeles. This 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 retail parcels with changes in total retail square footage over time in Figure 6. The figure shows growth in retail square footage that far outpaces the growth in retail parcels, suggesting that additional retail space is bigger or that new parcels are more entirely dedicated towards retail use. This pattern is true for both NYC and Los Angeles.

Therefore, while leased retail activity has slowed for at least five years, retail-classified parcels and retail square footage 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 retail-zoned space.

Finally, we use the land use data to test if the spatial allocation, or clustering, of regulated retail activity changes over time. 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.

We first establish that our concentration measure captures variation in retail clustering across space (using only data from 2022 for now). We disaggregate NYC into 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 in Appendix Figure 13 show that Manhattan—the smallest and most densely built borough—is the outlier borough. Manhattan 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 look more similar to each other, with shorter peaks and slightly thicker tails (especially for the Bronx and Brooklyn). 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. We do not discuss the distributions for

Los Angeles, but present them in Appendix Figure 14.

Now, we replicate these distributions across the entire municipality for two points in time to test if retail concentration has changed over the two decades of our study period. The change is very gradual. In NYC (see the top panel of Figure 7), the distribution shifts out and flattens between 2006 and 2022. Specifically, the retail clusters become bigger over time. This is true both in terms of the aggregate retail-designated square footage and the typical size of the retail parcels, the latter of which is not shown here. The shift is more subtle in Los Angeles (see the bottom panel of Figure 7), where the left side of the distribution flattens out, but the tail remains intact. Therefore, there are some changes in concentration among the smaller clusters, but the shift is not as widely distributed across all retail clusters as it is in NYC.

As an additional exercise, we generate maps of the concentration metrics for 2006 and 2022 to identify how these shifts in retail clustering are distributed across neighborhoods within NYC and Los Angeles. The maps in Figures 8 and 9 show retail clustering (averaged by census tract) at two points in time for NYC and two cities in L.A. county. First, retail is prevalent throughout most neighborhoods of NYC, Long Beach and the City of Los Angeles, indicating widespread mixing of land use and higher retail densities in areas with denser populations (this is not the case for the other L.A. cities not shown, which have more isolated centers of retail).

Over time, the move towards more concentrated regulated retail square footage takes place throughout NYC (that is, the entire map gets lighter in color). While Manhattan demonstrates the biggest visual shift, it is clear that retail clusters are growing in neighborhoods throughout the city (this is also illustrated by the upward shift in the histogram next to the map). Retail concentration is generally stable across all areas of the L.A. cities (including those not shown here). If anything, retail use in Long Beach becomes less clustered over time.

As a final analysis, we combine information on retail rents and parcel-level retail clustering to assess the relationship between rents and retail co-location. In theory, if retail co-location brings advantages to businesses, these benefits should be reflected in rent premia among 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 across different degrees of retail clustering nearby (displayed in Figures 10 and 11).

Again, we observe different patterns across the cities. In NYC, there is a clear hierarchy of rents, such that more clustered parcels have higher rents.[14] Therefore, rents seem to capture the benefits from retail clustering, and the 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 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 lines are more intertwined (and 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 is consistent with the modest and idiosyncratic changes in clustering documented above. It also suggests that, for Los Angeles, other factors may determine the value of retail location apart from typical agglomeration spillovers.

7 Synthesis and Conclusion

During the early 2000s and through 2012 we observe a 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 rents have declined or flattened in real terms. These patterns are evident across all of the cities in our sample. Furthermore, we confirm that the decline in retail rent is particular to this sector and not simply a reflection of broader economic trends.

When we additionally consider land use regulations for New York City and Los Angeles, we find evidence of a misalignment between the quantity of land and space zoned for retail and the amount of retail market activity. Over the years when market retail activity slowed, regulated retail square footage continued to grow. This disconnect may contribute to the

[14] 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.

proliferation of retail vacancies in NYC and Los Angeles. Furthermore, we find that the clustering of retail parcels has increased over time in NYC, while clustering in Los Angeles was relatively stable. While clustering is a benefit for retailers that, all else equal, should be reflected in higher rents, we do not observe corresponding increases in rent premia. 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.

We recognize that there is likely important variation in retail activity at the neighborhood level in our sample cities, but we unfortunately cannot observe it with our current data. While any planning or policy intervention to address the provision and regulation of retail services should consider localized conditions, citywide patterns remain valuable in establishing a broader point of reference.

Our analysis has provided empirical and conceptual grounding for this broader citywide perspective along three dimensions. First, our analysis provides a framework for situating local retail market conditions in the context of national trends and city-specific institutional regimes. While cities must take a tailored approach to addressing retail vacancies and designing a plan for managing local retail services, any approach must seriously grapple with the macro-conditions of the sector that are largely out of the control of any one municipality.

Second, neighborhood-level planning inevitably feeds off of and contributes to citywide conditions. Because of this, credible citywide trends of retail services and density, both from market and regulatory standpoints, are instructive for iterating and balancing local needs.

Finally, 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. Therefore, cities will need to reckon with the oversupply of retail space, documented here, and plan for strategies to re-purpose or convert existing retail square footage that would otherwise remain unproductive. The upside may be that converting retail space into other commercial or residential uses is likely less costly than other recent proposals related to office-to-residential conversions.

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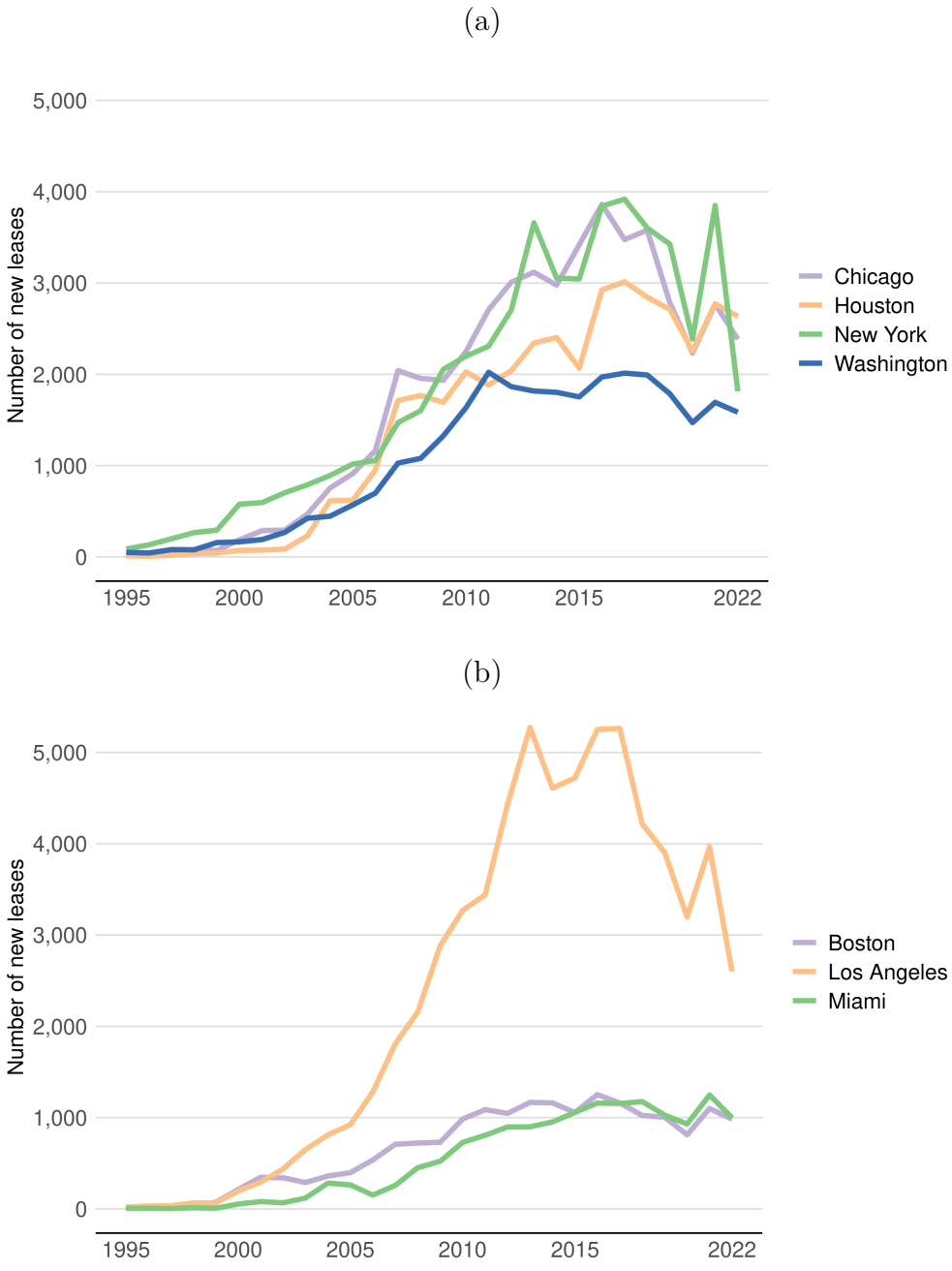
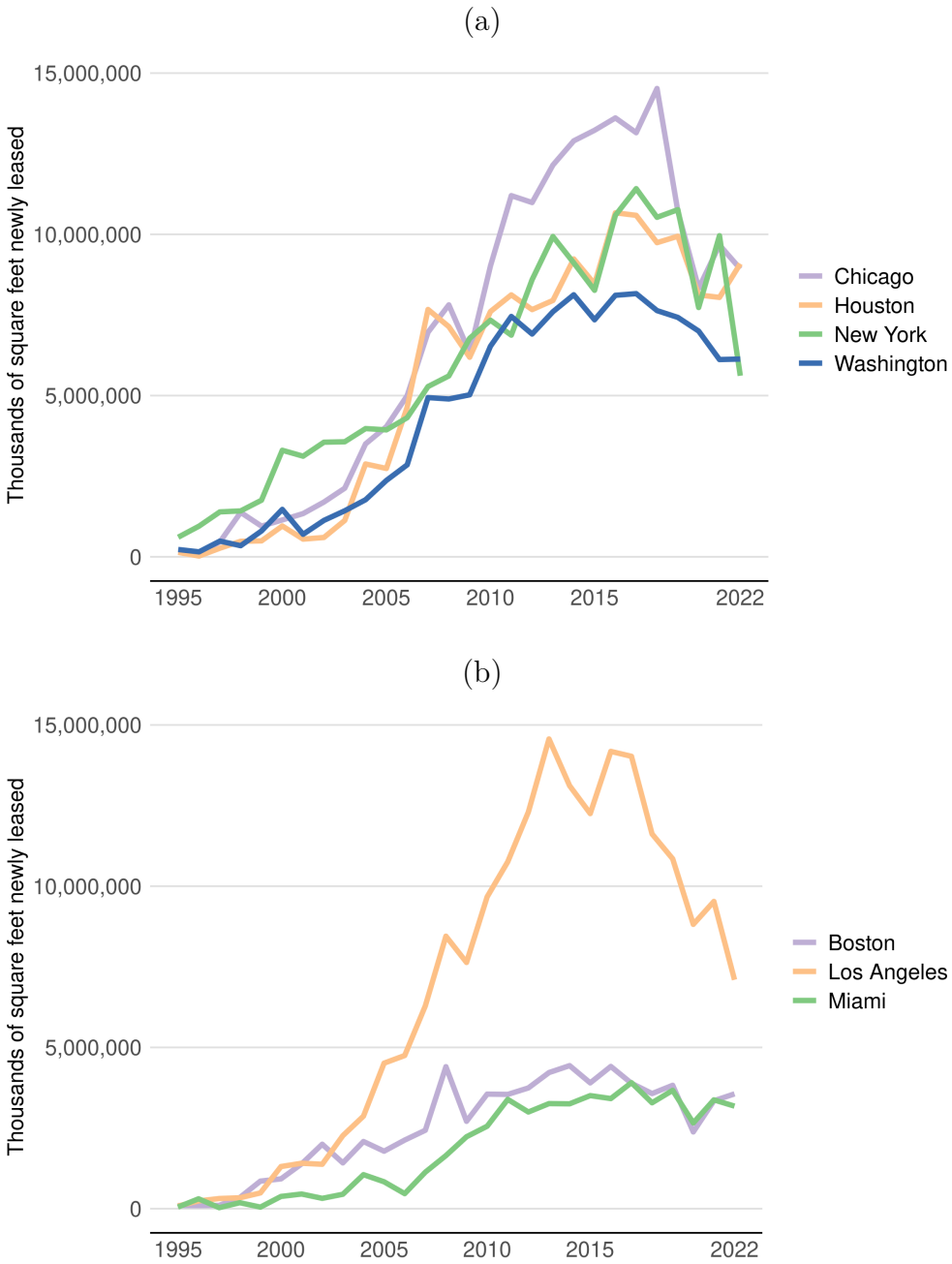
Manchester: applying microhistorical principles to retailing." History of Retailing and Consumption 7(3): 232–260.

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



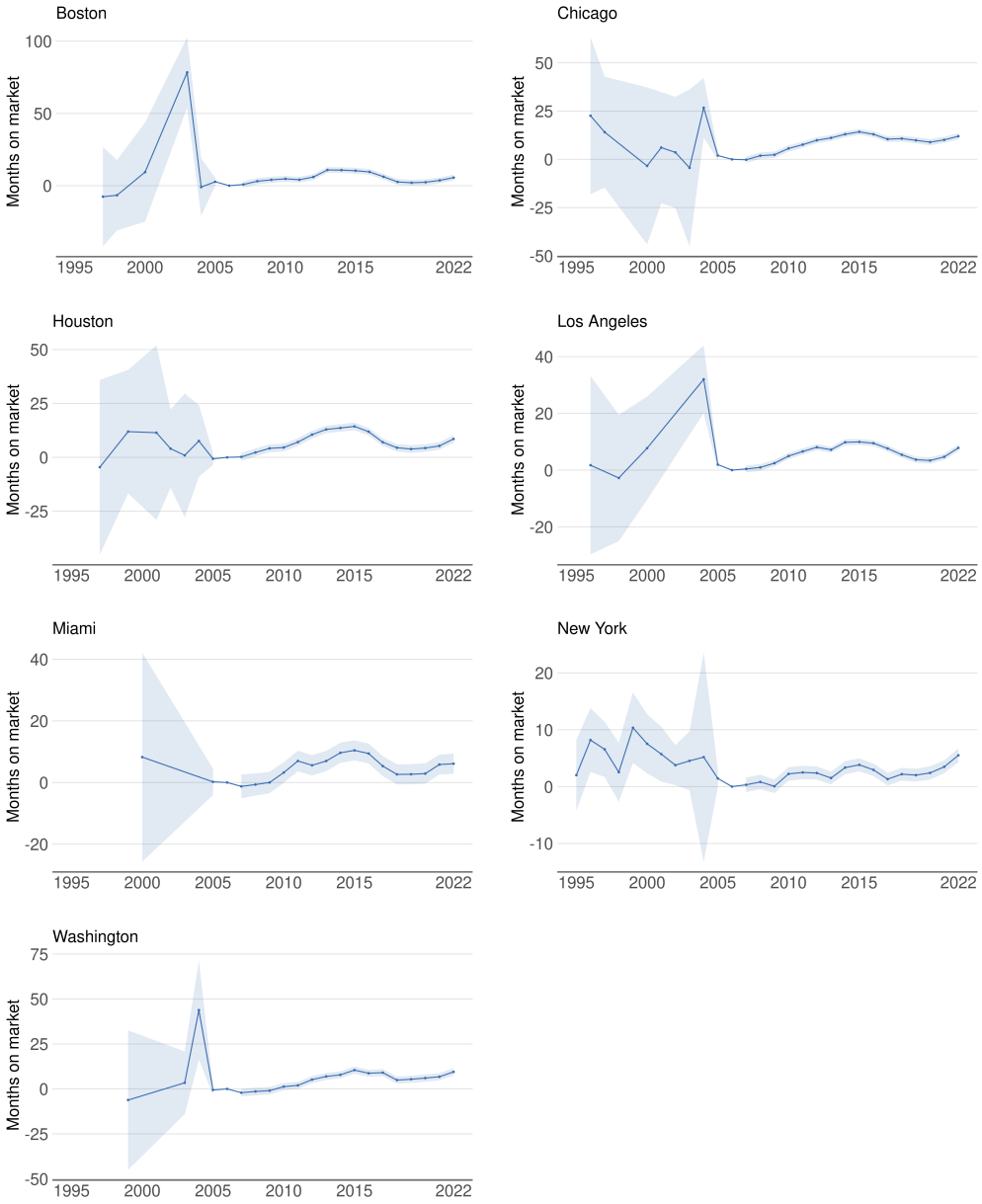
Note: This figure uses CoStar lease data and reports the total number of new leases by market and year.

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



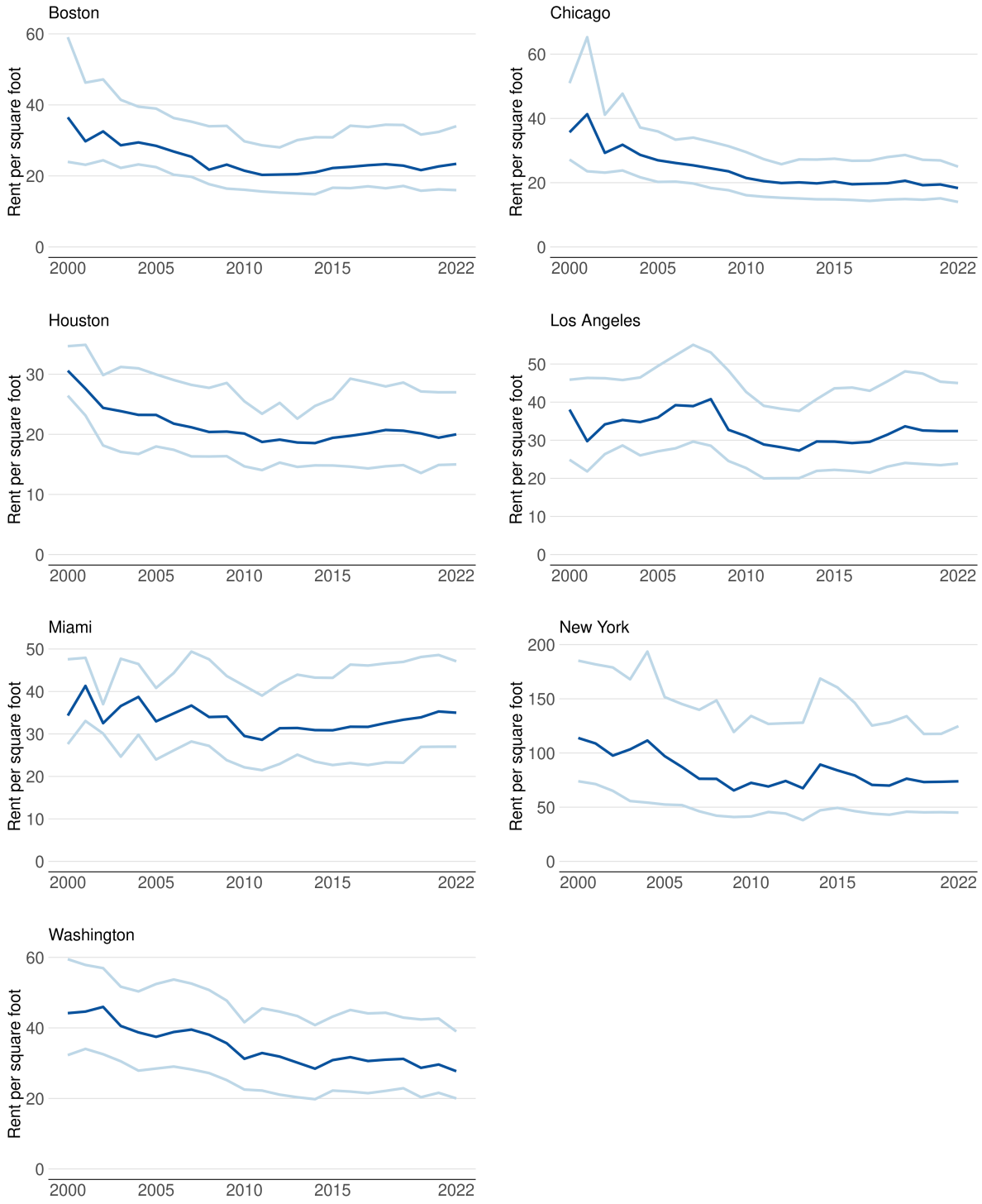
Note: This figure uses CoStar lease data and reports the total amount of square footage newly leased by market and year.

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.

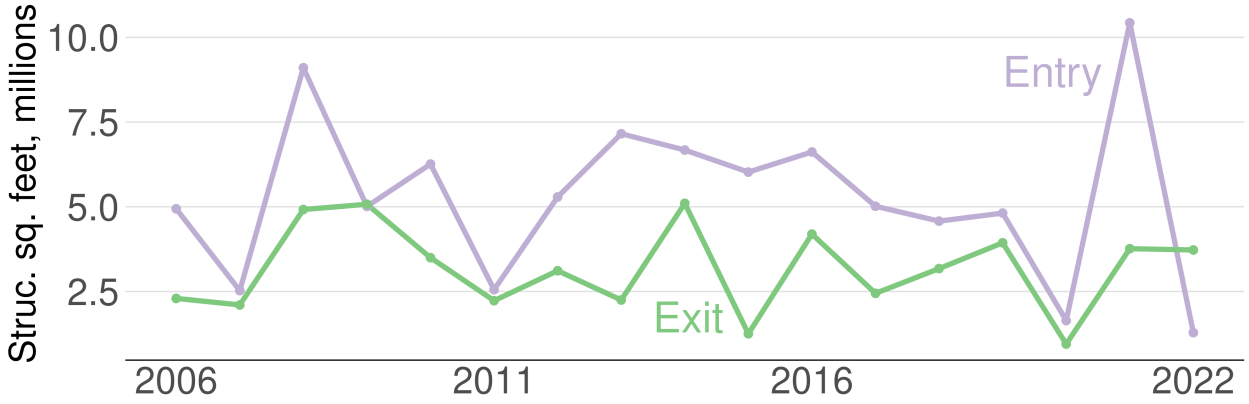
Figure 4: Distribution of Rent per Square Foot for New Leases by Market



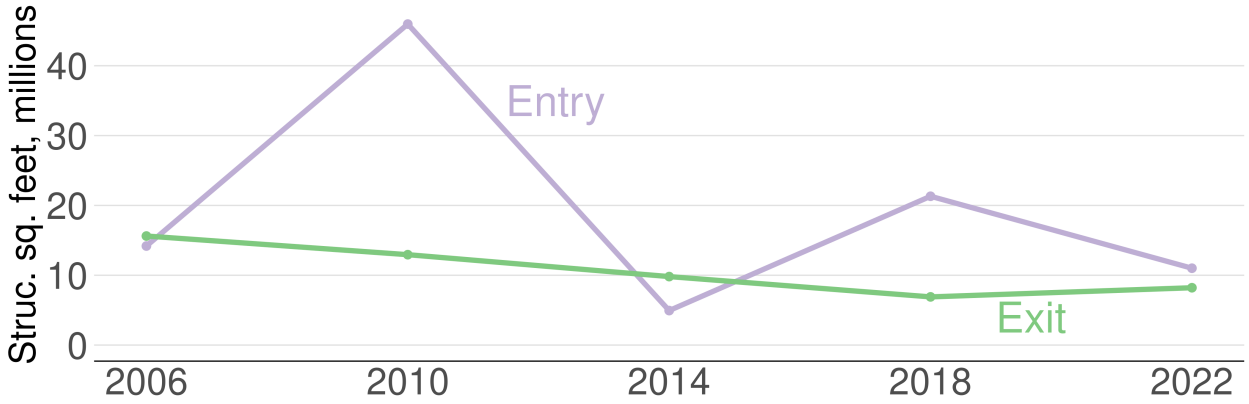
Note: This figure uses CoStar lease data and reports the median (dark blue), 25th percentile and 75th percentile (both in light blue) of asking rent per square foot in 2022 dollars by market and year.

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

(a) New York



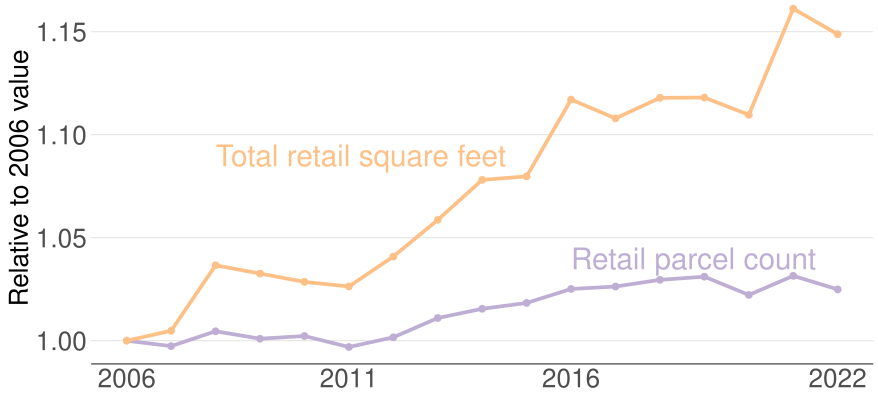
(b) Los Angeles



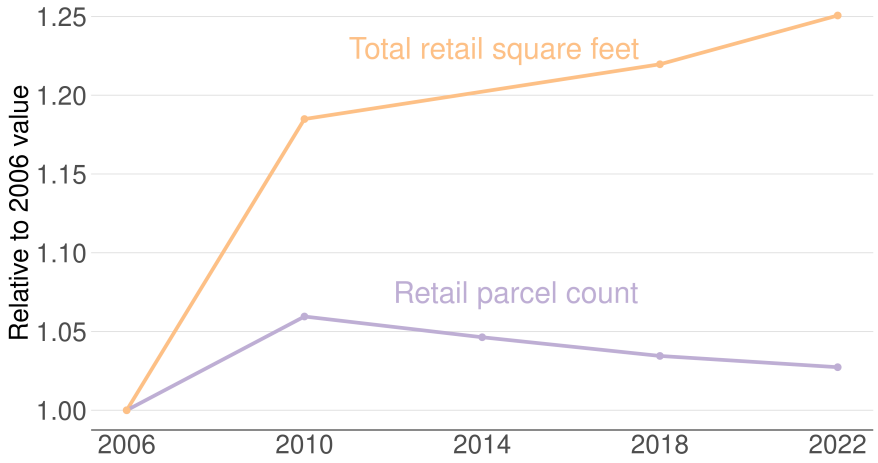
Note: New York: Land use data are from NYC's PLUTO database. The figure reports the total square footage of lots that are newly zoned retail (purple) and are converted away from retail zoning (green) in a given year. Los Angeles: Land use data are from the County Assessor, recording decisions by municipal 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



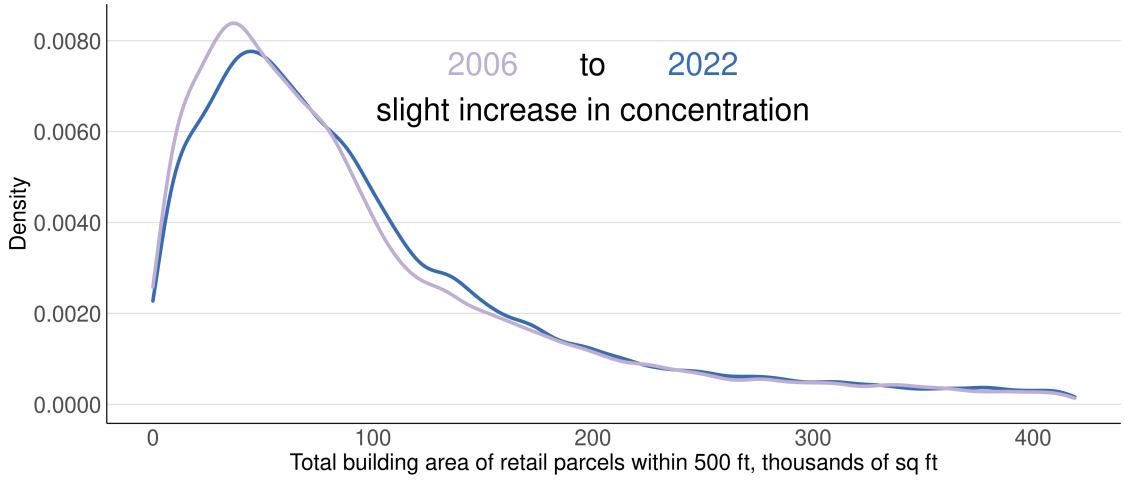
(b) Los Angeles



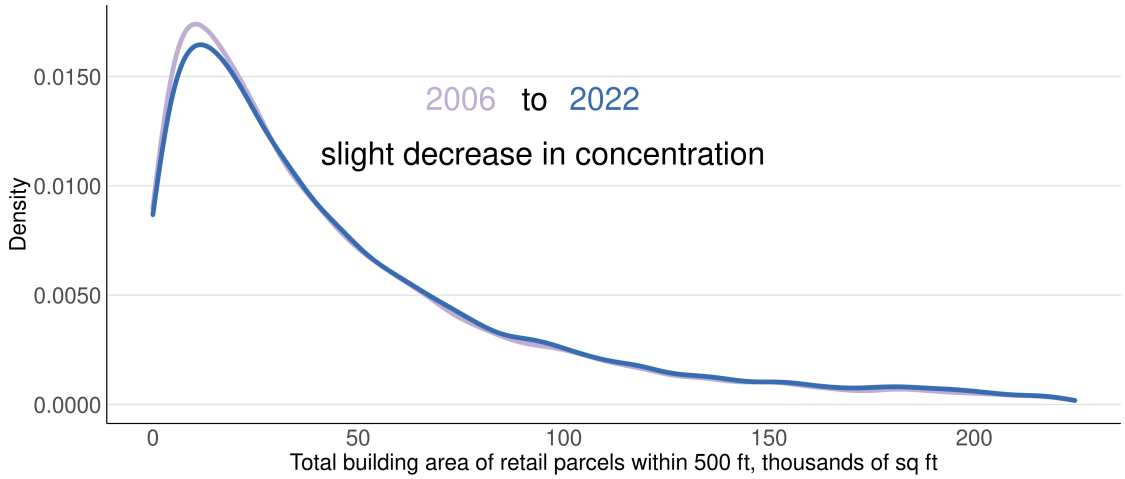
Note: New York: This figure uses NYC land use data to show the total number of retail parcels (purple) and total retail square footage (orange) for any given year from 2006 onward. All values are scaled relative to 2006, so that a value of, for example, 1.05, indicates a five percent growth from 2006. 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: Change in Retail Concentration

(a) New York

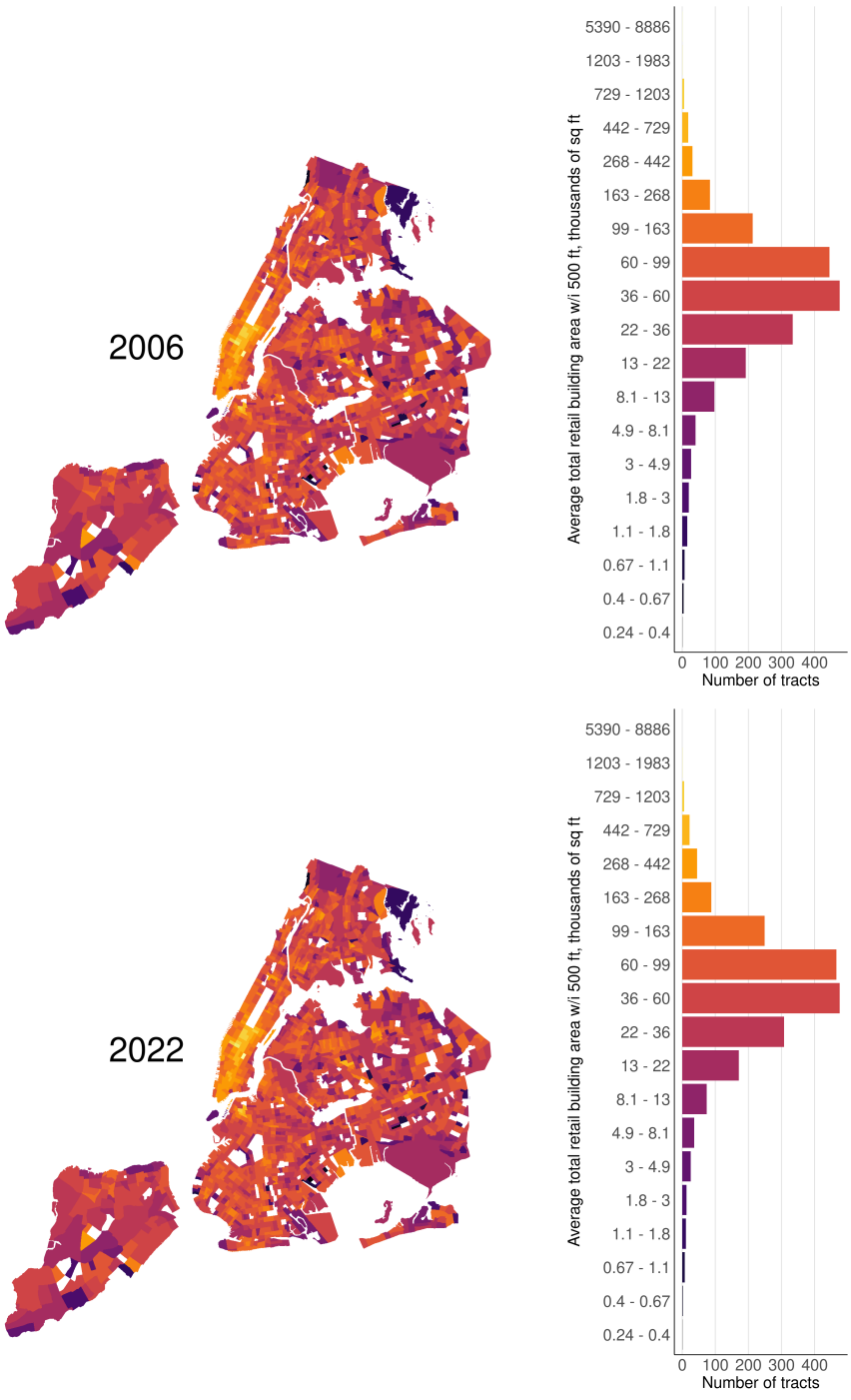


(b) Los Angeles



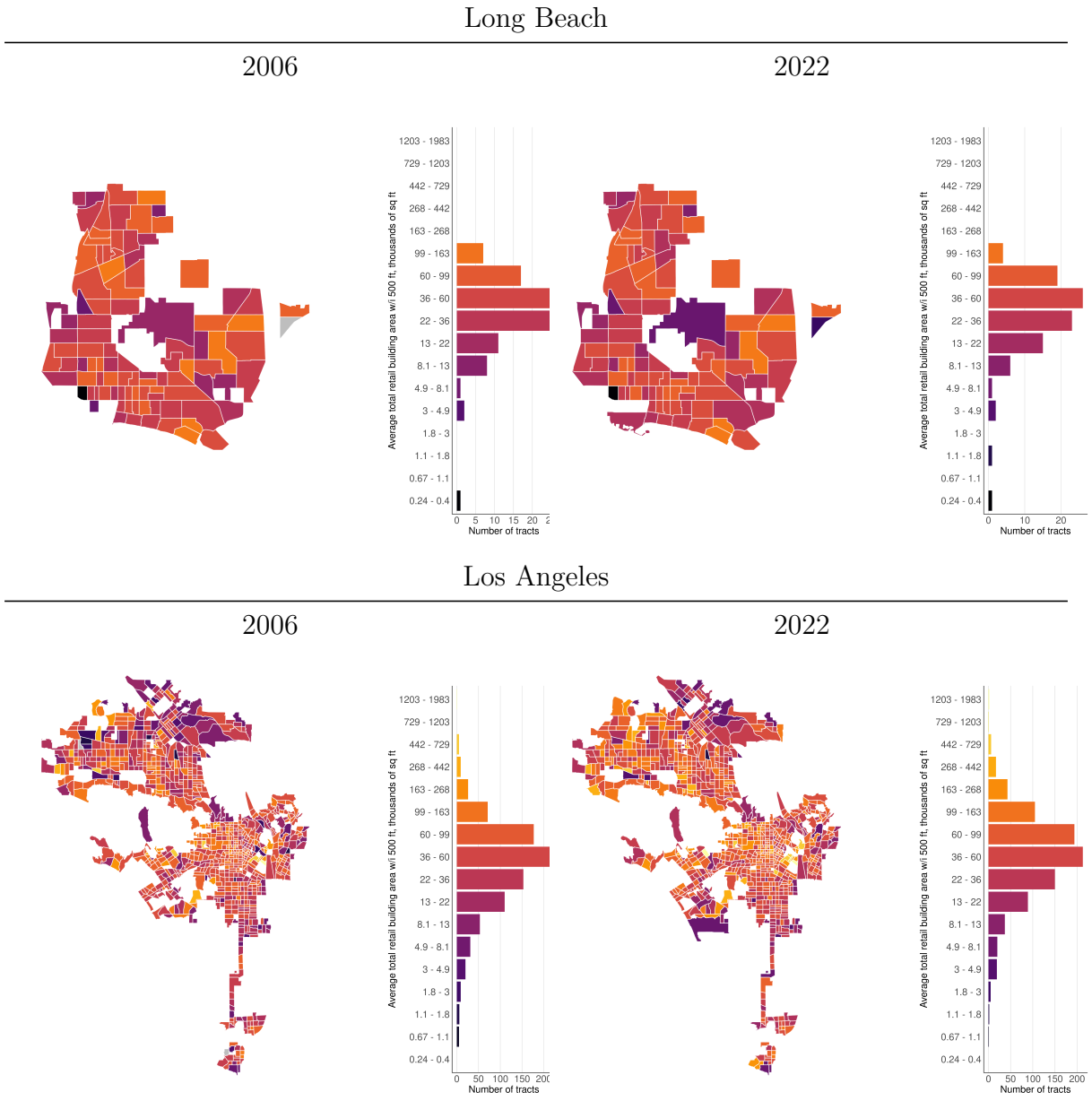
Note: New York: Land use data are from NYC's PLUTO. This figure shows the distribution of the parcel-level concentration measure (the total amount of retail square feet within 500 feet of a given lot) in 2006 and 2022. We use only parcels zoned for retail. For visibility, we show only parcels with concentration less than the 95th percentile. Los Angeles: Land use data are from the Los Angeles County Assessor. This figure uses parcels 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. This figure shows the distribution of the parcel-level concentration measure (the total amount of retail square feet within 500 feet of a given lot) in 2006 and 2022. We use only parcels zoned for retail. For visibility, we show only parcels with concentration less than the 95th percentile.

Figure 8: New York City: Clustering Changes, 2006 to 2022



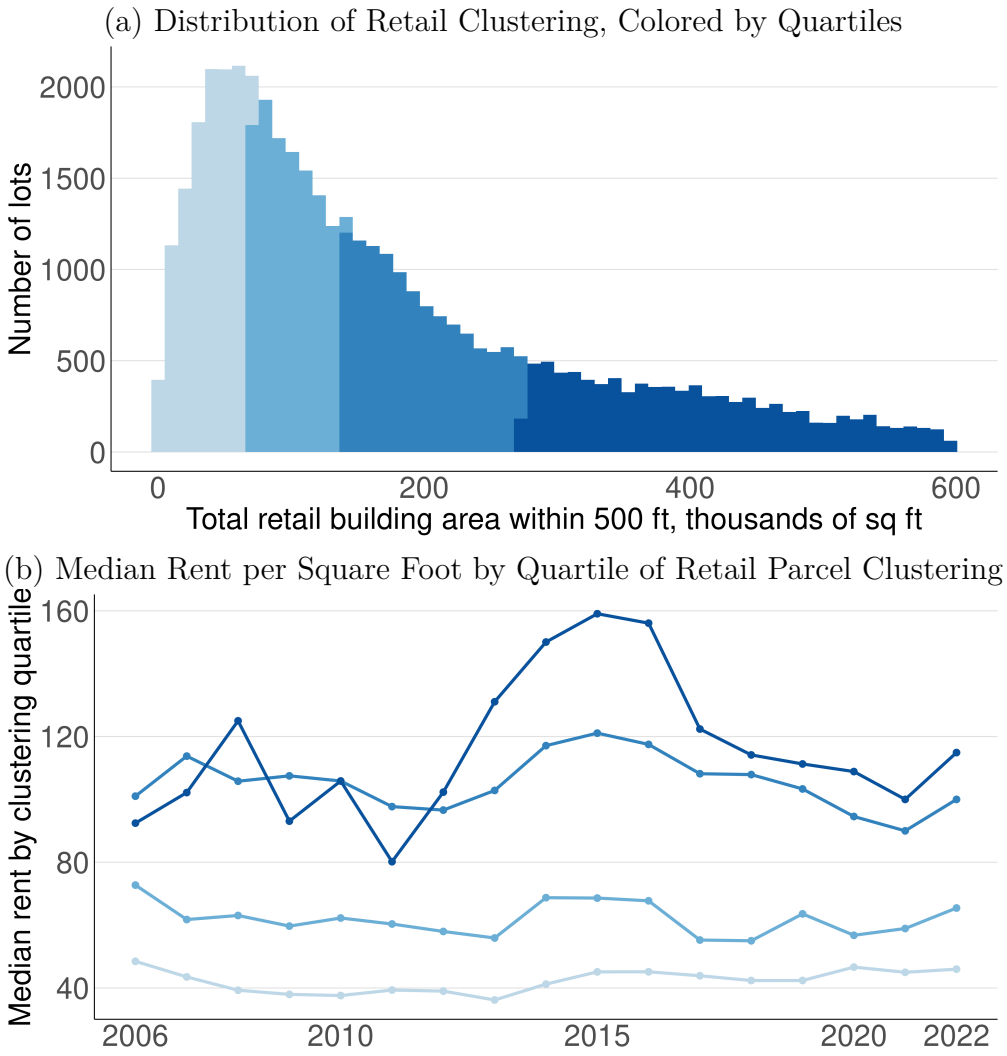
Note: Land use data are from NYC's PLUTO. The map shows the average retail concentration measure for census tracts, for 2006 and 2022. The vertical histograms show the distribution of retail concentration measure across the entire city, for 2006 and 2022. Lighter colors indicate more concentration.

Figure 9: Los Angeles and Long Beach: Clustering Changes, 2006 to 2022



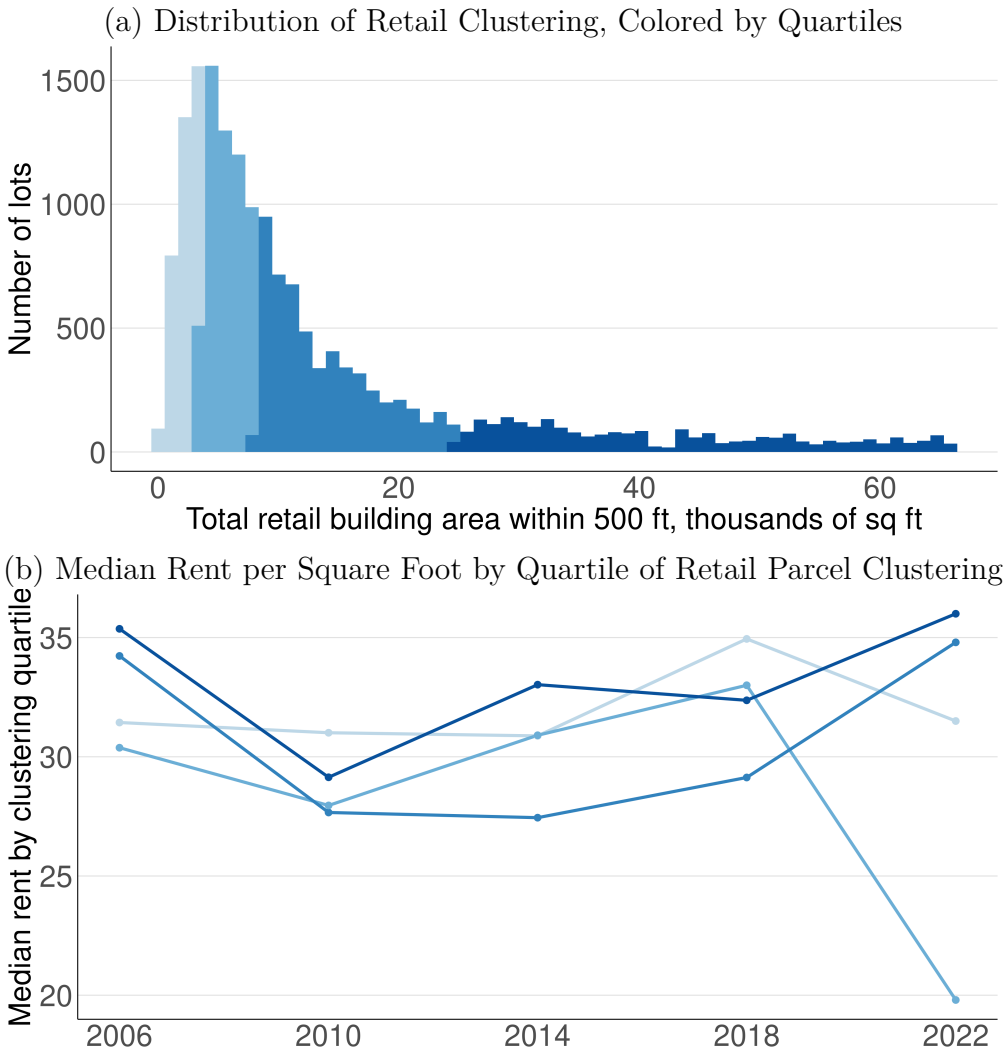
Note: Land use data are from the Los Angeles County Assessor. These maps use parcels in the city of Los Angeles and Long Beach. The maps show the average retail concentration measure for census tracts, for 2006 and 2022. The vertical histograms show the distribution of retail concentration measure across the entire city, for 2006 and 2022. Lighter colors indicate more concentration.

Figure 10: New York: Higher Rent 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 11: Los Angeles: Little Association Between Rent 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

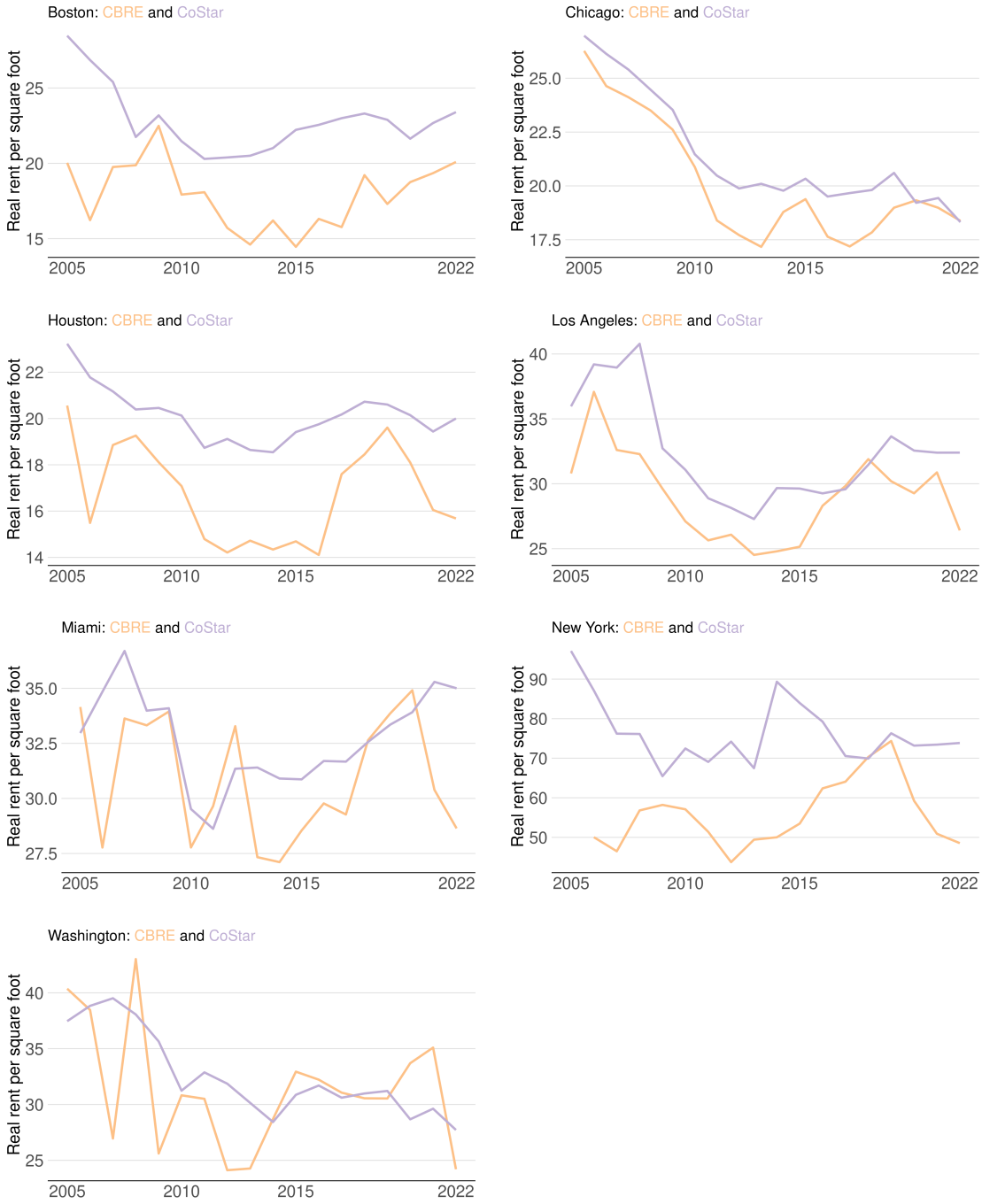
As a first attempt at validating the coverage and content of the CoStar data, we compare them to three alternative data sources. First, we consult CBRE, a global real estate services company that collects data on retail lease rates over time. CBRE makes data on rents available at aggregate levels (i.e., 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.

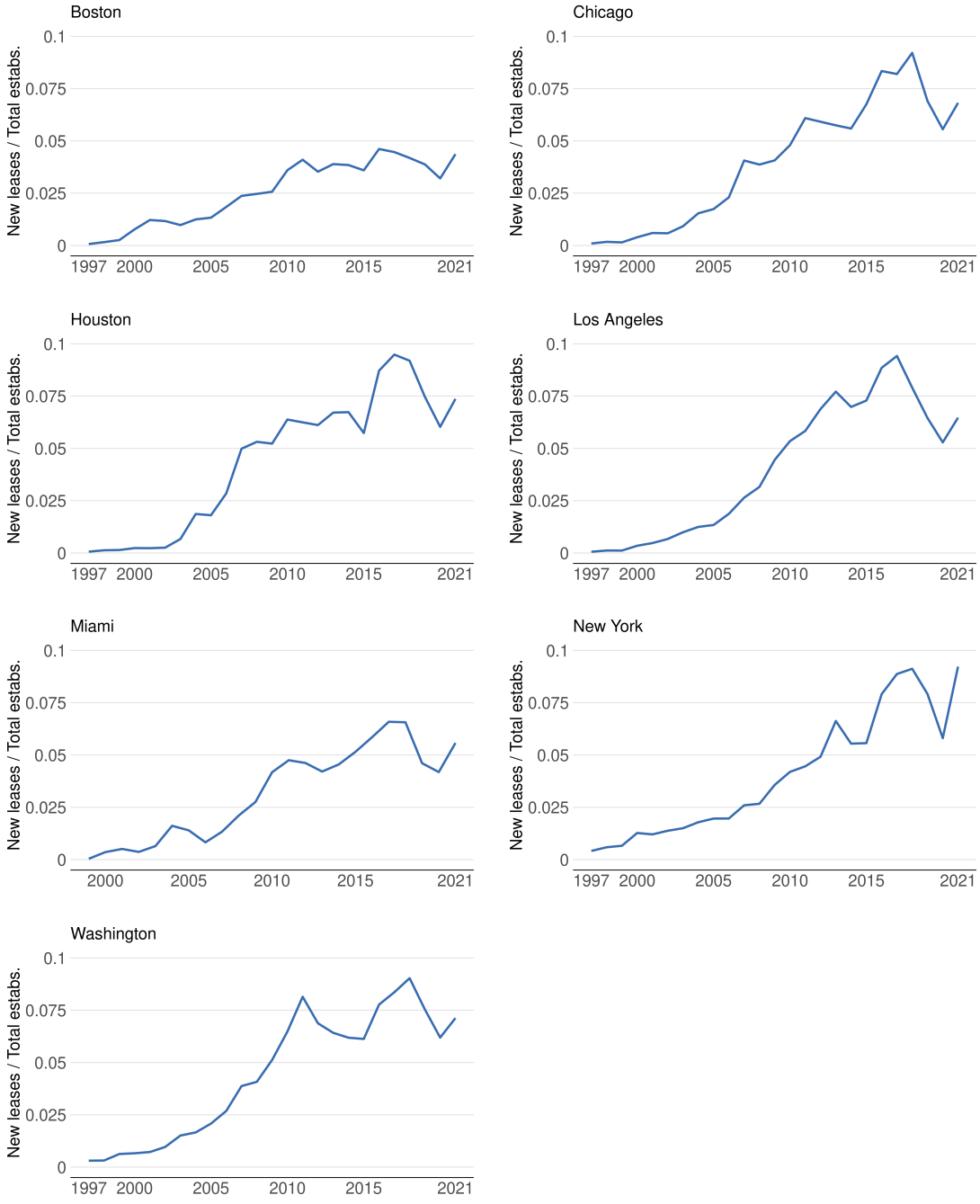
[15] We access these data from via a Wharton Research Data subscription provided by Harvard University.

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

	Average Annual Totals			Lease Share of Estabs.	
Market	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

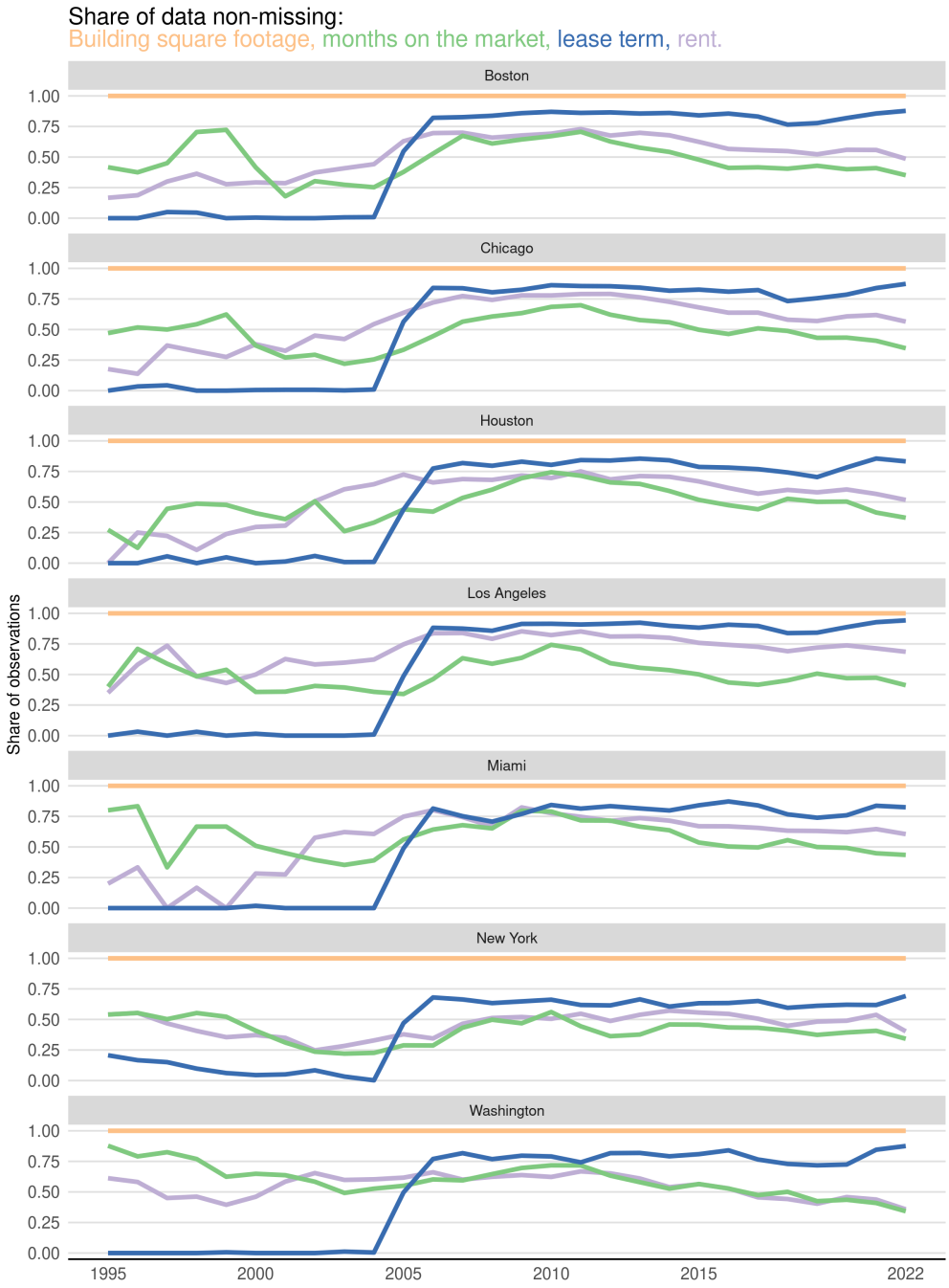
We now present summary statistics documenting retail leases from the CoStar data. First, we note that other than square footage, the coverage of information on rents and lease terms is not complete. In Appendix Figure 3 we report the share of observations by year that are missing data on the square footage 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.

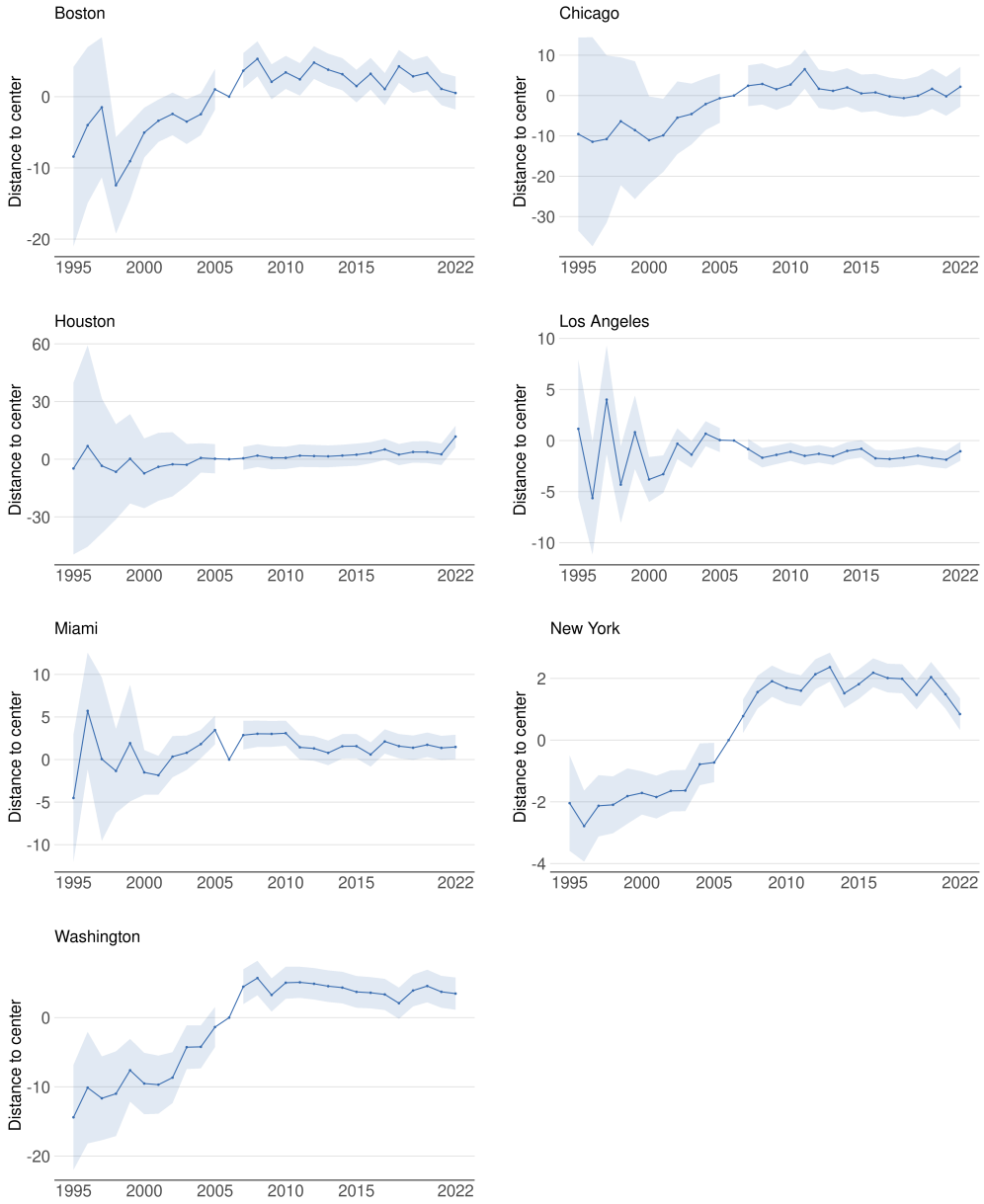
We also assess the CoStar data and its coverage with respect to the main variables of interest. Since the key contribution of the CoStar data is the information on rents, we divide the sample of leases into those with the (asking) rent field populated and those with that field missing. We show summary 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 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.

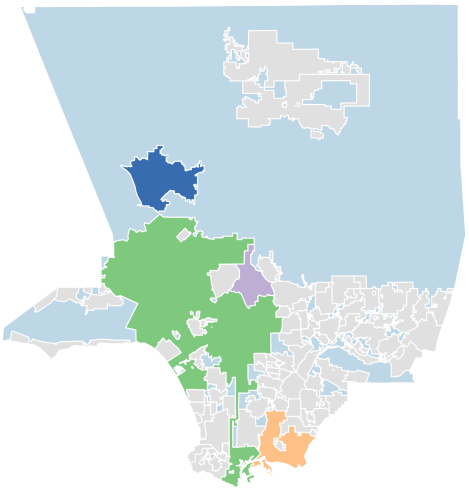
C Additional Figures and Tables

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

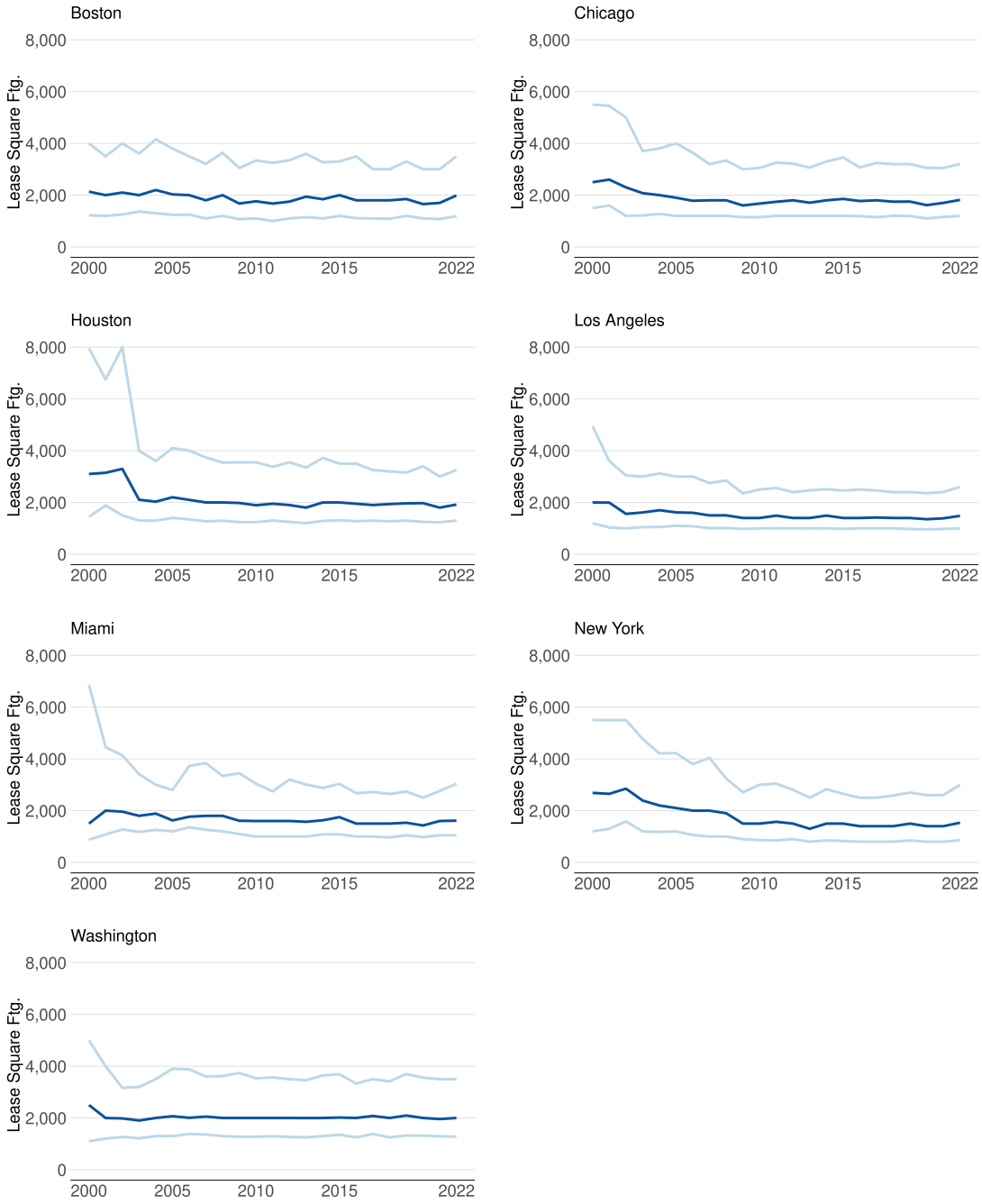


Note: The top figure shows the five boroughs of the city of New York in blue. The bottom figure shows the County of Los Angeles (omitting the offshore islands), with the areas we include in our analysis shown in color (those not included are shown in gray). We include the incorporated municipalities 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).

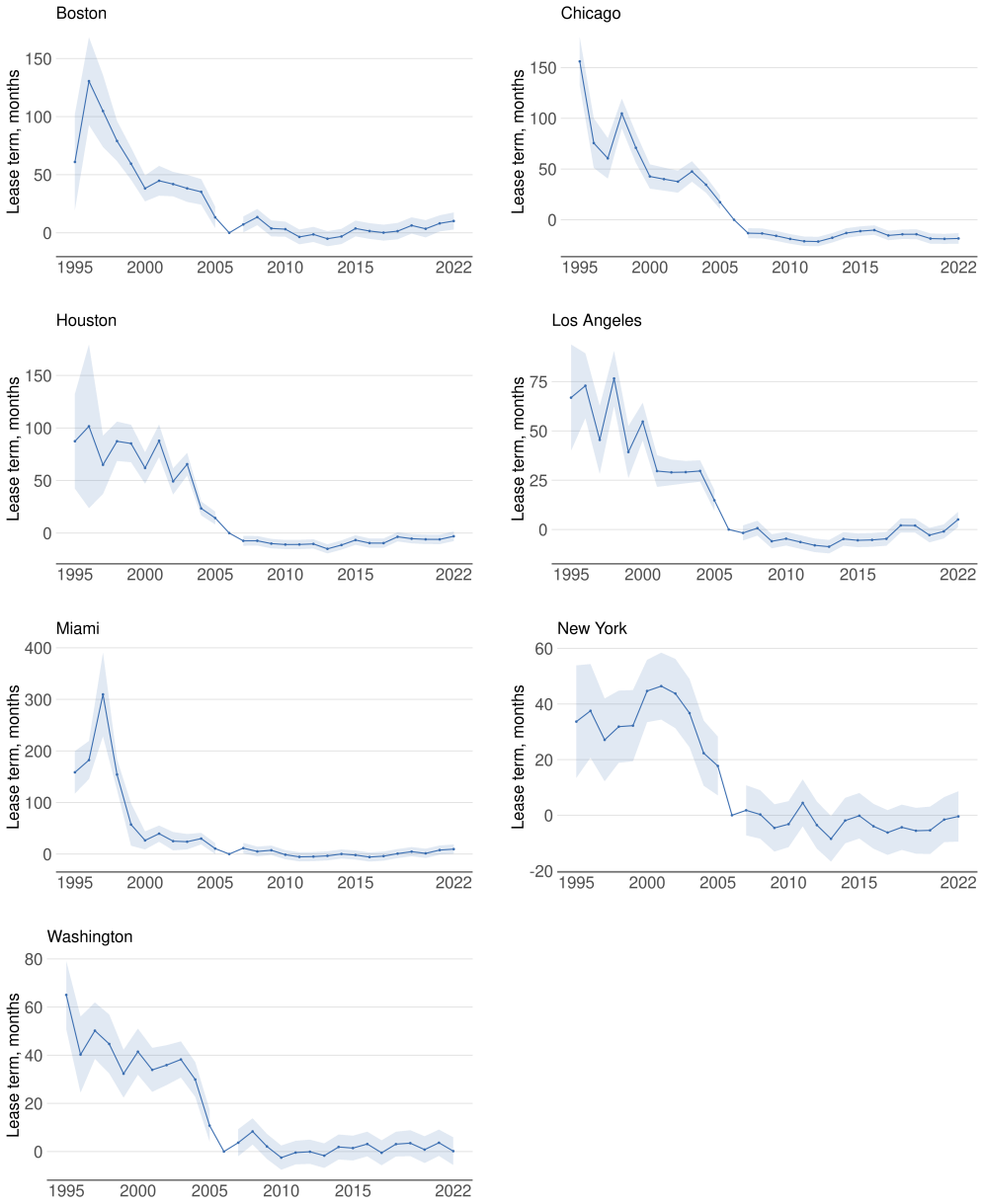
Appendix Figure 6: Distribution of New Square Footage Leased By Market

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



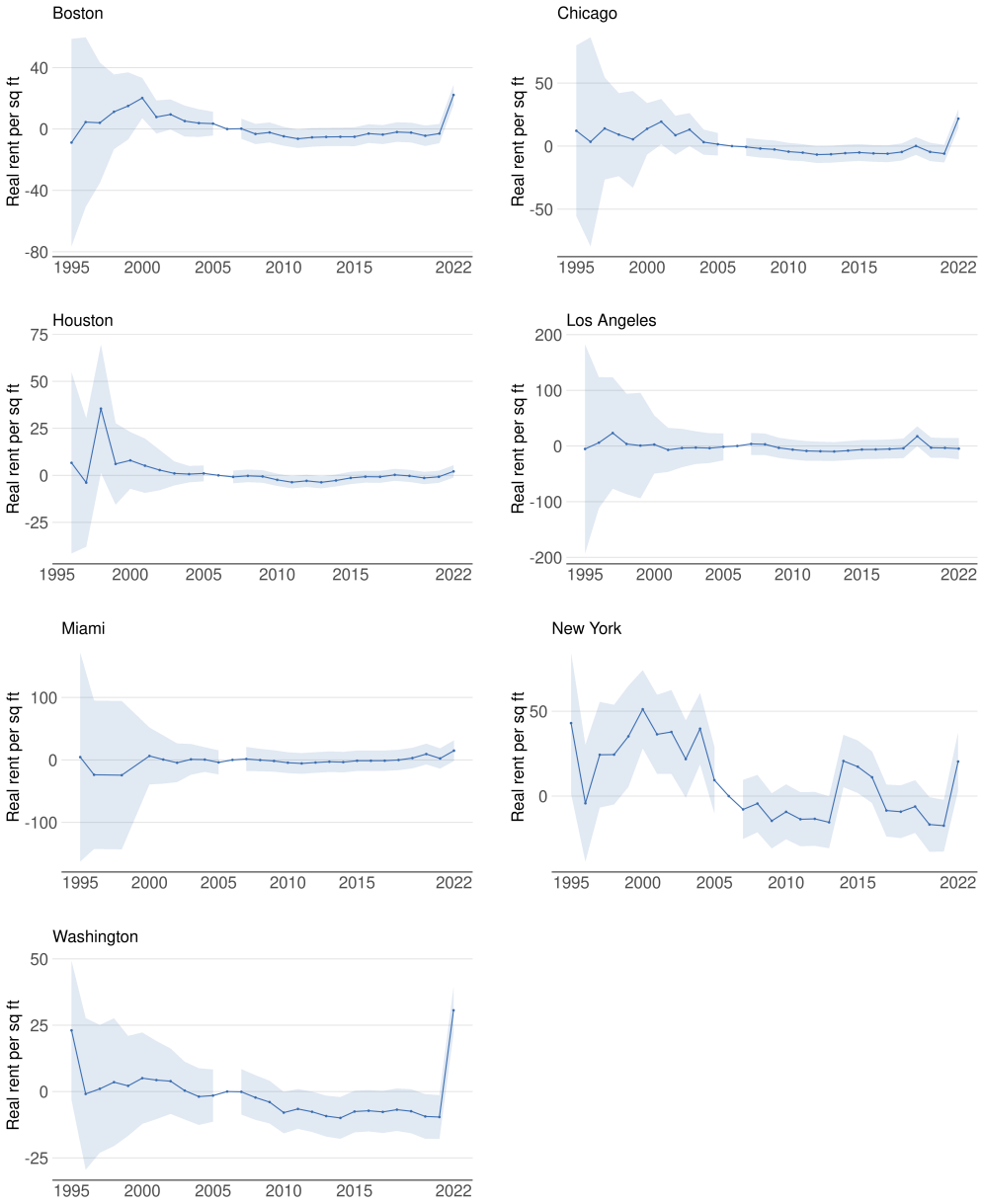
Note: This figure uses CoStar lease data and reports the median (dark blue), 25th percentile and 75th percentile (both in light blue) of leased square footage by market and year.

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



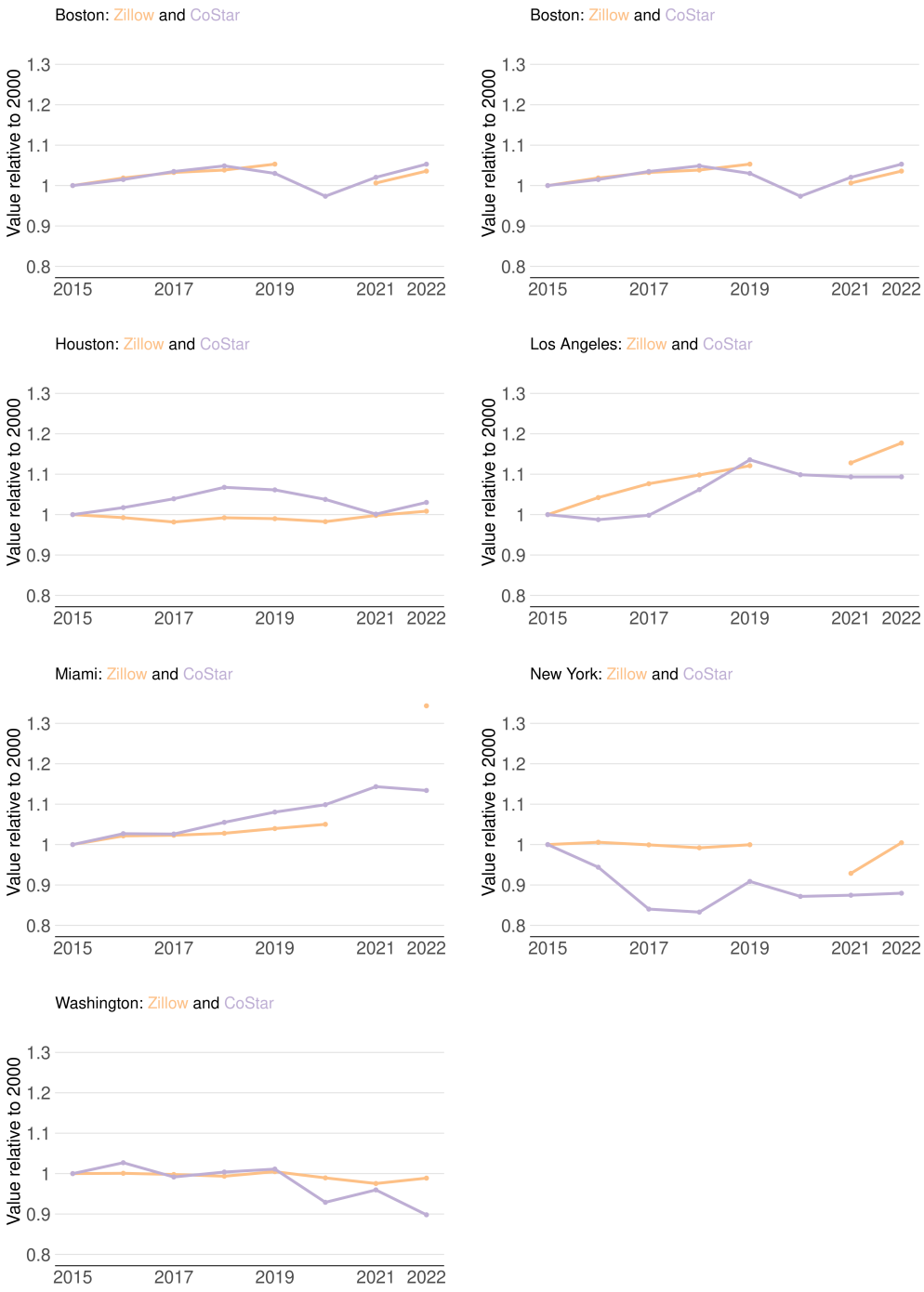
Note: We use geocoded CoStar lease data to regress a lease's term length in months on a set of year fixed effects, where we omit year 2006. This figure plots the coefficients on these year fixed effects, along with their standard errors (shown by the shading around the line). All values are relative 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 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

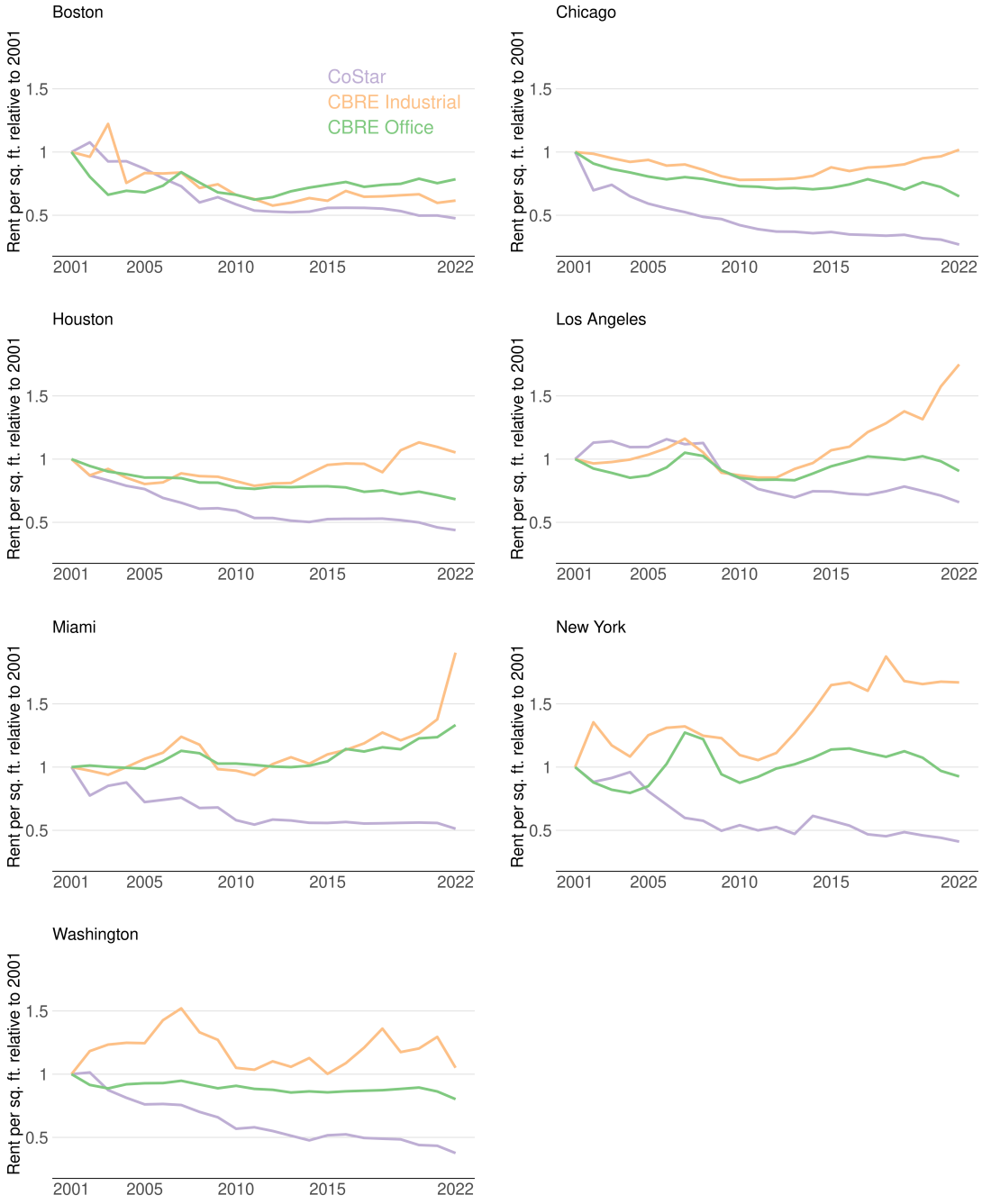


Note: This figure compares CoStar median retail rent per square foot in 2022 dollars (purple) to a Zillow residential rental price index (orange), also in 2022 terms. We normalize both indices to 1 in 2015. Because Zillow does not report a rental index for all markets and years, there are gaps in the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

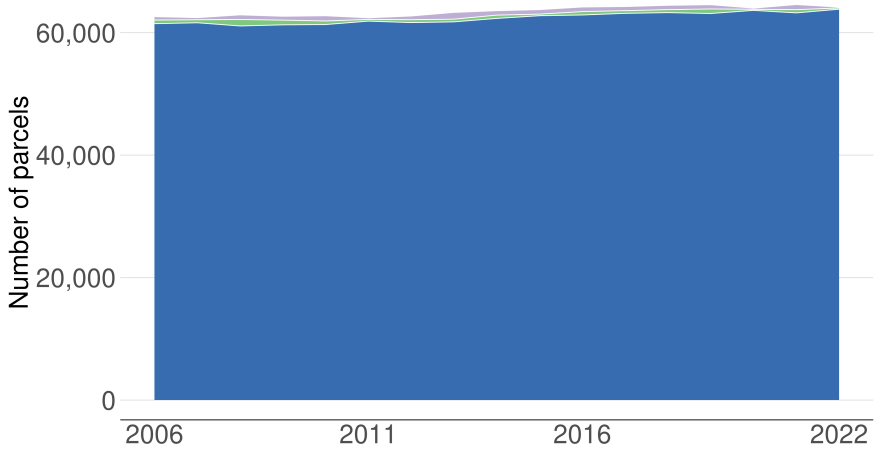


Note: This figure shows median CoStar retail rent per square foot (purple), and mean CBRE gross asking rent for office (green) and industrial properties (orange), all by market and year. We adjust both series for inflation, and normalize all values to one in 2001 when our data series are complete for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

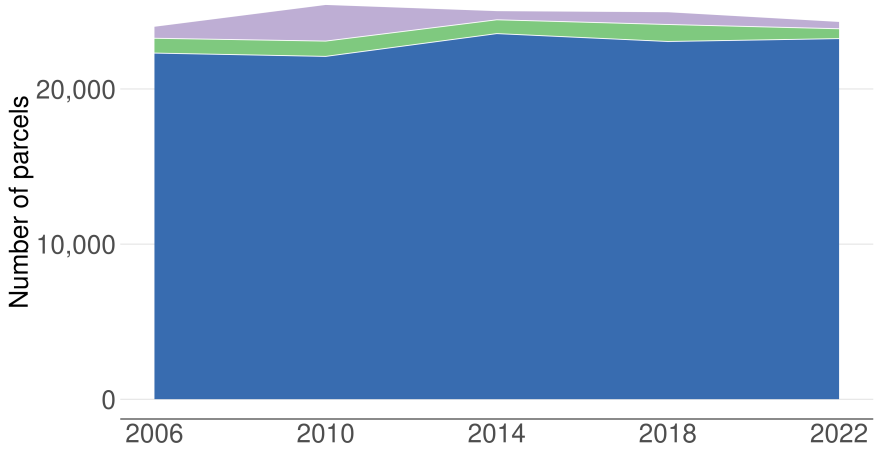
Appendix Figure 12: Most Retail Parcels Do Not Change Zoning Classifications

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

h (a) New York

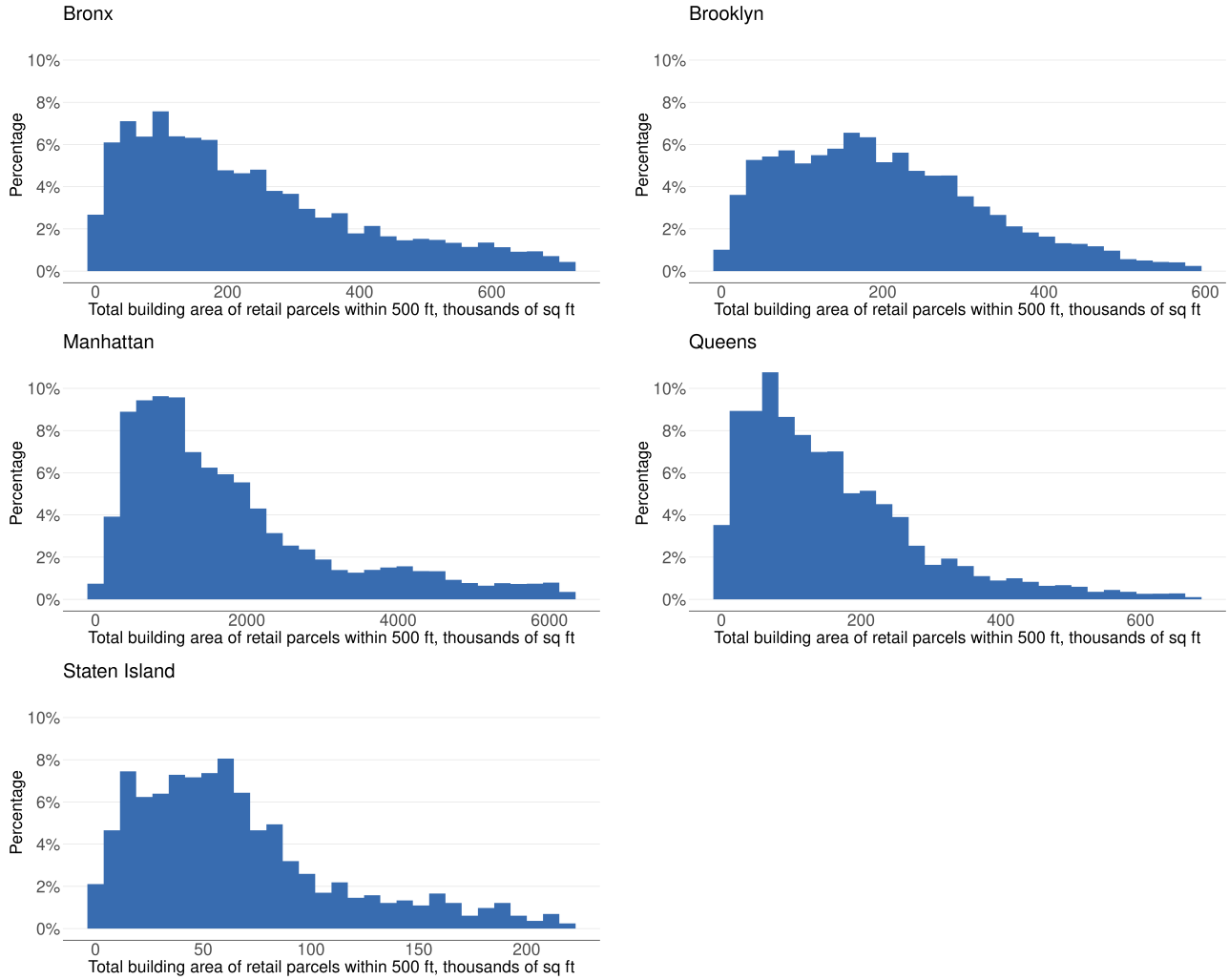


(b) Los Angeles



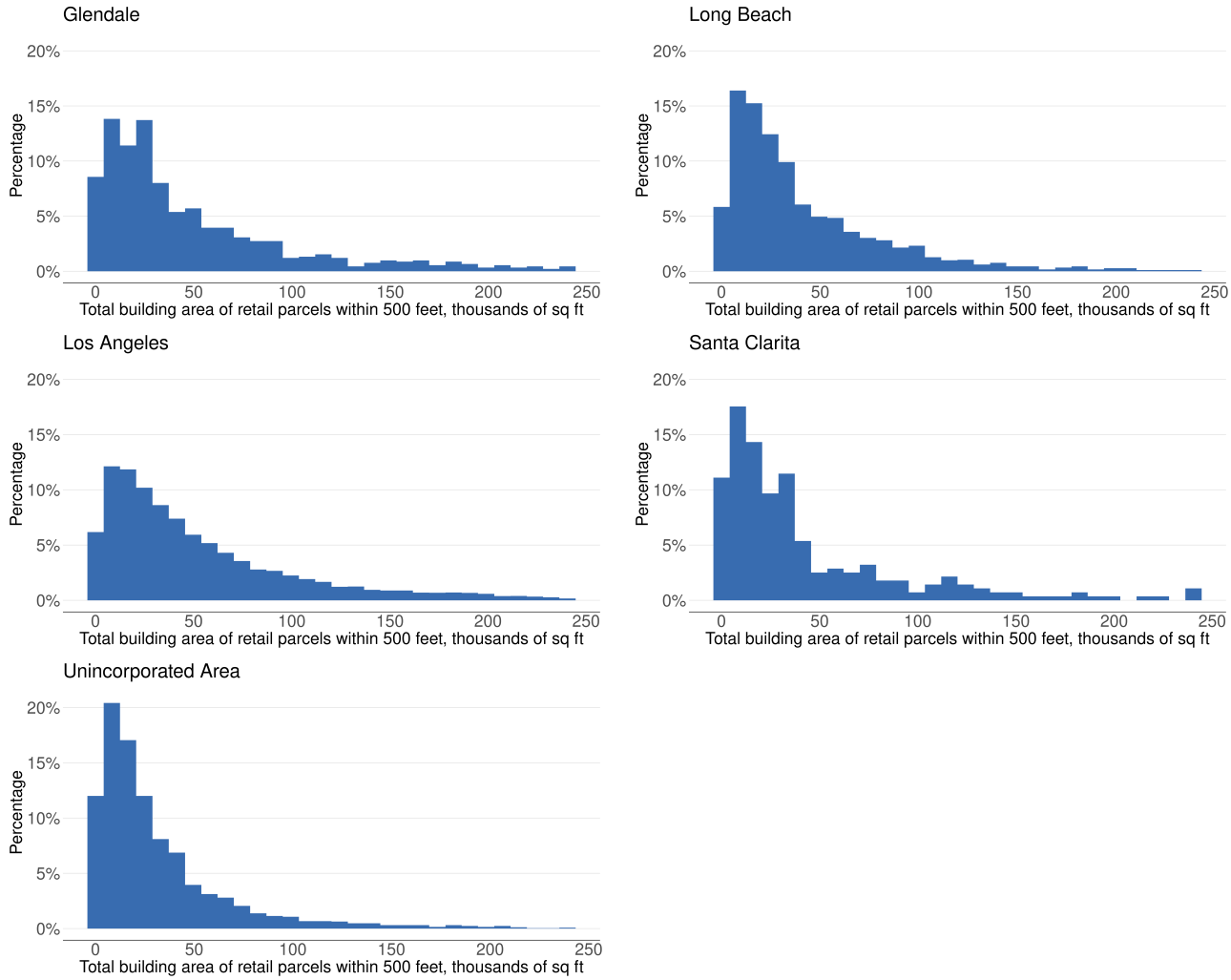
Note: New York: Land use data are from NYC's PLUTO database. The figure reports the total number of lots that remain zoned as retail (blue), are newly zoned retail (purple), and are converted away from retail zoning (green) in a given year. Los Angeles: Land use data are from the municipal planning departments 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.

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.