How Regional Inequality and Migration Drive Housing Prices and Rents

Greg Howard* Jack Liebersohn†

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For several decades after World War II, regional incomes converged within the United States, but in recent decades, this trend has stopped and even reversed. Instead, more recent income growth—and the economic opportunities that come with it—has been increasingly concentrated in a small number of cities. From 2000 to 2018, median household incomes increased by about 15 percent more in cities that were already in the top 10 percent as compared to cities that were initially in the bottom half. During this time, the FHFA house price index rose by 31 percentage points more than the consumer price index (CPI). This increase is unevenly distributed, and driven in large part by the higher rate of housing price increases in major cities. Relative to CPI, house prices rose by 49 percentage points in New York, 96 percentage points in Seattle, 129 percentage points in Los Angeles, and 113 percentage points in Miami (Federal Reserve Bank of St. Louis, 2024b). Our essay argues that this is no coincidence: the workhorse model of urban economics predicts that an increase in regional inequality leads to higher average national housing rents and prices, and the data support this theory.

To understand the link between regional inequality and average housing prices, we start with the relationship between regional inequality and cross-sectional differences in housing prices. Classic models in spatial economics predict that if a location experiences relatively higher productivity growth, then the associated rise in income will increase demand to migrate there. If there is a mismatch between the places where people increasingly want to live and places with the space and zoning policies to absorb population, then housing costs can increase a lot in the in-demand cities, while decreasing only a little elsewhere. Since 2000, rising spatial inequality has increased relative demand to live in high-income cities. Because these cities face more geographic and regulatory obstacles to new housing, this has raised the prices and rents of housing

*University of Illinois. glhoward@illinois.edu
†University of California-Irvine. cjlieber@uci.edu

in aggregate. In the rest of this paper, we discuss the empirical evidence behind the essential ingredients of our theory; we present the theory graphically in a two-region model; and we conclude by discussing implications of the theory.

1 Three Building Blocks

Three facts about regional inequality are crucial building blocks to our thesis in this paper. First, the impetus for our story is that high-income places have seen faster income growth from 2000-2018—that is, regional inequality has increased. Higher inequality has many possible causes, but a sufficient reason is that productivity growth has been higher in cities that had high incomes to begin with—in large part because they had an initially high concentration of industries that experienced growing productivity. Second, these high-income places have also seen higher growth in the cost of housing during the same time period. Together with the first fact, we interpret the second fact as evidence that people have increasingly wanted to move to the highest-income places because of the increased regional income inequality. Third, high-income places have less capacity to build new housing than lower-income regions, both because they are denser and have more housing-related regulation. Taken together, these cross-sectional facts are building blocks that come together to establish a link between regional inequality and aggregate housing costs.

Regional inequality has increased

US metropolitan areas that had initially higher incomes in 2000 also experienced faster income growth by 2018. In Figure 1a, each point in the figure is a "core-based statistical area." A CBSA is defined by the Office of Management and Budget as including both "metropolitan" statistical areas with an urban cluster of at least 50,000 population and "micropolitan" areas with a cluster of at least 10,000. CBSAs are defined at the county-level, with multiple counties included when there are sufficiently extensive commuting patterns between them. In 2000, there were 362 metropolitan statistical areas and 560 micropolitan statistical areas in the United States. Each datapoint in Figure 1 is a CBSA, and the size of each point represents the initial population. Each additional $10,000 of median household income is associated with an additional two percentage points of income growth over the 2000-2018 period. In the highest-income cities, there was a particularly large increase. The relationship is statistically significant; the figure notes include regression coefficients, standard errors and t-statistics from a population-weighted linear regression.

One plausible hypothesis is that lower-income areas, with lower wages and lower

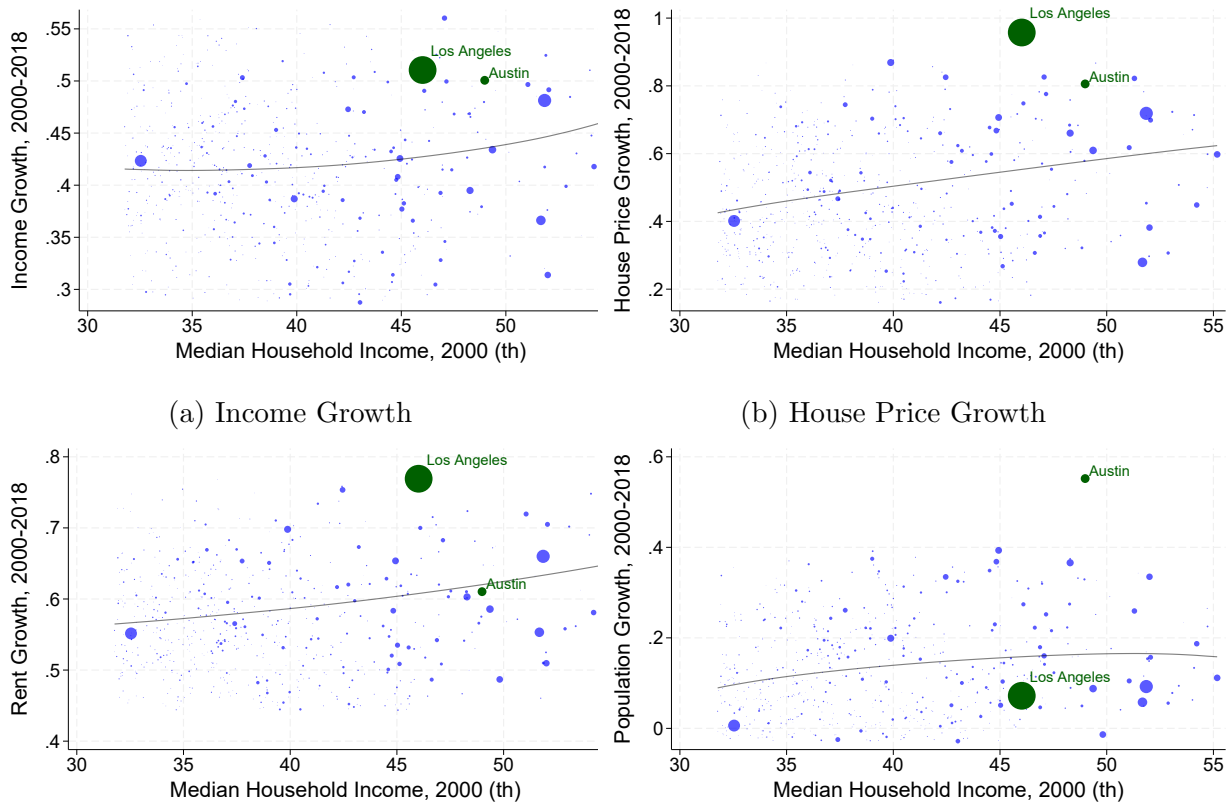
costs of housing and land, are likely to attract more economic growth. However, agglomeration economies can ensure that industries remain concentrated in high-income metropolitan areas, even though their higher cost gives some firms the incentive to relocate (for a review of agglomeration economies, see Glaeser and Gottlieb 2009 or, in this journal, Duranton and Puga 2020). The higher-income urban areas have long specialized in certain industries, especially related to technology, health care, finance and highly-skilled services. These industries have grown quickly since the 1980s, causing faster growth in cities that were already high-income (Giannone, 2017; Rubinton, 2020; Eckert, Ganapati and Walsh, 2022). Much of regional income growth is caused by the relative productivity improvements across industries. For example, Barro and Sala-I-Martin (1991) argues that there is a steady 2 percent rate of convergence across U.S. states, but also that deviations from this rate can be explained by differential industry growth rates. Such models also helped motivate the shift-share instruments used in Blanchard and Katz (1992) and Bartik (1991), and the many subsequent papers that have tried to predict regional growth.[1] In short, we do not need a new economic theory to understand the increase in regional inequality; it can be explained by the fact that the industries that did well in recent years were characterized by agglomeration economies and were already concentrated in high-income regions.

Of course, we are not the first to document this widening regional disparity. From 1940 to 1980, incomes converged, but since then the relative growth rates have reversed. Moretti (2012) describes the widening disparities as "the Great Divergence" and documents growing disparities in education, health and quality of life, as well as income. Ganong and Shoag (2017) and Giannone (2017) focus on the reversal from previous convergence. Economists have hypothesized that the relevant agglomeration economies may be the result of market access, thick labor markets, or innovation spillovers, each of which is the subject of a large literature. Whatever the underlying cause, these forces make the high-productivity firms choose to stay in the high productivity cities, despite facing higher wages.

Migration Links Income Changes and Housing Cost Changes

Migration in response to real income differences across cities creates a strong correlation between local incomes and housing costs. Economists have long emphasized a relationship between incomes and housing costs in the cross-section, starting with classical

[1]We are not trying to claim that these factors are the only ones that determine regional growth. Besides changes in industry productivity, we would expect local economic policy (for example, Suárez Serrato and Zidar, 2016), agglomeration spillovers (for example, Greenstone, Hornbeck and Moretti, 2010; Howard, 2020; Duranton and Puga, 2004), or changes in amenities (for example, Rappaport, 2009) to also have effects on regional growth. Our only point is that differential industry productivity growth is sufficient to explain the increase in regional inequality.



(a) Income Growth

(b) House Price Growth

(c) Rent Growth

(d) Population Growth

Figure 1: The growth in income, house prices, rents, and population, 2000-2018 (relative to levels in 2000)

Note: The panels in this figure show the relationship between nominal 2000 median household income and nominal median income growth, house price growth, rent growth and population growth. Each point is a Core-Based Statistical Area (CBSA) weighted by 2000 population. Growth is measured in log-changes from 2000 to 2018. We use the 2000 decennial census to measure median income and rent in 2000, and we use the 2016-2018 five-year ACS to measure median income and rent in 2018. Population data is from the 2000 decennial census and 2018 inter-censal estimates as compiled by NHGIS (Manson et al., 2025) and SEER (2025) using correspondence files from the Missouri Census Data Center (2025). Population, rent and income are provided via NHGIS (Manson et al., 2025). House price growth is from the Federal Housing Finance Agency (2025). All data are CBSA aggregates of county-level data, collecting non-CBSA counties into one unit. Figure omits top and bottom 5% of CBSAs. Fit line is from a local linear polynomial with smoothing parameter 10. Slope (robust s.e.; t) of population-weighted OLS fit lines: Household Income = 0.002 (0.001; 2.51); House Price Growth = 0.008 (.002; 3.99); Rent Growth=.004 (.001; 4.70); Population Growth=0.003 (0.001; 1.96).

economists who recognized a link between ground rents and agricultural productivity.[2] The foundational spatial economics models of Rosen (1979) and Roback (1982) make the link between housing costs, wages, and migration explicit. Because people can move across space, differences in wages between cities cause net migration to high-wage locations. Consistent with these models, survey evidence agrees that many people move for jobs or because of housing costs (Molloy, Smith and Wozniak, 2011). Modern urban models allow for heterogeneity across people, stronger attachments to particular cities, migration costs and a variety of other refinements, but still retain the essential concept (e.g. Redding and Rossi-Hansberg, 2017; Monte, Redding and Rossi-Hansberg, 2018).

In Figures 1b and 1c, we show how house price growth and rent growth vary with the initial income of core-based statistical areas in 2000. The same high-income cities where median incomes increased the most also had the greatest increase in house prices and rents, consistent with evidence from Van Nieuwerburgh and Weill (2010). As with incomes, the rise in housing costs is most prominent on the right-tail of the figure, which contain high-income cities like San Francisco, California; San Jose, California; and Stamford, Connecticut. Figure 1b shows that the relationship between incomes and house price growth is, if anything, even stronger than the relationship between incomes and rents. In Howard and Liebersohn (2023), we argue that this is because trends in regional inequality are persistent, so rent growth today predicts further increases in the future. Because house prices are partially determined by future rents, this can lead to a larger increase in house prices than rents.

A likely reason that housing costs reflect incomes is that people will migrate in response to changes in wages. We can think of this using a supply and demand relationship, as shown in Figure 2. The demand curve traces out the number of people that would like to live in that city for a given cost of housing. In this case, the relevant supply curve might be called a "population capacity curve"; that is, we are thinking more broadly of the number of people the city will accommodate at a given price. This measure incorporates two incentives as prices rise: more housing will be built, and people will consume less housing per capita, whether through smaller units or more occupants per unit. Because it is hard to adjust the size of housing units, one can think of this curve as primarily determined by the housing supply curve. When incomes rise, the demand curve for living in a city increases, raising both the population and the housing cost.[3] The degree to which housing prices will rise depends on how much the demand

[2]For example, Ricardo (1817) argued that land rents are determined by the value of agricultural output, which in turn are determined by the demand for the land's output, writing that "rent is always the difference between the produce obtained by the employment of two equal quantities of capital and labor." Mill (1848) extends the argument to non-agricultural land, whose rent is at least as high as its agricultural use, but with a premium for "beauty or convenience."

[3]We ignore the income effect on housing demand: that is, the fact that people will want more housing

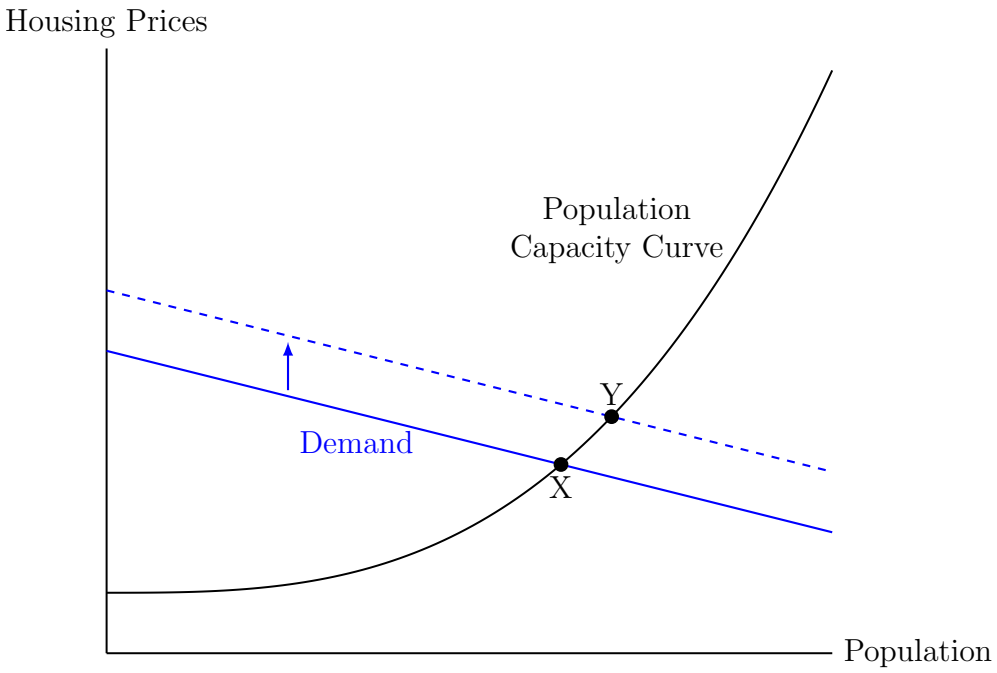


Figure 2: One-city Model

curve moves in response to income and the steepness of the population capacity curve.

For how much the demand curve moves, we can use the fact that a person should be (to first-order) indifferent about living in a particular city if their incomes and their housing costs increase by the same dollar amount. Thus, a rise in a city's income will shift the housing demand curve up by the same dollar amount of the income increase.[4] If the population capacity curve is vertical or the demand curve is horizontal, then all the change in incomes will be reflected in housing costs. But if the capacity curve is horizontal and the demand curve is not, then there will be no change at all in housing costs. But here, we consider the more plausible case of an upward-sloping supply curve and downward-sloping demand curve.

In the next section, we discuss heterogeneity in the steepness of the population capacity curve across urban areas with different per capita income level. Here, we focus on the slope of the demand curve. Many economists have tried to estimate the elasticity of this demand curve with many different methods and have gotten a wide range of answers: for a list of elasticities used in the literature, see Fajgelbaum, Morales,

or fewer roommates in response to increased income. Given that we are expressing our quantities as population, such a force would actually shift the housing supply curve to the left, meaning we underestimate the change in housing costs. However, since our focus is on relative changes in income across space, not absolute changes, we wish to primarily focus on the increase in demand to live in the city.

[4]To translate this to elasticities, this means that the elasticity with respect to housing costs is equal to the elasticity with respect to incomes times the share of housing in consumption.

Suárez Serrato and Zidar (2019, Table A.17) or Howard and Liebersohn (2021, Table 1)).[5] A typical estimate is that a 1 percent increase in wages would cause a 2 percent change or more in the population. This is flatter than the best recent estimates of housing supply: for example, Baum-Snow and Han (2024) estimate average housing supply elasticities around 0.3-0.5. (In the short-run, it is hard to redivide housing, making it hard to change housing quantities per capita; therefore, we expect the elasticity of housing demand to be even smaller.) Thus, when we draw Figure 2, we would expect the demand curve to be relatively flat compared to the population capacity curve, and when the demand curve shifts up, we would expect to see an increase in housing costs. Taking it to the data, we expect that income differences are reflected in housing price differences across cities. Indeed, Figure 1b suggests that found the same places that experience income gains were also experiencing house price gains.

Some economists are skeptical of a relatively flat demand curve for housing in a certain area, because of widely reported findings that Americans have become less mobile in recent decades. There is some controversy over the extent to which the internal migration rate has fallen in recent decades. The fall in migration is primarily found in the Current Population Survey (as discussed in Molloy, Smith and Wozniak 2017; Kaplan and Schulhofer-Wohl 2017), while the decline appears much smaller in other surveys such as the American Community Survey, or in administrative data from the Internal Revenue Service (Foster, Ellis and Fiorio, 2023).[6] Here, we emphasize that we are primarily focused on long-run migration rates, which are still fairly high in the United States. More than 30 percent of Americans live in a different state than the one in which they were born (Molloy et al., 2011). More importantly, there is significant heterogeneity in the growth rate of U.S. urban areas. At the 90th percentile, urban areas grew by 42 percent from 2000-2018, while cities at the 10th percentile neither gained nor lost population. These facts emphasize that in the long-run, there is a lot of migration, and so we might expect the demand curve for housing to be fairly flat.

So far, our evidence has relied upon simple and transparent measures of housing costs and incomes. The implicit assumption behind these measures is that someone on the margin of moving would be able to get a higher income in a high-income city than in

[5]To translate that into an elasticity of population with respect to rents, we first need to calculate the size of a 1 percent increase in rents, as a percent of wages. For that, we need to multiply by the housing share of consumption, which is somewhere near one-third. So the elasticity of population with respect to rents should be about one-third as large as the elasticity of population with respect to income.

[6]A related concern might be that if migration costs are as high as they are sometimes estimated—for example, Kennan and Walker (2011) estimate costs of over $300,000 per interstate move—that might limit the degree to which housing costs would move in response to income changes. Howard (2024) offers a critique of interpreting this number as a literal moving cost. In particular, these moving cost estimates depend on the modeler's choice of timing; and over long time periods, the estimated moving costs will be mechanically lower.

a low-income city. But differences in average income reflect not only differences in wages being offered, but also differences in the types of workers who live in higher-income cities as compared to workers elsewhere. For example, they may be more educated or more experienced and receive higher wages as a result. The incentive to migrate to high-income places depends on counterfactual incomes, so the ideal measure of incomes would adjust for differences in average ability, education, job quality, taxes/transfers, and so on.

How would our conclusions change if we adjusted for measures of worker quality? Not much. To approximate this type of measure for incomes, Card, Rothstein and Yi (2023) use a "mover design"—comparing movers and non-movers while adjusting for differences between these groups—to hold worker characteristics constant. They find that differences in income across space are compensated by differences in housing costs. Diamond and Moretti (2021) show that the cost of living also varies across space, with high-income places also being the most expensive places to live. Both papers show a strong cross-sectional relationship between incomes and the cost of living, confirming the basic assumption of our model. The exact extent to which wages are imputed into housing costs depends on a variety of features of the local economy: for example, the extent of pass-through of rents to other prices can temper the house-price response (Couture, Gaubert, Handbury and Hurst, 2024).

A limitation of sophisticated data based on movers of the kind these papers use is that it is not available very far back historically, so we cannot use the data to study changes in economic opportunity over long time periods. Making use of fuller historical data, we adjust for worker characteristics using linear regressions in Howard and Liebersohn (2021). This adjustment does not change the basic fact that regional inequality has increased. Even further back in time, data from the mid- and early-20th century is less likely to have worker characteristics, and researchers studying that time period often just use average local wages.

An ideal measure of housing costs would adjust for differences in the type of housing that is available and would measure housing costs on a per-period basis, similar to incomes. Rents are often a better measure of housing costs than the price of housing, because house prices are related to both current rents and expectations of future rents. Greater availability of rent data in recent years, much of it from private sources such as Zillow, has made it increasingly feasible to study rents directly rather than house prices.

Land prices depend less on housing quality than house prices do, so one potential way of controlling for housing quality is to look at land prices. A disadvantage is that it is difficult to know how much of the cost of housing is due to land alone. However, researchers have used different methods and time periods to back out land prices using

data on structure costs or transactions involving vacant lots (for example, Ahlfeldt and McMillen 2018; Davis and Palumbo 2008; Albouy, Ehrlich and Shin 2018; and Davis, Larson, Oliner and Shui 2021). All find that land values are highest in the highest-income urban areas. But also, Davis and Palumbo (2008) and Davis et al. (2021) find that land prices have increased the most in expensive coastal metros, similar to rents and house prices. In other words, looking at land prices instead of rents or house prices does not change our basic story.

Spatial equilibrium models also predict that housing costs depend on differences in urban amenities, which again are hard to measure. Some natural amenities may be fixed or slow to change and can be differenced-out by studying changes across time. This assumption may be reasonable over short time periods, but changes in the urban environment or climate are likely to matter more over long time periods. Using an index of many amenities, Diamond (2016) shows that some amenities change endogenously in response to population changes. In particular, this theory emphasizes the role of college-educated people who are more mobile and also have an equilibrium effect on the local amenities. In another approach, Almagro and Domínguez-Iino (2024) allow for preference heterogeneity over multiple amenities instead of using a single quality index. Amenities improve the most in areas with the greatest growth, in this way amplifying the effects of income shocks.

Summing up, we think that migration towards cities with higher real incomes is a key driver of the relationship between income growth and housing cost growth. Looking at the data, Figure 1d shows how population growth relates to median incomes. All else equal, one would expect population growth to be the greatest in the highest-income core-based statistical areas, because economic and income growth has been the highest there. But instead, the relationship between population growth and median incomes is inverse-U shaped, with the highest population growth in the middle of the income distribution rather than the top. Average population growth in locations at the top quintile of income was about 15 percent, equal to population growth in the second-lowest quintile. Population growth in the middle quintile of the income distribution was higher than both, at 18 percent. Why did people move more to middle-income places instead of the very highest-income places? This brings us to our next building block.

Higher-Income Regions Have Not Produced Additional Housing

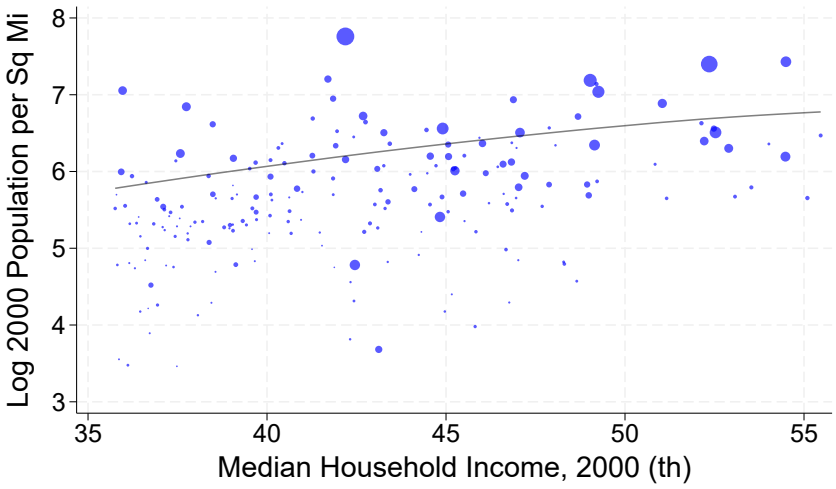
The urban areas with the highest per capita income levels also tend to have the greatest constraints on new housing construction, which means that that changes in housing de-

mand have larger effects on equilibrium housing costs but smaller effects on equilibrium population. The key quantitative measure is the housing supply elasticity with respect to prices. This parameter measures by what percent the quantity of housing increases for every one percent increases in house prices. In areas where the housing supply is elastic, small price increases lead to a large percent increase in housing construction, whereas in areas where it is inelastic, even large price increases do not lead to new homes being built.

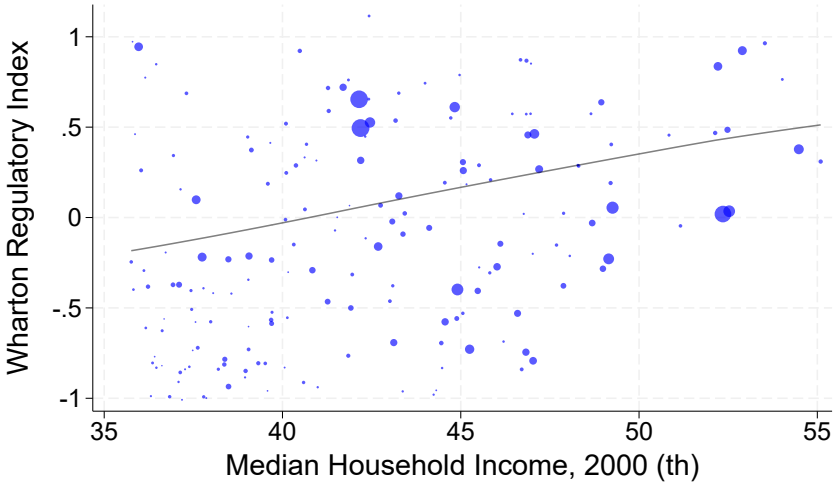
Why is the housing supply more elastic in some areas than others? Two factors seem particularly important. First, it is harder to build in areas with more people because higher density makes it harder to assemble plots and fit new structures (Baum-Snow, 2023). Given that people migrate towards higher-income areas, it is not surprising that higher-income areas are denser on average. Figure 3a shows how median incomes relate to population density: here, each data point represents a Metropolitan Statistical Area—that is, the larger urban areas that were part of the Core-based Statistical Areas defined earlier. For every $10,000 higher median income in the year 2000, the population density was 8 percent higher. We include coefficients, standard errors and t-statistics from corresponding population-weighted linear regressions in the figure notes.

Not only are higher-income places denser, they also regulate new construction by more. Glaeser and Gyourko (2018) show how stringent land-use restriction in high-income places leads to spatial misallocation (see also Hsieh and Moretti 2019); indeed, such regulations tend to redistribute wealth from lower-income house buyers to higher-income house sellers. Figure 3b shows the relationship between median incomes and housing supply regulation. To measure regulation, we use data from the Wharton Residential Land Use Regulatory Index, a summary index of land use regulation based on a survey of local land use authorities conducted by Gyourko et al. (2008). The relationship between incomes and housing restrictions is positive and strong. Every $10,000 increase in income is associated with about a 0.4-point higher value of the index, a bit less than half a standard deviation. The strong relationship is notable in part because, unlike population density, land use regulation is under the direct control of local governments. One might think that local governments would respond to house price increases by loosening regulation. But the opposite is true: in an update to the Wharton index, Gyourko, Hartley and Krimmel (2021) show that land use regulation has increased over time, particularly in large coastal markets. Unless there is a dramatic change of course in land use regulation in high-income areas, we expect the correlation with income to continue.

Why do the high-income urban areas make it harder to build new housing? One reason has to do with fears that new housing will erode home values, which is described as the "Home-Voter Hypothesis" by Fischel (2005). These fears are exacerbated by the



(a) Population Density



(b) Wharton Residential Land Use Restriction Index

Figure 3: Supply constraints and median incomes.

Note: The panels in this figure show the relationship between nominal 2000 median household income, and land use regulation and log population per square mile. Each point is a Metropolitan Statistical Area (MSA) weighted by 2000 population. Elasticity and unavailable land share are from Saiz (2010), and the Wharton Regulatory Index are from Gyourko et al. (2008). We include MSAs with elasticity data available in Saiz (2010). We use the 2000 decennial census to measure median income and population in 2000 as provided by NHGIS (Manson et al., 2025) compiled using correspondence files from the Missouri Census Data Center (2025). Figure omits top and bottom 5% of CBSAs. Fit line is from a local linear polynomial with smoothing parameter 10. Slope (robust s.e.; t) of population-weighted OLS fit lines: Log pop./mi^2 = 0.080 (0.027; 2.99); Wharton Reg. Index = 0.043 (0.012; 3.55).

fact that moving is costly and that homes have a high value and represent a source of wealth that it is difficult to diversify. A related argument is that zoning can also be a way for homeowners to raise the tax base (Epple, Romer and Filimon, 1988) or to manage congestion costs in high-density areas (Hilber and Robert-Nicoud, 2013). A robust literature discusses the political origins of zoning restrictions, but without firm conclusions as to the reasons (Gyourko and Molloy, 2015). The link between housing costs and zoning restrictions holds both across and within cities, and has been found in papers using a variety of methods and time periods (Glaeser and Ward, 2009; Glaeser, Gyourko and Saks, 2005). In a study of the aggregate implications of the home-voter hypothesis in a spatial equilibrium model, Parkhomenko (2020) finds that these regulations reduce aggregate productivity, because they keep people away from the highest-productivity locations.

Combining data on regulation, population, and other features of the local environment, several recent papers have estimated measures of the housing supply elasticity. The most widely used measure of housing supply elasticity is the one in Saiz (2010), that estimates an elasticity for each MSA (Metropolitan Statistical Area), the largest of the CBSAs. Baum-Snow and Han (2024) makes a similar calculation, but at the neighborhood level and for a later and shorter time period, and estimate a much smaller average elasticity. But the same comparative static still holds in both papers, with the housing supply more inelastic in higher-income areas.[7]

If housing supply becomes more inelastic as incomes and housing costs rise, that should have implications for changes in population. Going back to the supply-and-demand graph in Figure 2, we have drawn the population capacity curve to be convex, reflecting that as income rises, and demand increases, it will be harder to build new housing. Thus, for a high-income city, an increase in demand will lead to a big increase in prices, but a smaller increase in population. For a city that starts out low-income, an increase in demand will have only a small change in prices, but a large change in population.

We see evidence consistent with such elasticities in our data on populations and housing costs. From the previous section, we documented that the highest-income parts of the country saw the largest housing cost increases. Without differences in housing supply elasticities, that would mean that we would expect those places to grow the most too. Yet in Figure 1d, the highest-income places did not expand more than the middle-income places. This is consistent with lower housing supply elasticities in the highest-income places, where it is relatively hard to build new housing due to density

[7]There is some debate about the strength of this heterogeneity. Louie, Mondragon and Wieland (2025) finds that existing measures of housing supply elasticity are not an important mediator of the relationship between income growth and price growth. In response, Furth (2025) argues that their measure of income growth is incorrect.

and regulation.

Of course, one way to put more people into a city without changing housing supply is for people to consume less housing—for example, by having roommates or dividing up existing houses. However, we hypothesize that this margin of adjustment is also more elastic in less-expensive areas. When housing is cheap and people are consuming a lot of it, they will adjust consumption in response to price changes, but when housing is expensive and people are closer to consuming the bare necessities, then they are unwilling to continue to shrink their housing consumption even if it continues to get more expensive. This is consistent with, although not necessarily implied by, a well-document fact about housing demand: that people's consumption rises with their income, but less than one-for-one (Mayo, 1981; Quigley and Raphael, 2004; Albouy, Ehrlich and Liu, 2016; Cardullo and Sechi, 2023). This heterogeneity works in the same way as the heterogeneity in housing supply: people will consume less housing in richer cities than they would in poorer cities, where housing is relatively cheap compared to other goods. This means that as house prices change, the amount of adjustment they are willing or able to do is smaller.

Finally, it is worth mentioning again that at least some of the relationship between housing supply elasticity and income is a policy choice and therefore could be changed. Several cities with a high level of income and robust income growth sustained large population increases while avoiding substantial increases in housing costs. Many of these cities are located in Texas and the Southwestern United States, where there are few natural barriers to construction and new housing is relatively uninhibited by regulation. To illustrate, compare Austin, Texas and Los Angeles, California. In 2000, our data show that median incomes were similar in both cities — around $49,000 in Austin and $46,000 in Los Angeles. Real income growth from 2000 to 2018 was about 15 percent in Austin and 16 percent in Los Angeles. However, population growth was much greater in Austin, where the total population increased by 74 percent, than in Los Angeles, where it only increased by 7.5 percent. Real house prices increased by 74 percent in Austin — a substantial increase — but much less than the 110 percent increase in Los Angeles. While Austin is an extreme example, similar patterns of robust income growth, large population increases and relatively moderate housing costs occurred in Houston, Dallas and Las Vegas.

2 Aggregate Implications of Regional Inequality

The cross-sectional data itself is not sufficient to tell us how regional inequality affects national housing prices. We might be tempted to take the model from Figure 2 and see if we can apply it to the country as a whole. But when we think about the population

capacity curve of housing at the national level, it ought to be much more elastic than the curve for individual cities. In particular, if we wanted to induce housing construction that occurs anywhere in the United States, it might not require a very large rise in house prices at all. Thus, we need a model that incorporates differences across space to put all the facts together and draw conclusions about the aggregate.

Here, we begin by considering a model that builds on Figure 2 by having multiple places that interact in equilibrium. For graphical simplicity, we show City A and City B. The top half of Figure 4 shows population capacity curves—what share of the total population a city can hold for a given price of housing. The key additional assumption in this figure is that total population is fixed, and that people choose between living in City A and City B. Thus, housing costs in both locations are determined by one variable: the share that choose to live in City B. As the population in B increases to the right, housing costs in B rise. At the same time, the population in A necessarily decreases, so housing costs in A fall. We also plot the average housing cost, which will come in handy later. We plot the unweighted average in Figure 4 because we want to focus on an increase in average housing costs that is the result of housing cost changes within cities. When population becomes more unequal, the housing cost for the average person will rise by even more because more people will be choosing to live in the more expensive city. However, this increase does not reflect a change in the person's budget set in the same way that a change in the unweighted average does.

The population capacity curve becomes less elastic as the population increases: as a result, the average will be higher when the population is unevenly distributed. As in the one-city model in Figure 2, we will assume any shifts in the capacity curves due to changes in regional inequality to be quantitatively negligible.

Because there are two places to live, people decide where to live based on not just the housing cost of one city, as before, but rather the difference in housing costs between the two cities, which is shown in the bottom panel of Figure 4. Thus, the relative demand curve is a function of how many people will choose to live in City B given the difference in housing costs between the two cities. The slope of this curve is related to the slope of the demand curve in the one-city model, but the one-city model did not consider any changes in the utility of the outside option, while here we are explicit that the only alternative is to live in the other city. The average level of the demand curve depends on people's common preference for City A or City B. For example, if amenities in City B improve, the relative demand curve will move up and City B will become relatively more expensive. The slope comes from the heterogeneity of people's preferences for each city and how important that heterogeneity is compared to housing prices. If house prices go up in City B but not City A, people on net will move from City B to City A. If many people are close to indifferent across the cities, that will

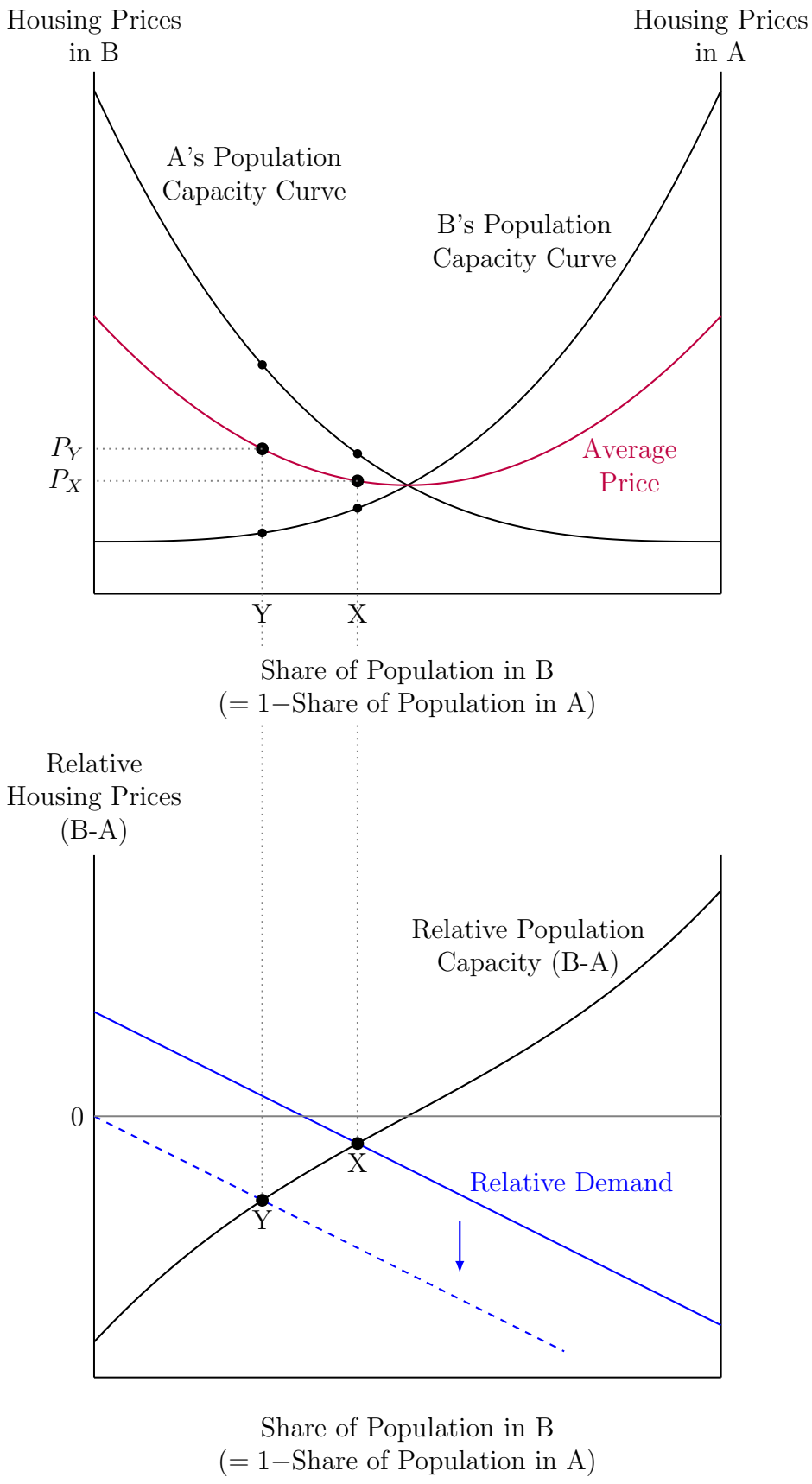


Figure 4: Two-City Model

induce many people to move, and the relative demand curve will be fairly flat. If most people have a strong attachment to one city or the other, then not many people will be induced to move, and the relative demand curve will be steep. The spillover at the center of this assumption—people moving in response to house price changes causing house price changes in the place they move to—has been well-documented in Schubert (2021). The bottom panel plots the relative population capacity curve, which is the difference between the two curves in the top panel.

The equilibrium of this model will be where the relative demand curve meets the relative population capacity curve, at point "X" in the bottom panel. This point tells us the populations in both cities, as well as the relative housing costs of the two places. Of course, we are primarily interested not in the relative housing costs, but in the individual housing costs and the average housing cost. For those we can trace the equilibrium up to the top panel, where we can see the average housing costs as a function of the population distribution. The average price corresponding to equilibrium "X" is "P_X" in the top panel of Figure 4. The prices in each city can be found by tracing up from the X to the two population capacity curves (to the smaller dots) and then over to the y-axis. As we would expect given the relative housing costs in the lower figure, housing prices in A are higher than housing prices in B.

Now consider a shift in the relative demand curve, representing an increase in regional inequality. Initially, City A was slightly preferred to City B, which we will assume was due to City A having a slightly higher income. Now imagine that City A's income rises compared to City B. That will lower the relative demand curve, so that fewer people wish to live in City B at any given relative price for housing. In the bottom panel, we can see that equilibrium shifts to the left and down to point "Y."

The effect of rising relative income in City A for the overall housing costs can be seen by tracing the new equilibrium Y up to the top panel. In City B, housing costs have fallen slightly due to their having a relatively elastic housing supply. In City A, housing costs have risen steeply due to a less elastic housing supply, since they were already the place with more population. Overall, the average house price between the two cities rises because the increase in City A is larger than the decrease in City B. Note that the dot above "Y" on"A's Population Capacity Curve" is much higher than the corresponding dot above "X," while the two dots on "B's Population Capacity Curve" are of more similar heights. In addition, house prices for the average person rise by even more because people are moving to the more expensive city. The average housing cost has increased to P_Y.

We can see the importance of our third building block—that higher-income cities have less elastic population capacity—by imagining that instead of the population capacity curves being concave, they were linear and symmetric. In this case, the average

housing supply is no longer a function of population—and a change in regional inequality would have no effect on average housing costs nationally.

Generalization of a Model to Many Cities

The model in Figure 4 has only two regions, but the world is a big place, and the regional inequality that we have documented is not universal: there were plenty of lower-income cities that outperformed and plenty of higher-income cities that under-performed. So should we expect our result to hold generally? Is a positive correlation between income growth and initial incomes enough to expect housing costs to rise?

Yes. The key assumption is the equilibrium assumption that everyone must live somewhere. If one person moves from a lower-income more-housing-supply-elastic city to a higher-income less-housing-supply-elastic city, they raise house prices in the less-elastic city more than they lower house prices in the old region. Their net effect is to raise house prices on average. So when regional inequality increases and people—on average—move to higher-income places, average prices will rise. Indeed, in Howard and Liebersohn (2021), we show that the covariance of relative demand changes and housing supply elasticities is the important statistic for the increase in housing costs.

Regional Inequality and Housing Costs in the Data

To this point, we have established a rationale for why increased regional inequality would lead to higher housing costs through migration. Moreover, we have argued that the data is consistent with many of the necessary assumptions for our theory to work. But whether our theory explains a lot of the increase in housing costs is an inherently empirical question. To answer it, we look at the time series of regional inequality and rents.

Figure 5 shows several measures of rents, plotted in the left-hand axis. The top line uses the measure of rents in the Consumer Price Index divided by the overall Consumer Price Index, indexed so that 1969 is equal to 1 (Federal Reserve Bank of St. Louis, 2024a). While this index focuses on urban areas, it is the only rent index that is even close to nationally representative and has data for a long period of time. However, one of the key criticisms of this rent index is that it reflects existing rents, which may not be the current price being charged in the market for starting a rental. As a result, it can lag market-priced rents by several years, so we should focus on medium- and long-term trends rather than year-to-year variation.

Crone, Nakamura and Voith (2010) argues that prior to 1985, the CPI rent index is mismeasured, because it omitted units that had a change of tenants, thus leading to nonresponse bias. We include their rent measure as well, which includes a much smaller

decline over the 1970s. We also show the real rent index from Lyons, Shertzer, Gray and Agorastos (2024). It is a hedonic rent index based on newspaper real estate listings in 30 major cities. While it is less nationally representative, the timing is likely to align more closely to market rents, and it is unlikely to suffer from the bias that Crone et al. (2010) discusses.

To measure regional inequality, we use the standard deviation of the log per capita personal income, available through the Bureau of Economic Analysis (BEA) Regional Accounts (U.S. Bureau of Economic Analysis, 2023), as measured on the right-hand axis. The BEA has published data at the county level yearly since 1969. We aggregate counties to core-based statistical areas, following our earlier data analysis. We also take a three-year moving average so that the standard deviation is less noisy. Of course, this measure is not ideal, as per capita personal income will include income that is not likely available to someone on the margin of moving between cities, for example business income. Nonetheless, better measures do not have the same geographic and temporal coverage.

We would not use the time series shown in Figure 5 to make causal claims about regional inequality and rents, but there does appear to be a correlation in the values. In addition to the general upward trend in both rents and regional inequality since 1980, many of the fluctuations show up in both series with similar timing. In both series, there is a decline in the first few years, followed by a rise in the 1980s, another fall into the mid-1990s and then a large increase since then.

Although our theory predicts many of the long-run changes in the price of housing, it does not get all of the smaller fluctuations right. The decline in regional inequality before 1980 and the subsequent rise in inequality are both reflected in falling and then rising rents—although the fall before 1980 is not present in the Crone et al. (2010) rent series. The period of flat rents in the 1990s corresponds to a period of falling regional inequality, and the same thing is true immediately in the early 2010s. At the same time, there are a few periods (like after 2000) when inequality falls but rents in the CPI index do not—although they do fall in the Lyons et al. (2024) rent series. Also, as we discuss in Howard, Liebersohn and Ozimek (2023), the COVID-19 pandemic increased housing prices while raising the demand to live in places with an elastic housing supply. We argue that the rise in housing costs since 2019 is due to an increase in demand for housing, rather than demand to live in more expensive areas.

Although we would be hesitant to draw too strong a conclusion from this graph, the data do seem to be consistent with regional inequality playing a role in determining rents. Perhaps another way to put it is that given the cross-sectional evidence in favor of the assumptions of our theory, a comparison of the macro trends in rents and regional inequality does not provide any evidence against it.

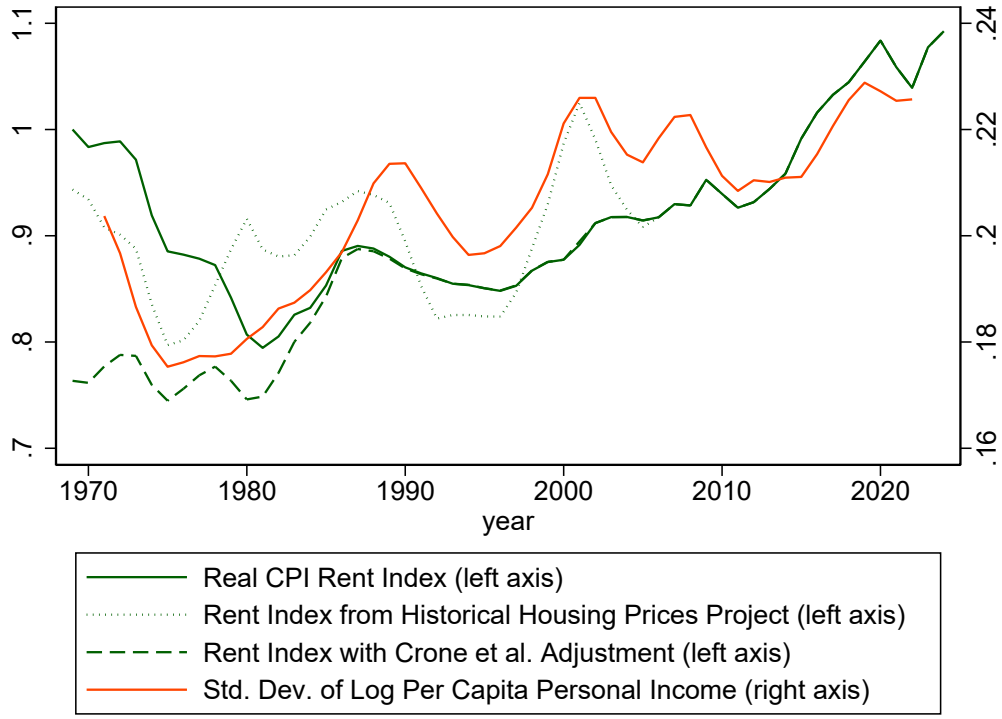


Figure 5: Regional Inequality and Real Rents

Note: Real CPI Rent Index is calculated by using the Consumer Price Index: Rent of Primary Residence in U.S. City Average from the BLS, and dividing by the Consumer Price Index: All Items in U.S. City Average. It is indexed to be 1 in 1969. The dashed line shows the rent index from Crone et al. (2010) similarly adjusted for overall inflation. This series ends in 2000 and is indexed to end at the same level as the Real CPI Rent Index in 2000. The dotted line shows the rent index from Lyons et al. (2024) This series ends in 2006, and is indexed to have the same level as the Real CPI Rent Index in 2006. For the standard deviation of log per capita personal income, we obtain county-level data from the BEA on per capita personal income. We aggregate the data to core-based statistical areas based on the BEA's population estimates (for Virginia and Alaska, the BEA reports per capita personal income for county groups rather than individual counties. We treat each county group as a city rather than try to inexactly assign them to CBSAs). We take a backward-looking three-year moving average for each city, and then we take the standard deviation in each year of the log of that moving average.

For a more quantitative assessment of a related theory, we refer interested readers to Howard and Liebersohn (2021). In that paper, we use a quantitative spatial model to study the importance of the growth for demand to live in housing-supply-inelastic areas. Using elasticities from the literature and similar data to that presented in Figure 1, we argue that the majority of the national rent increase from 2000-2018 is due to the change in relative demand for high-income low-elasticity cities.

Discussion and Implications

The link between regional inequality and housing affordability has applications for a variety of important economic questions and policies. We close by mentioning a few of them.

First, our essay has focused on housing costs in the United States, but there are good reasons to think that the same theory holds elsewhere. Housing costs have trended up in most countries of the Organization for Economic Cooperation and Development (OECD) in recent decades, as has regional inequality (Knoll, Schularick and Steger, 2017; International Monetary Fund, 2019). In countries where researchers have studied the elasticity of housing supply, they have often found similar regional differences as in the United States (Beze, 2023; Hilber and Vermeulen, 2016). For an example from the United Kingdom, Hilber and Mense (2024) find that the interaction of supply elasticities and demand shocks can explain fluctuations in London house prices.

Second, while our discussion has largely avoided differentiating between rents and house prices, regional inequality matters for both. In particular, economists have had success with matching major swings in house prices by considering changes in regional inequality combined with assumptions about the way people extrapolate recent changes in the cost of housing to the future (Chodorow-Reich, Guren and McQuade, 2024; Howard and Liebersohn, 2023).

Third, the emerging trend of remote work since the COVID-19 pandemic has changed the geography of income and is likely to continue to do so. Remote workers tend to be high-income, raising the average incomes in high-amenity low-cost regions. If this has a big impact on regional inequality, it could lead to long-term changes in housing affordability as well (Davis, Ghent and Gregory, 2024; Delventhal and Parkhomenko, 2023; Howard et al., 2023; Brueckner, Kahn and Lin, 2023). Of course, in general, the rise of remote work also led to demand for larger living spaces (e.g., for home offices), which caused house prices to rise during the pandemic.

Fourth, cities that are stagnant or shrinking in population have a particularly inelastic housing supply due to the durability of buildings—a notable departure from the typical negative relationship between median income and housing supply elastic-

ity (Glaeser and Gyourko, 2005; Notowidigdo, 2020). Over the last few decades, this has not been particularly relevant for aggregate housing costs because very few cities are shrinking (weighted by population, only about 10 percent of cities from 2000-2018 shrunk, and most of those that shrunk did so by less than 3 percent). Nonetheless, should it become relevant, it could undo or even reverse the economic forces we highlighted here. If, for example, housing supply in the biggest cities were to increase, migration out of the lower-income regions would lead to lower housing supply elasticities there. In that case, further increases in regional inequality might not raise aggregate housing costs as much—and might even lower them.

Finally, while housing supply policy is primarily determined by local governments, there are significant spillovers across cities in the demand for housing. Therefore, policies that may affect relative demand to live across cities also affect national affordability. For example, place-based policies often target lower-income regions (Neumark and Simpson, 2015; Glaeser and Gottlieb, 2008), with an explicit goal of reducing regional inequality. Increasing housing affordability nationally can be an important unintended consequence. On the other hand, a variety of policies implicitly subsidize living in the highest-cost areas, including housing vouchers, the state and local tax deduction, and tax credits for housing costs. These policies will have the unintended consequence of reducing affordability nationally.

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