MERCATUS SPECIAL STUDY

# RISING HOME PRICES ARE MOSTLY FROM RISING RENTS

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## ABSTRACT

Home prices have been rising, unusually, since the mid-1990s. This increase could be attributed to any number of factors, either temporary or permanent, sustainable or imminently reversible. Those factors include low interest rates, speculation, federal subsidies, and monetary stimulus. In fact, however, rising rents have been the primary factor driving up home prices. This is especially true, in 2021, for the ZIP codes where prices are rising the most. For the period before the Great Recession, the importance of rent is most clear in cross-sectional comparisons of metropolitan areas. The metropolitan areas with the highest rents also had the highest prices. Since the Great Recession, the importance of rents requires looking within metropolitan areas. Generally, in ZIP codes with lower incomes, rents have risen faster, and thus so have prices. This finding has important policy implications. If prices are rising because of monetary stimulus, speculative activity pushing prices above a sustainable norm, or other cyclical or temporary demand factors, then policymakers may aim to pull back on economic stimulus or aim for slowing residential investment, as the Federal Reserve did before the Great Recession. However, if rising rents are the more important factor, then policies aimed at stimulating more construction may be more apt and may help increase real incomes for Americans in neighborhoods where rents have been rising.

*JEL* code: R310

Keywords: housing, housing price determination, housing prices, housing supply, regional housing market, rent, residential real estate

Home prices have risen considerably since the mid-1990s. This upsurge could be attributed to any number of factors that are (a) temporary or permanent or (b) sustainable or imminently reversible. Plausible causes of rising prices could include low interest rates, speculation, federal subsidies, and monetary stimulus. In fact, rising rents have been the primary factor driving up home prices, which was especially true in 2021 for the ZIP codes where prices were rising the most.

For the period before the Great Recession, the importance of rent was most clear in cross-sectional comparisons of metropolitan areas. The metropolitan areas with the highest rents also had the highest home prices. Since the Great Recession, the importance of rents requires looking within metropolitan areas. Generally, rents have risen faster in ZIP codes with lower incomes than in ZIP codes with higher incomes, and because rents in those ZIP codes have risen faster, so have prices.

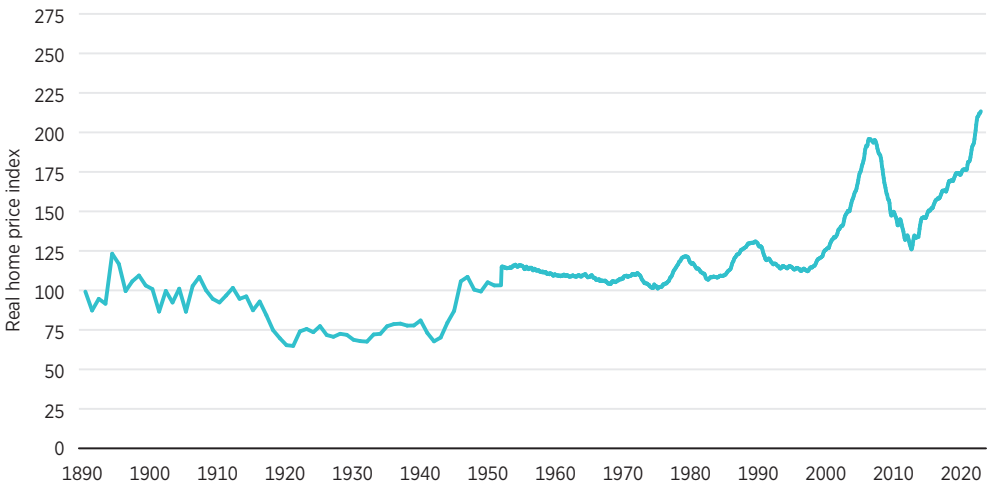
This change has important policy implications. If prices are rising because of monetary stimulus, speculative activity pushing prices above a sustainable norm, or other cyclical or temporary demand factors, then policymakers may aim to pull back on stimulating the economy or may aim for slowing residential investment—as the Federal Reserve did before the Great Recession. However, if rising rents are the more important factor, then policies aimed at stimulating increased construction may be more apt and may help increase real incomes for Americans in neighborhoods where rents have been rising.

## AGGREGATE NATIONAL PRICE MEASURES

One commonly referenced measure of home prices is the Case Shiller Home Price Index, which is shown in figure 1 and is adjusted for inflation.[1] Charts using

1. Case Shiller Home Price Index, "Index for Oct 2017" (dataset), https://www.multpl.com/case-shiller-home-price-index-inflation-adjusted.

FIGURE 1. CASE SHILLER HOME PRICE INDEX, 1890–2020




Source: Case Shiller Home Price Index, "Index for Oct 2017" (dataset), https://www.multpl.com/case-shiller-home-price-index-inflation-adjusted.

this index were widely cited during the housing boom of 2000–2005. The figure shows real home prices that were flat for a century or more before shooting up to unprecedented levels during the housing boom. Prices briefly retouched the preboom range before rising again in recent years.

Figure 1 draws a picture of unsustainability, reflected notably in the output of Professor Robert J. Shiller himself, including his book *Irrational Exuberance*[2] and his 2014 Nobel Prize lecture titled "Speculative Asset Prices."[3] However, adjusting for general inflation does not completely rule out fundamentals, because if the housing supply is constrained, then rent inflation will be higher than general inflation. This fact has been strikingly the case. From the end of 1976 until the end of 2020, the consumer price index (CPI) for shelter increased by nearly 60 percent compared to the CPI for all items excluding shelter.[4] It is possible that, over the

2. Robert J. Shiller, *Irrational Exuberance* (Princeton, NJ: Princeton University Press, 2005).
3. Robert J. Shiller, "Speculative Asset Prices (Nobel Prize Lecture)" (Discussion Paper No. 1936, Cowles Foundation for Research in Economics, New Haven, CT, 2014), https://ssrn.com/abstract=2391284 or http://dx.doi.org/10.2139/ssrn.2391284.
4. US Bureau of Labor Statistics, "Consumer Price Index for All Urban Consumers: All Items Less Shelter in U.S. City Average," FRED (database), Federal Reserve Bank of St. Louis, October 13, 2021, https://fred.stlouisfed.org/series/CUSR0000SA0L2; US Bureau of Labor Statistics, "Consumer Price Index for All Urban Consumers: Shelter in U.S. City Average," FRED (database), Federal Reserve Bank of St. Louis, October 13, 2021, https://fred.stlouisfed.org/series/CUSR0000SAH1; and US Bureau of Labor Statistics, "Consumer Price Index for All Urban Consumers: Shelter in U.S. City Average/Consumer

long term, rising rents are an adequate explanation for rising home prices and that an excessive focus on cyclical variations around a rising baseline has obscured the more fundamental cause of high prices.

The rate of 30-year, fixed-rate mortgages has declined from a peak of more than 16.0 percent in the early 1980s to a level of about 7.5 percent in the 1990s and more recently further down to levels below 3.0 percent.[5] Before the 1990s, much of that shift was in the inflation premium, which should not have as strong an influence on real estate values. Since the 1990s, much of the decline has been in real rates (interest rates after adjusting for inflation). Yields on Treasury inflation-indexed bonds were about 4 percent in the late 1990s and have been negative for most of 2020 and 2021.[6]

Those declining rates are one reason home prices could rise above previous norms. However, over the same time, rents have been rising, which offers an alternative explanation for rising home prices. This increase is evident both in rent inflation, as noted earlier, and in the increasing portion of personal incomes being claimed by rental value of homes.[7] Of course, mortgage rates have recently increased substantially, which likely reflects both rising real rates and inflation concerns. Readers should keep in mind that the quantitative analysis shown next is restricted to data that predate the recent changes in interest rates. Yet this analysis does suggest that low interest rates have not been as important as rising rents in driving home prices higher; thus, their recent spike may not be as important a development as it seems.

One way to try to separate the influence of rents from interest rates and other factors is to measure price-to-rent ratios. The inverse rent-to-price ratio reflects a gross yield on real estate investment, so when real interest rates decline, one might expect price-to-rent ratios to rise, which has been the case. Figure 2 shows the aggregate estimate of market value of owner-occupied homes against

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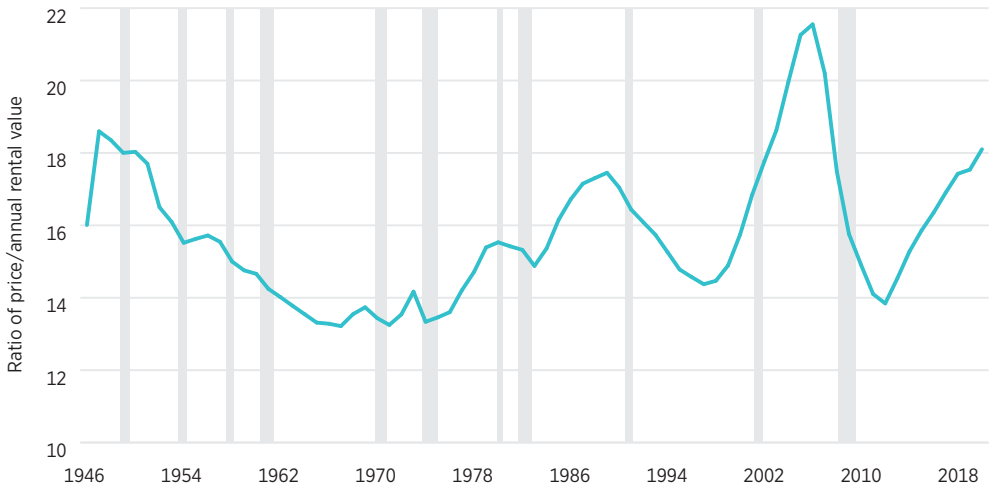
Price Index for All Urban Consumers: All Items Less Shelter in U.S. City Average" FRED (database), Federal Reserve Bank of St. Louis, October 13, 2021, https://fred.stlouisfed.org/graph/?g=HHKw.

5. Freddie Mac, "30-Year Fixed Rate Mortgage Average in the United States," FRED (database), Federal Reserve Bank of St. Louis, October 12, 2021, https://fred.stlouisfed.org/series/MORTGAGE30US.

6. Board of Governors of the Federal Reserve System, "Market Yield on U.S. Treasury Securities at 30-Year Constant Maturity, Quoted on an Investment Basis, Inflation-Indexed," FRED, Federal Reserve Bank of St. Louis, October 13, 2021, https://fred.stlouisfed.org/series/DFII30. Haver Analytics and Dow Jones & Company, "30-Year 3-5/8% Treasury Inflation-Indexed Bond, Due 4/15/2028," FRED, Federal Reserve Bank of St. Louis, October 13, 2021, https://fred.stlouisfed.org/series/DTP30A28.

7. US Bureau of Economic Analysis, "Personal Consumption Expenditures by Type of Product: Services: Household Consumption Expenditures: Housing," FRED, Federal Reserve Bank of St. Louis, October 13, 2021, https://fred.stlouisfed.org/series/DHSGRC0. US Bureau of Economic Analysis, "Personal Income," FRED, Federal Reserve Bank of St. Louis, October 13, 2021, https://fred.stlouisfed.org/series/PI.

FIGURE 2. MARKET VALUE/RENTAL VALUE OF US OWNER-OCCUPIED RESIDENTIAL REAL ESTATE




Source: FRED database.

Note: Shaded areas indicate US recessions.

their rental value. The estimate removes some of the upward trend from the inflation-adjusted Case Shiller index, but prices by this measure were still elevated before the Great Recession as they have again been recently.[8] Again, this finding could reflect low interest rates or any other number of cyclical or secular factors. In any case, when one views aggregate national data, it does appear that prices have moved up in a way that rents have not.[9]

Yet this observation should create a bit of doubt about inferences that may be drawn from the inflation-adjusted Case Shiller index. That index infers a very

8. Bureau of Economic Analysis, "Imputed rental of owner-occupied housing," FRED (database), Federal Reserve Bank of St. Louis, October 12, 2021, https://fred.stlouisfed.org/series/A2013C1A027NBEA. Board of Governors of the Federal Reserve System, "Households; Owner-Occupied Real Estate Including Vacant Land and Mobile Homes at Market Value, Market Value Levels," FRED (database), Federal Reserve Bank of St. Louis, October 12, 2021, https://fred.stlouisfed.org/series/HOOREVLMHMV. Board of Governors, "Households; Owner-Occupied Real Estate Including Vacant Land and Mobile Homes at Market Value, Market Value Levels/Imputed Rental of Owner-Occupied Housing," FRED (database), Federal Reserve Bank of St. Louis, July 11, 2022, https://fred.stlouisfed.org/graph/?g=HHSD. US Bureau of Economic Analysis, "Imputed Rental of Owner-Occupied Housing" [A2013C1A027NBEA], FRED (database), Federal Reserve Bank of St. Louis, July 11, 2022, https://fred.stlouisfed.org/series/A2013C1A027NBEA. Board of Governors, "Households; Owner-Occupied Real Estate Including Vacant Land and Mobile Homes at Market Value, Market Value Levels" [HOOREVLMHMV], FRED (database), Federal Reserve Bank of St. Louis, July 11, 2022, https://fred.stlouisfed.org/series/HOOREVLMHMV.

9. The data in figure 2 are only updated annually and are current only to 2020. Therefore the figure does not include the most recent rise in prices.

long-term price stability that suddenly swung widely away from all previous norms. The price-to-rent trend does not show such a binary before-and-after pattern, which should create doubt at two levels.

First, the trend muddies the stark picture drawn by the Case Shiller measure. When taking rents into account, prices appear to have become more volatile but are not so clearly outside a long-term range.

Second, price appreciation of durable assets can be due to (a) ongoing short-term or cyclical fluctuations, (b) declining discount rates (which are likely to correlate with long-term real Treasury rates or mortgage rates), (c) rising cash flows (which are represented by rental value), or (d) rising expectations of future cash flows (expected future rent inflation).

The first two categories might be referred to as *demand* factors and the second two as *supply* factors. Rising rents can come from inadequate or inelastic supply. The fact that accounting for rising rents explains much of the increase in prices suggests that inelastic supply is an important component causing price appreciation. Moreover, rising rents could lead to both rising volatility and rising price-to-rent ratios, because rising rents from supply constraints leads to both (a) less of a tether to the cost of construction as a price moderator and (b) more volatile expectations of future rent increases, which will affect current prices because of both changing expectations of future cash rents and changes to the discount rate applied to them.

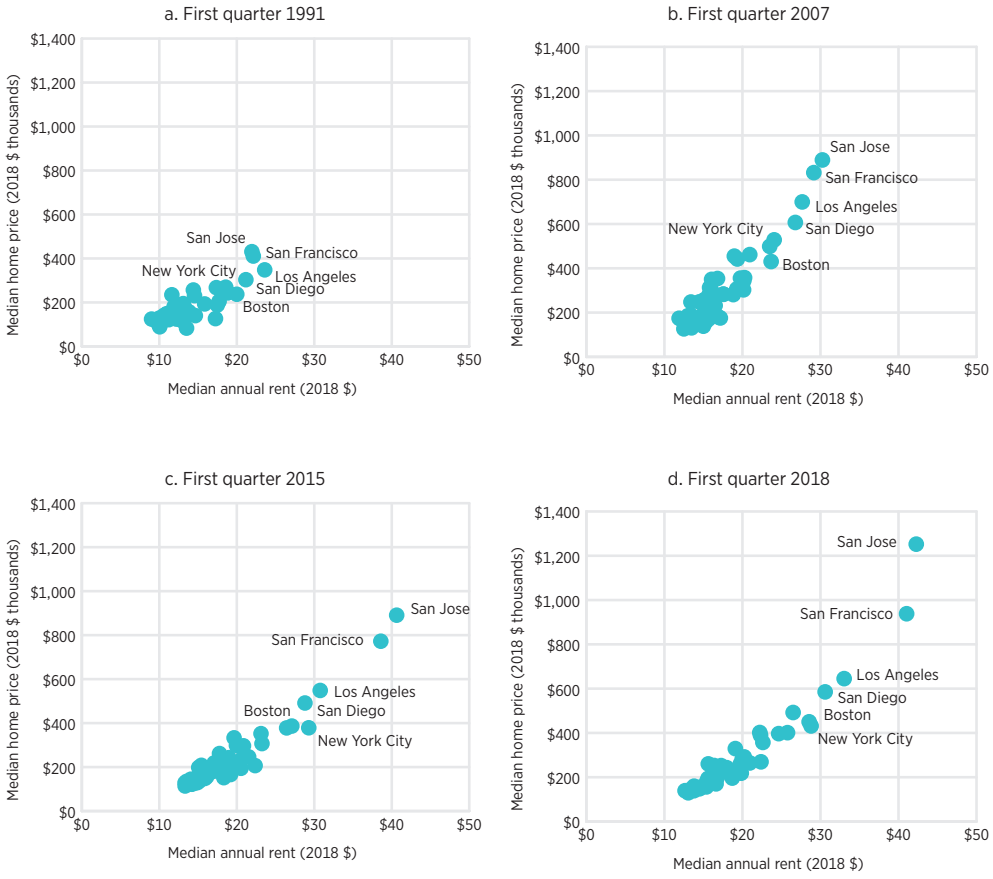
Volatile expectations about future rents are triggered by a context where supply constraints have untethered rent (as well as price) expectations from the cost of building. Hence, supply constraints can lead to price volatility that looks deceptively like demand factors such as cyclical optimism and rising incomes, because expectations also tend to reflect cyclical sentiment.

## CROSS-SECTIONAL COMPARISONS OF METROPOLITAN AREA HOME PRICES

The 2000–2006 price boom was very regional. This issue alone should suggest that aggregate national factors such as interest rates will be inadequate as indicators of the influences on changing prices. As Scott Sumner and I have argued, the importance of rents is clearer when viewed among metropolitan areas.[10]

10. Scott Sumner and Kevin Erdmann, "Housing Policy, Monetary Policy, and the Great Recession" (Mercatus Research, Mercatus Center at George Mason University, 2020), https://ssrn.com/abstract=3667309 or http://dx.doi.org/10.2139/ssrn.3667309.

FIGURE 3. MEDIAN HOME PRICE AND MEDIAN RENT FOR 50 METRO AREAS

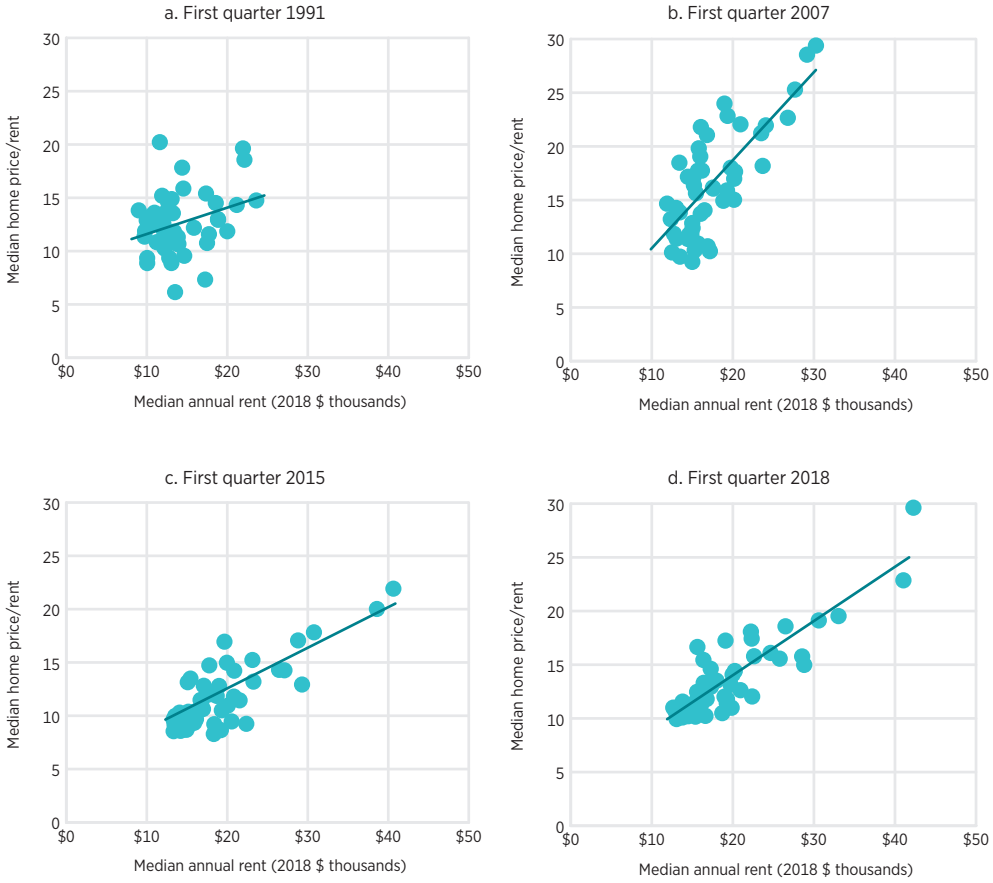



Source: Zillow Group, "Rent Affordability," "Price to Income," "Median Household Income," March 28, 2019, https://web.archive.org/web/20190220210045/https://www.zillow.com/research/data/. Data are combined with author's calculations, adjusted for inflation with US GDP deflator.

Figure 3 compares the median home price and median rental value in the 50 largest metropolitan statistical areas (MSAs) at four points in time.[11] After the turn of the 20th-to-21st century, the differences in home prices and rents between various MSAs increased greatly. As late as the 1990s, there were differences in rents and prices, but the relationship between rents and prices was relatively weak. Differences in local costs, amenities, property tax rates, and so forth dominated as effects on relative prices because rents were not enormously different in various MSAs.

11. Zillow Group, "Rent Affordability," "Price to Income," "Median Household Income," March 28, 2019, https://web.archive.org/web/20190220210045/https://www.zillow.com/research/data/. Data are combined with author's calculations, adjusted for inflation with US GDP deflator.

FIGURE 4. MEDIAN PRICE/RENT RATIO AND MEDIAN RENT FOR 50 METRO AREAS



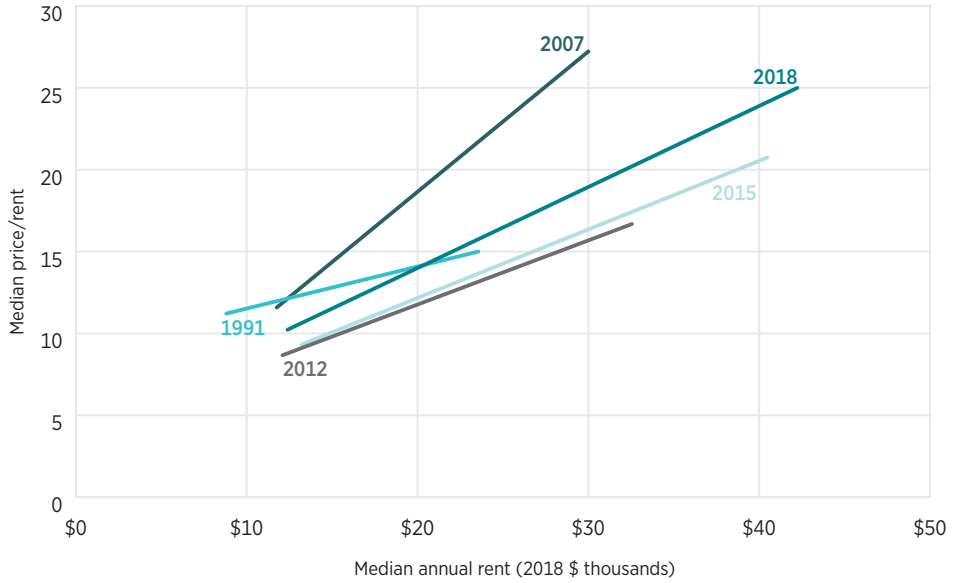

Source: Zillow Group, "Rent Affordability," "Price to Income," "Median Household Income," March 28, 2019, https://web.archive.org/web/20190220210045/https://www.zillow.com/research/data/. Data are combined with author's calculations, adjusted for inflation with US GDP deflator.

The sharp rise in home prices in the national indexes after the mid-1990s coincided with a novel variance between MSAs in which rents in some MSAs moved well beyond any previous relative levels. Looking at 1991, 2007, 2015, and 2018 (shown in figure 3), we see that rents in the outlier MSAs (labeled) became much higher, and thus differences in MSA rents became an increasingly important factor when determining the prices of homes.

Clearly, where local rents were rising faster than the general rate of inflation, so were prices. In an even clearer demonstration, figure 4 shows the same four points in time but with price-to-rent ratios on the y-axis instead of prices.

In 1991, there was some correlation between rental value and prices, but as mentioned earlier, the difference between rents was not so great that it became

FIGURE 5. CORRELATION OF PRICE/RENT AND RENT IN 50 MSAS, 1991–2018




Source: Zillow Group, "Rent Affordability," "Price to Income," "Median Household Income," March 28, 2019, https://web.archive.org/web/20190220210045/https://www.zillow.com/research/data/. Data are combined with author's calculations, adjusted for inflation with US GDP deflator.

a significant factor in determining regional prices. Increasingly, as local rents became more varied, rent became increasingly important. And price-to-rent ratios increased where rents had increased. This change could be because expectations of future rents increased, because the sensitivity of those future rents became more important in a low interest rate environment, or because of some combination of the two.

The price-to-rent ratios of affordable MSAs have not changed much over time. Therefore, the primary influence on price-to-rent ratios has been localized rising rents. This influence is intuitively satisfying. In a market that is not supply constrained, rent tends to be sensitive to incomes. And the price of homes tends to be moderated by the cost of construction. Relatively stable rents plus relatively stable construction costs will mean that in areas without disruptive supply constraints, prices and even price-to-rent ratios tend not to be volatile. Furthermore, this conclusion appears to be confirmed by 30 years of data.

To further clarify those relationships, figure 5 shows (a) the removal of idiosyncratic differences in price-to-rent ratios and (b) the graphs of expected price-to-rent ratios for MSAs in each of the four years as a function of median MSA rents. The year 2012 was added as further reference, because that year was roughly the bottom of the market after the Great Recession.

Here, one can think of the national average of price-to-rent ratio as being the result of three different types of change: (a) the price-to-rent ratio of more affordable cities, (b) the sensitivity of the price-to-rent to the rent (the slope of the regression lines in figure 5), and (c) the variance in rents between MSAs (the length of the lines in figure 5).

## 1991–2007

From 1991 to 2007, a time when the aggregate national price-to-rent ratio increased by more than four points, the median price-to-rent ratio of the most affordable MSAs remained largely unchanged, moving from 11.2 to only 11.6. At the same time, both the slope of the line and its length increased. Rents became more varied during those 16 years, and higher rents became more correlated with higher price-to-rent costs. In other words, after removing idiosyncratic variance in prices, almost all the systematic changes in price-to-rent ratios from 1991 to 2007 were either a direct or an indirect function of rising rents.[12]

## 2007–2012

By 2012, according to the inflation-adjusted Case Shiller measure, home prices were back to near their 1991 levels. The aggregate US price-to-rent estimate in figure 2 had declined to well below the 1991 level. As shown in figure 5, however, this decline was not a reversal of the 1991–2007 market. The most affordable cities had become more affordable compared to 1991, and the most expensive cities had become more expensive.

Price-to-rent ratios across MSAs declined so that by 2012 the expected price-to-rent ratio of the most affordable MSAs was down to 8.7. In fact, for a city with any given level of median rent, the median price was lower than it would have been in 1991 in a city with a similar rent level.

But rents had risen, in general, and rents had especially risen in the most expensive cities. In addition, prices had become more sensitive to rents. (The slope of the line had increased.) So the reason prices in some cities were higher in 2012 than prices in any cities had been in 1991 was because their rents were higher than rents had been in any cities in 1991.

The inflation-adjusted Case Shiller index from figure 1 implies that prices since the 1990s have never returned back down to long-term norms, but the price

12. Note that 2001, not shown here, generally has intermediate conditions between 1991 and 2007.

measure shown in figure 2 is closer to the truth. Prices had been pressed down quite substantially everywhere, compared to rents, but rents had risen more than enough to counteract it.

## 2012–2015

Both figures 1 and 2 show recovering home prices and price-to-rent ratios from 2012 to 2015, but as figure 5 demonstrates, prices recovered only very slightly for any given rental value. The primary change was that rents resumed their long-term increase, and the variance in rents between MSAs especially continued to grow. During this period, the recovery in price-to-rent ratios was largely related to increased variance in rents (the third type of influence on rising price-to-rent ratios).

## 2015–2018

The partial recovery from the declines of the Great Recession continued after 2015. Rents continued to rise, and variance in rents continued to rise. The sensitivity of price-to-rent ratios to the MSA rents increased a little bit, though it still remained lower than it had been in 2007. The median price-to-rent ratio in the most affordable MSAs continued to recover (now at 10.3) but remained lower than in 1991 or 2007.

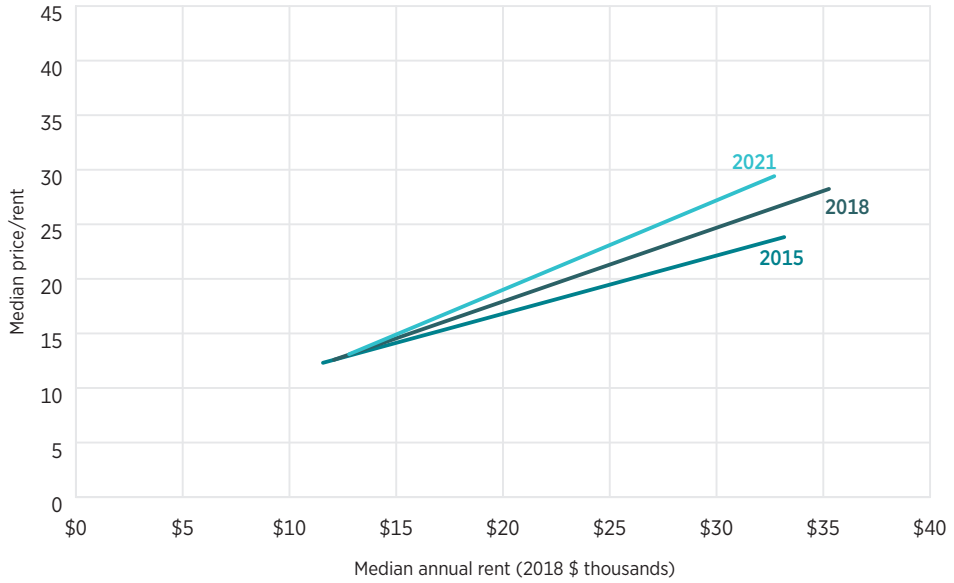
In 2018, price-to-rent ratios were lower at any given rent level and were less sensitive to rents than in 2007, but because rents were so much higher in the most expensive cities, price-to-rent ratios in the most expensive cities were again high. The median price-to-rent ratio for both the most affordable and the most expensive MSAs was about 10 percent lower than it had been in 2007, but in the expensive MSAs, that ratio was related to higher rents compared to 2007. So, in the expensive MSAs, price-to-rent ratios were somewhat lower but prices were higher than in 2007.

If one compares 2018 to 1991, the baseline price-to-rent ratios have declined, but (a) the rents have increased, (b) the variance in rents has increased, and (c) the sensitivity of price-to-rent ratios has increased, so that prices have increased since 1991 because of rising rents, especially where rents are highest.

## 2018–2021

The earlier estimates used historical data previously published by Zillow. Since 2014, Zillow has maintained detailed estimates of rents, which the company

FIGURE 6. CORRELATION OF PRICE/RENT AND RENT IN 50 MSAS, 2015–2021




Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. For the 2015–2021 data, the average of 12 months is used for annual estimates (7 months through July for 2021). Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

refers to as the Zillow Observed Rent Index, in addition to information about prices, which is referred to as Zillow Home Value Index.[13] There are slight differences between the new data and the old data, but the general trends are similar. The new, more detailed data are used in figure 6 for 2015, 2018, and 2021.

As shown in figure 6, the sensitivity of the price-to-rent ratio to the rental value has continued to recover back toward 2007 levels. Since 2018, the median rent in affordable MSAs has trended somewhat higher. Price-to-rent ratios have continued trending slightly higher, also back toward 2007 (and 1991) levels. Median rents in the most expensive MSAs have actually retracted a bit since 2018, owing in part to some migration out of expensive cities during the COVID-19 scare. That change may be temporary. In the meantime, the change has moved rents and price-to-rent levels back toward the levels of 2007. Rents in expensive cities remain more than 20 percent higher than in 2007, in real terms, and are unlikely to continue to recede.

13. Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. For the 2015–2021 data, the average of 12 months is used for annual estimates (7 months through July for 2021). Price is Zillow Home Value Index for metro areas and Rent is Zillow Observed Rent Index for metro areas.

## Adding It All Up

Thus, there are three broad periods of time to consider the effects of three general sources of price appreciation: (a) price-to-rent ratios in affordable MSAs, (b) sensitivity of price-to-rent ratios to rental values, and (c) rising local rents. Those sources suggest the influence of (a) low interest rates or other boosters of buyer demand, (b) an interaction of demand boosters and rent, and (c) rent alone.

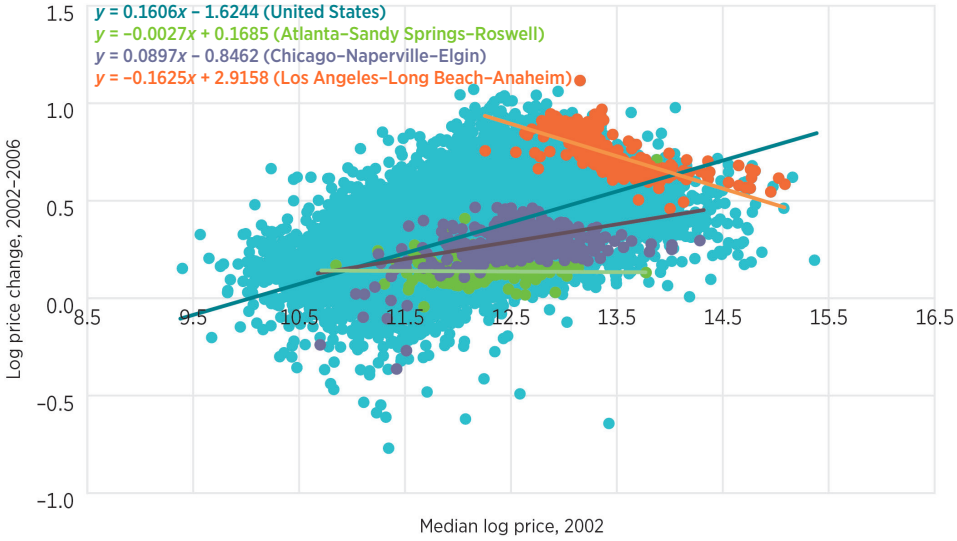
- *1991–2007:* Price-to-rent ratios remained level in affordable MSAs, real rents increased in expensive MSAs, and price-to-rent ratios became more sensitive to high rents. This combination of changes suggests that rents were the primary factor driving up home prices, in general; other demand factors facilitated some of the sensitivity of prices to rising rents.
- *2007–2015:* Price-to-rent ratios declined sharply in affordable MSAs, real rents continued to rise in expensive MSAs, and price-to-rent ratios became less sensitive to high rents. This combination of changes suggests that a retraction of demand boosters became a stronger force pushing down home prices than were the rising rents that were pushing prices up.
- *2015–2021:* Price-to-rent ratios for affordable MSAs recovered back toward the 1991 and 2007 levels; real rents continued to rise, but the variance in rents declined (there was less difference between MSAs); and the sensitivity of price-to-rent ratios to rental values recovered back toward 2007 levels.

This analysis limits the discussion to general evidence that rising rents (reflecting inelastic supply) have been a primary driver of high price-to-rent ratios throughout the past three decades that have been associated with high home prices. A more detailed analysis of demand boosters is left for discussion elsewhere. It is notable, however, that nominal mortgage rates and real interest rates were declining in all three periods, which suggests that demand boosters other than interest rates had negative effects on home prices from 1991 to 2015 and especially from 2007 to 2015. Given that price-to-rent ratios are only nearing 2007 levels in 2021 even though interest rates are much lower than they had been in 2007, other demand boosters remained much weaker than they had been in 2007 and in 1991.

# COMPARISON OF HOUSING BOOMS

Figure 6 highlights recent changes in trends, which might possibly be temporary because of the COVID-19 pandemic. Real rents in expensive MSAs have retraced a bit. They were about the same in 2021 as they were in 2015, but real

FIGURE 7. HOME PRICE TRENDS, BY ZIP CODE, 2002–2006




Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

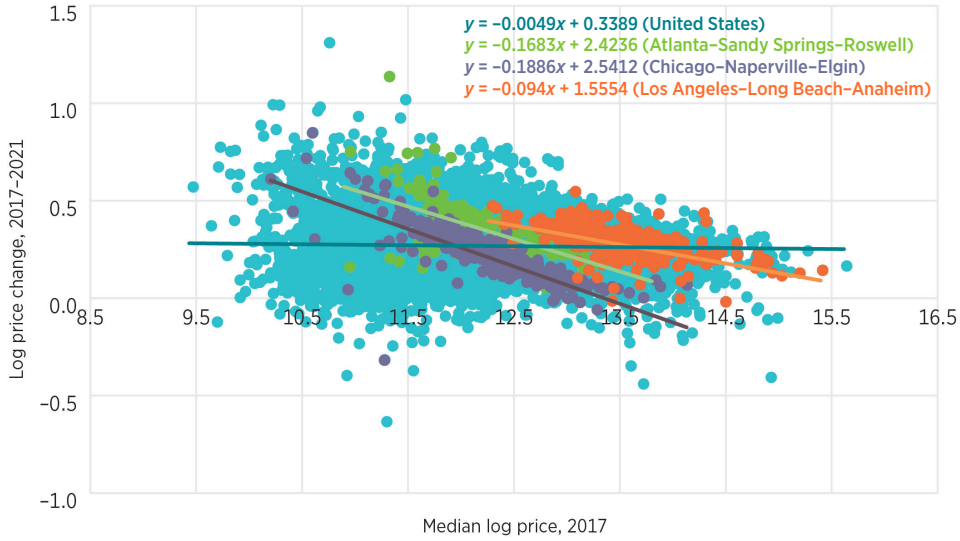
rents in affordable MSAs have risen over that time. This rise is different from the pattern in the previous housing boom. As discussed earlier, before 2007 cities that started expensive became more expensive, and cities that started affordable tended to stay affordable.

Zillow estimates both rents and prices at the ZIP code level for the more recent period, but it lists prices only for the earlier period. However, even if one looks only at prices, differences between the two periods can be highlighted. Figure 7 compares the price appreciation of homes—arranged by the starting median home price in each ZIP code—from 2002 to 2006. This comparison echoes the earlier discussion. The important differences in price appreciation before 2007 were differences between MSAs. The MSAs with high and rising rents also had high and rising prices.

Figure 7 highlights the Atlanta, Chicago, and Los Angeles areas. The trends highlighted are typical throughout MSAs during the period. Knowing whether a home was located in Atlanta, Chicago, or Los Angeles would tell you much of what you needed to know about how much that home appreciated during the boom. Of course, many local factors created idiosyncratic price changes in different parts of each city.

However, although there was a systematic relationship between expensive MSAs and rising prices, there was not a strong systematic relationship between

FIGURE 8. HOME PRICE TRENDS, BY ZIP CODE, 2017–2021




Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

expensive ZIP codes and rising prices *within* most MSAs. The exception shown in figure 7 is Los Angeles. Within the most expensive MSAs, the least expensive ZIP codes experienced the most price appreciation. So, there was a positive correlation between high rents or prices and price appreciation at the MSA level. In most MSAs, there was little correlation between prices and price appreciation for ZIP codes. But in the most expensive MSAs, the least expensive ZIP codes experienced systematically higher price appreciation than did the most expensive ZIP codes.

Without more detailed estimates of rents at the time, it is difficult to establish firm relationships between local rents and prices for that period. Were rents in the least expensive ZIP codes in Los Angeles also rising more than rents in the most expensive ZIP codes? Were changing intra-MSA prices simply a reflection of changing intra-MSA rents, or is there a more complicated story about expectations, credit access, sensitivity to interest rates, and so forth?

Some questions may remain difficult to answer, but one thing is clear, whatever the trends in rents and prices before 2007 were, they were different from what recent trends have been. Figure 8 is the same chart, but for the four years from 2017 to 2021. During that period, there is no systematic difference between MSAs. Expensive MSAs and affordable MSAs have experienced similar levels of price appreciation, which can be inferred from figure 6.

Although the median rent declined somewhat in the expensive MSAs, price-to-rent ratios continued to rise. Meanwhile, in the most affordable MSAs, a modest increase in median rents was coupled with a modest increase in price-to-rent ratios. The net of the different combinations of trends at the top and bottom of the US housing market appears to have settled out with a similar amount of price appreciation in both cheap and expensive metropolitan areas.

The national average amount of price appreciation was similar for the two periods. From 2002 to 2006, the average appreciation of the ZIP code log price in this data set was 0.32. From 2017 to 2021, it was 0.28. From 2002 to 2006, MSA averages told much of the story, but as figure 8 shows, MSA averages hide most of the story from 2017 to 2021. The median price appreciation between MSAs from 2017 to 2021 tends to have less variance than does the median price appreciation between ZIP codes within each MSA.

Where there is price-sensitive variance in intra-MSA price appreciation, it is the cheapest ZIP codes that have appreciated the most, as was sometimes the case from 2002 to 2006. However, from 2002 to 2006, this appreciation was limited to the most expensive MSAs, whereas in recent years, the cheapest MSAs were where the intra-MSA differences were the greatest. In other words, from 2002 to 2006, the cheapest homes in the most expensive cities appreciated the most. From 2017 to 2021, the cheapest homes in the cheapest cities appreciated the most.

Figure 6 suggests that prices in expensive MSAs have been rising *in spite of* moderating rents, and prices in cheaper MSAs have been rising *because of* rising rents. This observation is clearly different from the trends that were driving home prices from 2002 to 2006. If one uses Zillow's new estimates of rents at the ZIP code level, it is possible to see whether differences in rent appreciation have driven differences in price appreciation in recent years. Is there a negative correlation between rent levels and changes in rents at both the inter- and the intra-MSA levels of analysis? Are prices in expensive ZIP codes rising in spite of moderating rents while prices in cheaper ZIP codes are rising because of rising rents?

## RENTS AND HOME PRICES WITHIN METROPOLITAN AREAS

A simple correlation between real changes in rents and prices from 2015 to 2021 suggests a straightforward and standard financial explanation. A regression of log price changes against rent changes by ZIP code, as shown in figure 9, has a

FIGURE 9. PRICES VS. RENTS, 2015–2021


Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

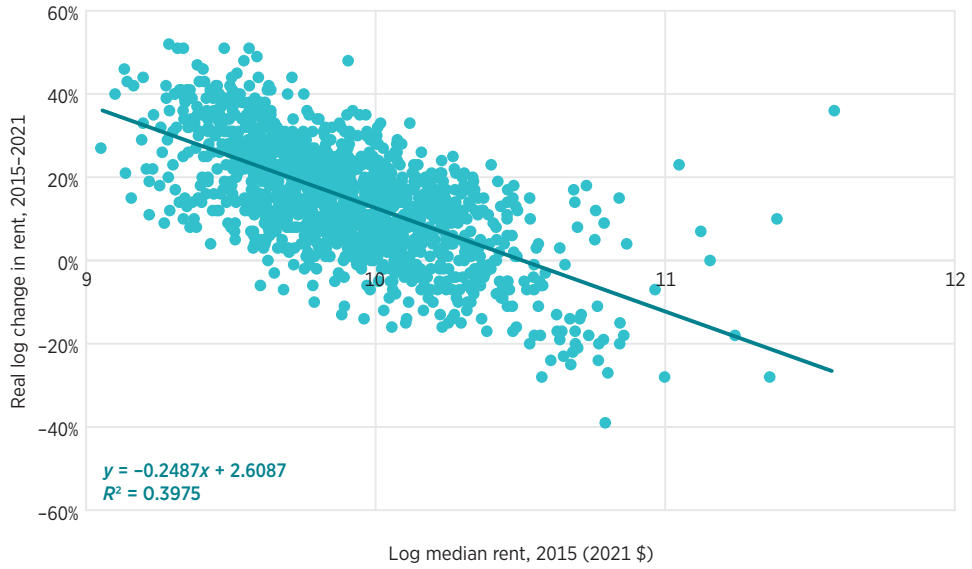
coefficient of 1.05 and a *y*-intercept of 0.17.[14] This regression suggests an easy interpretation that declining interest rates, loosening conditions, and so forth could have boosted home prices from 2015 to 2021 by 17 percent while rising rents had roughly a 1:1 effect on prices.

But as outlined earlier, this finding does not reflect the experience of housing markets over the past three decades. Demand factors such as interest rates do not appear to have had a uniform effect on all home prices, and rising real rents have tended to have more than a 1:1 effect on prices. From 1991 to 2015, prices were a product of (a) the price-to-rent ratio of the more affordable cities, (b) the sensitivity of the price-to-rent ratio to the rent (the slope of the lines in figure 5), and (c) the variance in rents between MSAs (the length of the lines in figure 5).

It was easy to see these trends from 1991 to 2015 because the MSAs and ZIP codes that were already expensive tended to become even more expensive. The trend has decidedly and systematically reversed since 2015. As is clear in figure 10, rent inflation from 2015 to 2021 has remarkably been negatively correlated with the beginning rent levels from 2015. That finding means that rent

14. A regression that includes MSA fixed effects produces a better fit with similar results: a coefficient of 0.96 with a standard error of 0.04.

FIGURE 10. RENT INFLATION, 2015–2021



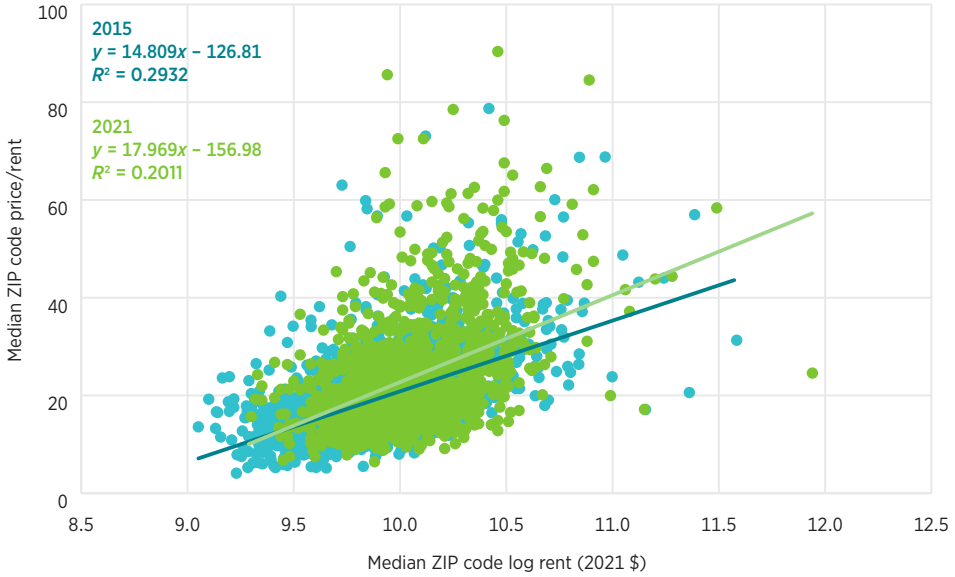

Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

inflation has been the highest in ZIP codes where home prices over the past three decades have been relatively insensitive to changing demand factors such as interest rates, and that rent inflation has been moderate in expensive ZIP codes, which have been sensitive to other factors that can push up price-to-rent ratios either separately from rents or as an interaction with the rents.

The answer to the question "Are prices in expensive ZIP codes rising in spite of moderating rents while prices in cheaper ZIP codes are rising because of rising rents?" appears to be "Yes" and "Yes." In figure 11, both facets of this trend are visible. Scatterplots of price-to-rent ratios and rents are shown for 2015 and 2021. Variance of rents has declined. Rents are rising in ZIP codes that were formerly more affordable, but they have not risen in expensive ZIP codes.

Meanwhile, as rents at the low end have risen (the dots in figure 11 move from left to right from 2015 to 2021), price-to-rent ratios have risen moderately, thereby reflecting the patterns that have been in place for at least three decades. (Both within and across MSAs, higher rents are associated with higher price-to-rent ratios.) In more expensive ZIP codes, price-to-rent ratios have risen for any given rental value, suggesting that in ZIP codes that are sensitive to demand factors such as interest rates, those factors have continued to push price-to-rent ratios back toward the levels seen in 2007.

FIGURE 11. PRICE-TO-RENT RATIOS VS. RENTS, 2015 AND 2021



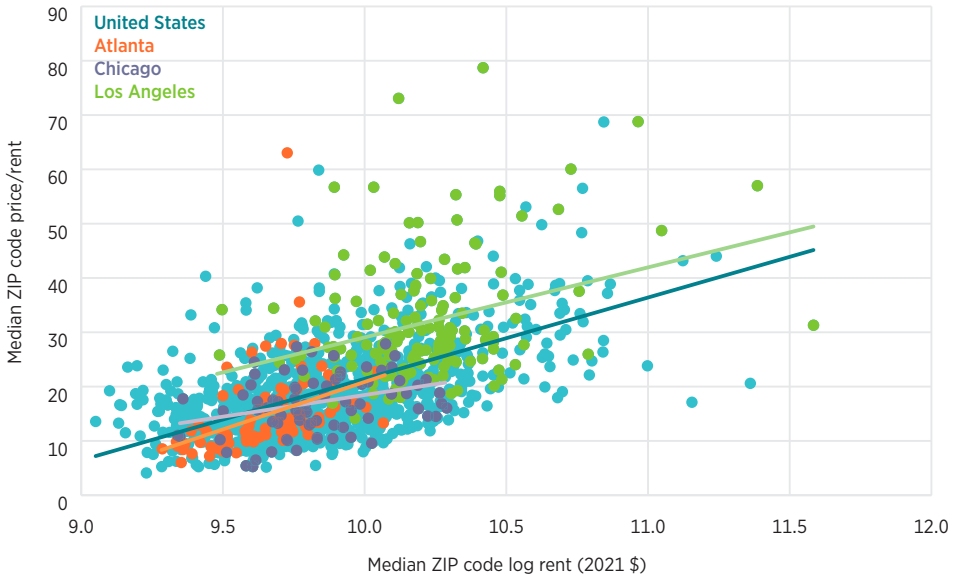

Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

The ZIP codes where prices have risen 40 percent or more since 2015 are mostly being subjected to rent inflation; conversely, the ZIP codes where prices have risen moderately in spite of rents that are stable in real terms are the ZIP codes that reflect appreciation from nonrent factors. In other words, if factors such as low interest rates had recently been inflating prices, they were mainly inflating the prices of homes whose prices were rising the least.

Looking within MSAs may also provide more clarification about the various trends. Figure 12 repeats the scatterplot from figure 11 for 2015 (here shown in blue with a dark blue regression line). Again, ZIP codes from Los Angeles, Chicago, and Atlanta are highlighted. In 2015, there were some differences between MSAs. Prices in Los Angeles, across the board, were higher for any given rental value than is typically the case in other MSAs, for example. But, in general, the relationship between rents and prices was similar within MSAs and across them.

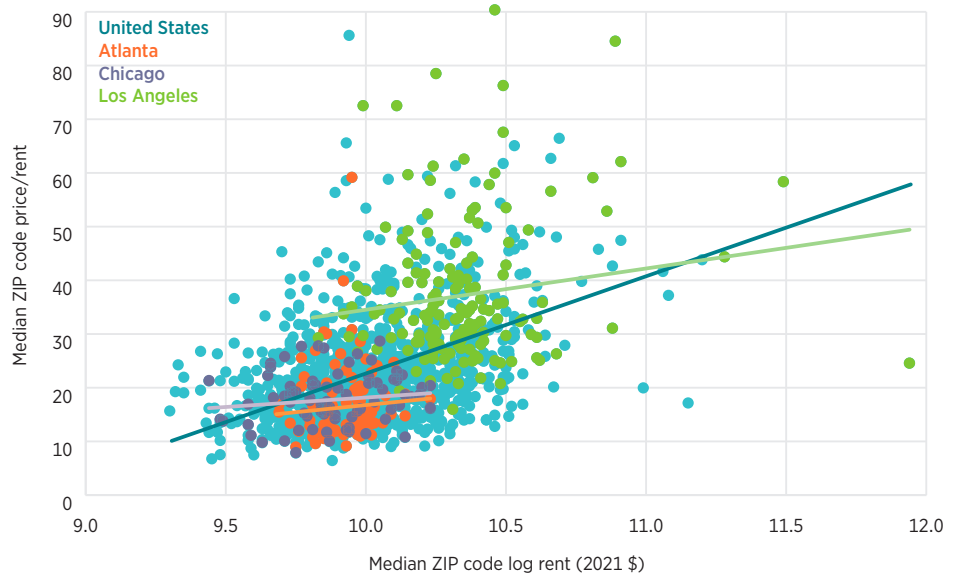
Figure 13 repeats figure 11 for 2021 and includes the highlighted MSAs. Notice that although the relationship between price-to-rent ratios and rents (shown in figure 11 for the United States) slightly steepened from 2015 to 2021, in general, the relationship sharply flattened within most MSAs from 2015 to 2021. This shift has been significant, and the primary driver is rising rents in formerly affordable ZIP codes. Atlanta is a particularly notable example. There are 83 ZIP

FIGURE 12. PRICE-TO-RENT RATIOS VS. RENTS, 2015




Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

FIGURE 13. PRICE-TO-RENT RATIOS VERSUS RENTS, 2021




Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

TABLE 1. RELATIONSHIP BETWEEN HOME PRICES AND RENTS, 1,358 ZIP CODES IN 30 METROPOLITAN AREAS

| | Dependent Variable (Home Price) | | | |
|---|---|---|---|---|
| Rent | 2015 | | 2021 | |
| Coefficient | 1.713 | 1.528 | 1.691 | 1.219 |
| Standard error | 0.029 | 0.043 | 0.036 | 0.052 |
| R2 | 0.723 | 0.804 | 0.615 | 0.769 |
| MSA fixed effects | No | Yes | No | Yes |

Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

codes in this dataset for Atlanta. The standard deviation of log rents across those 83 ZIP codes decreased from 0.17 in 2015 to 0.10 in 2021. That is a gratuitous level of rent compression in just six years.

Differences in rents and price-to-rent ratios are being compressed within MSAs, mostly resulting from rising rents and the associated rising prices in more affordable ZIP codes. At the same time, price-to-rent ratios in the expensive MSAs continue to rediscover a sensitivity to other demand factors, thus rising back toward pre–financial crisis price-to-rent ratios. In short, this relationship in the most affordable MSAs, such as Atlanta, has flattened because the most expensive ZIP codes have prices that have moved below the national regression line. In the most expensive MSAs, such as Los Angeles, the flattening is largely caused by Los Angeles's most affordable ZIP codes moving further above the national regression line.

While the differences in price-to-rent ratios within Atlanta, Chicago, and Los Angeles decline, the differences in price-to-rent ratios between Atlanta, Chicago, and Los Angeles increase. One way to see this easily is to pick a rent level, for instance, 10 on the log scale (equal to about $22,000 annually, or $1,836 monthly), and to compare the price-to-rent level at the four regression lines in figures 12 and 13.

Table 1 shows the relationship between rent and price for 1,358 ZIP codes from 30 metropolitan areas in 2015 and 2021, with and without MSA-level fixed effects. The use of fixed effects highlights the portion of the relationship that is due to which MSA the ZIP code is in. In both 2015 and 2021, a 1 percent rise in real rental value was roughly associated with a 1.7 percent rise in price. However, after accounting for the differences in MSAs (i.e., how all ZIP codes in Los Angeles tend to have a higher price-to-rent value than do similar ZIP codes in Chicago and Atlanta), one finds that a 1 percent rise in rental value was associated with a 1.5 percent rise in 2015 but only a 1.2 percent rise in 2021.

TABLE 2. ACTUAL PRICE CHANGES, 2015 TO 2021, VS. EXPECTED PRICE CHANGES BECAUSE OF RISING RENT

| | −1 Standard Deviation | Average | +1 Standard Deviation |
|---|---|---|---|
| Real rent change | 1.2% | 14.6% | 28.1% |
| Expected price change | 2.1% | 25.1% | 48.1% |
| Actual price change | 18.3% | 32.5% | 46.6% |
| Difference | 16.2% | 7.4% | -1.5% |

Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Price is Zillow Home Value Index for metro areas, and rent is Zillow Observed Rent Index for ZIP codes.

Thus, the trends at work in Chicago and Atlanta in figures 12 and 13 were common across MSAs from 2015 to 2021.

Using the 2015 coefficient in the left column of table 1 to estimate expected price changes associated with a given change in rent and applying it to real changes in rents from 2015 to 2021 provides the results shown in table 2. (Here the actual price change is the price change at the regression line in figure 9 for a given change in rent.)

Rent in the average ZIP code increased by 14.6 percent[15] more than the general rate of inflation from 2015 to 2021. Rents, in general, have been rising sharply. Home prices in the average ZIP code rose by 32.5 percent, and the 14.6 percent of rent inflation would be expected to lead to a 25.1 percent price appreciation. Thus, in the average ZIP code, 25.1 percent of price appreciation from 2015 to 2021 has been associated with rising rents, and 7.4 percent has been associated with other factors, such as declining interest rates.

ZIP codes with rent appreciation one standard deviation above the average level had a price appreciation of 46.6 percent, which was slightly less than the price appreciation one might expect from a 28.1 percent increase in rents. ZIP codes with rent appreciation that was one standard deviation below the average had a price appreciation of 18.3 percent. Only 2.1 percent of that figure was associated with rising rents. The remaining 16.2 percent appreciation was associated with other factors, such as declining interest rates.

Without more detailed historical rent data, it is possible to only infer the relationships for the years before 2015. In figure 7, however, price changes from 2002 to 2006 suggest that the trend in most MSAs today mimics the price trends that were limited to MSAs such as Los Angeles before 2007. One might infer

15. All percentages here are based on continuous compounding and use a natural log scale. The GDP deflator was used as the inflation adjuster: 10.0 percent for the period.

that, during 2002 to 2006, MSA fixed effects were becoming more important, that the difference between Los Angeles and Atlanta was widening, and that it was widening mostly because prices in the most affordable ZIP codes in Los Angeles were especially appreciating. In other words, if figures 12 and 13 could be replicated for the years 2002 and 2006, the slope of the regression line in Los Angeles would likely have flattened so that the cheapest ZIP codes in Los Angeles moved well above the national regression line; however, such was not the case in Chicago and Atlanta.

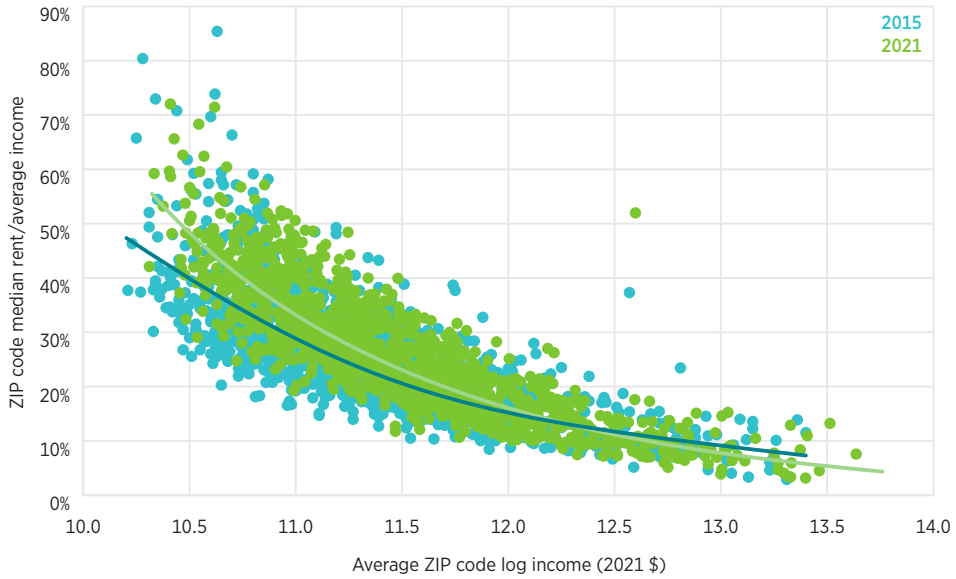
Why is a phenomenon that was limited to a few expensive MSAs from 2002 to 2006 now showing up in most MSAs? Further in-depth assessments about the precise causes of the trends are beyond the scope of this study, but here is one preliminary point. The rent inflation trends are higher than trends in income growth. Furthermore, rents were not particularly low (relative to incomes, for instance), especially in ZIP codes with lower incomes—even in 2015.[16] It is unlikely that natural demand related to factors such as rising incomes is driving rent inflation. Except where supply is very constrained, as incomes rise households do tend to spend more on housing in absolute dollars but less as a percentage of their incomes. Therefore, rising nominal incomes should not lead to rents rising as a percentage of incomes. Figure 14 compares the estimated rent affordability (rent as a percentage of income) for 1,358 ZIP codes in 2015 and 2021.[17] Where rent inflation has been especially high, it has been taking a larger portion of incomes. This change is not a product of increases in real consumption of housing. New construction since the financial crisis has been focused mostly on more expensive homes. A lack of supply is a key element in the rising rents that are the primary driver of rising home prices.

## CONCLUSION

By some measures, home prices in the United States had been relatively stable for many years. Then from the mid-1990s until about 2007, the average price-to-rent ratio of housing across the country increased by roughly 50 percent. After the financial crisis, it retracted back to the mid-1990s level briefly in about 2012 before it began to rise again to previously unknown levels. This change has led

16. Kevin Erdmann, "Squeezing Unqualified Borrowers," The Bridge, July 8, 2019, https://www.mercatus.org/bridge/commentary/squeezing-unqualified-borrowers.
17. The IRS reported that average incomes for ZIP codes are available only through 2019. The 2021 ZIP code incomes are estimates based on national income trends and relative ZIP code trends from 2014 to 2019.

FIGURE 14. RENT AS A PERCENTAGE OF INCOME, 2015 AND 2021




Source: Zillow Group, "Zillow Research," August 26, 2021, https://www.zillow.com/research/data/. Rent is Zillow Observed Rent Index for ZIP codes, and income is from "Average Income" at https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-statistics-zip-code-data-soi, using the average adjusted gross income (AGI) of all returns. These data are available for 1998, 2001, 2002, and 2004–2019. See footnote 16 for note about estimating 2021 income.

to an inference that some unsustainable source of buyers' demand has led to price bubbles, which must reverse either with macroprudential public policy responses or as an inevitable reversal of untenable excess.

However, disaggregating US housing markets highlights the important role that rising rents have played as a factor pushing up prices. High average price-to-rent ratios obscure this important detail. In metropolitan areas with affordable rents, price-to-rent ratios were relatively stable from 1991 to 2007 and were typically in the range of 10 to 12. Where prices reached unprecedented heights was generally in metropolitan areas where *rents* had reached unprecedented heights relative to other metropolitan areas. The main motivating development in US housing markets before 2007 was that rents in some metropolitan areas became much higher than rents in most other metropolitan areas.

This finding suggests that—to the extent that other demand boosters such as low interest rates have influenced American housing prices—there has been an interaction with high rents. Where rents are not high, prices have been stable in all contexts, except where they were unusually low after the 2008 financial crisis.

In recent years, from about 2015 to 2021, prices have begun to rise again. During the previous boom, home prices that appreciated the most were in the

most affordable ZIP codes in the most expensive metropolitan areas. In the recent period, this pattern has returned. Within metropolitan areas, prices in the most affordable ZIP codes are appreciating much more rapidly than are prices in the most expensive ZIP codes. However, in contrast to the period before 2008, this pattern is not limited to the most expensive metropolitan areas. Now, prices in the most affordable ZIP codes are appreciating at unusually high rates, even in many of the most affordable metropolitan areas.

Even more than in the last boom, such prices are driven by rising rents. The ZIP codes where prices have been appreciating the most since 2015 are where price-to-rent ratios have been relatively stable for many years. The rising prices today in these ZIP codes are being driven especially by rising rents, which means that the current market is being driven by two different factors. Expensive homes in expensive metropolitan areas have price-to-rent ratios that continue to recover back to 2007 levels—both because their underlying rental values have continued to diverge from the norm and because the sensitivity of prices in high rent areas to other factors continues to return to the 2007 level. Conversely, affordable homes in affordable metropolitan areas are rising because their rents are rising dramatically.

In either case, there may be a limit to the potential for prices to rise. In expensive markets, interest rates and related yields on investments are unlikely to decline much further. In more affordable markets, the ability of households to continue spending more of their incomes on rent may reach a limit. Both cases may put a governor on the potential for existing home prices to continue to appreciate, but it may be useful to understand the different factors at play in different markets.

Understanding these trends has important policy implications. If rising prices are due to some source of excess capital chasing yields, then either monetary or fiscal policies aimed at slowing that chase would seem prudent. However, in the ZIP codes where prices are rising the most, a lack of capital appears to be the most likely culprit because rents are rising and are taking a greater portion of incomes over time. Among the concerns recently being expressed about housing markets is a concern about a burgeoning market of private equity firms building or buying homes for rent. Some critics fear that those institutions are pricing potential owner-occupiers out of the market.

These data suggest that rising rents are drawing private equity into the housing rental market. More of that capital being drawn into building new units might be one factor that helps bring rents down again, thus returning markets to a better state of affordability. Other sources of capital that would develop new

supply and bring down rents could also help to restore housing affordability in a fundamental and sustainable way.

Fiscal and monetary attempts to induce capital out of housing—associated with the 2008 financial crisis and its aftermath—appear to have temporarily reduced prices, although in an unsustainable way, while more permanently leading to increasing rents. With rents already at newly high levels in the neighborhoods that are the most affected, following a similar strategy today could create dire circumstances for American households struggling with affordability.

## ABOUT THE AUTHOR

Kevin Erdmann is a senior affiliated scholar at the Mercatus Center at George Mason University. He has engaged in research with Mercatus about housing finance, land use restrictions, and monetary policy. His first book, titled *Shut Out: How a Housing Shortage Caused the Great Recession and Crippled Our Economy* (Rowman & Littlefield, 2019), offers a contrarian theory on the causes of the housing boom and bust and details a number of ways in which obstacles to housing supply affect the American economy. Reviews of *Shut Out* have appeared in the *Economic Record*, *Regulation*, and the *Washington Examiner*. His second book, *Building from the Ground Up: Reclaiming the American Housing Boom*, reconsiders the policy decisions that led to the Great Recession and brought the housing market to the condition it is in today. Erdmann's work has appeared in the *Wall Street Journal*, *Barron's*, *National Review*, *USA Today*, and *Politico*, and it has been featured on C-SPAN. Erdmann was a small business owner for 17 years and holds a master's degree in finance from the University of Arizona.

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