

Build More Houses: How an Incorrect Perception of Housing Supply Fueled the Great Recession and Slowed Recovery

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ABSTRACT

An oversupply of housing, as a result of a building boom after the turn of the century, is commonly cited as a key cause of the Great Recession and the slow recovery from that recession. Using both national data and data for individual metropolitan areas, such as housing permits, residential investment, and population trends, I show that the evidence for systematic overbuilding is weak. New building was primarily meeting sustainable demand for shelter before the crisis. Building had increased where local regions with inadequate supply had created pent up demand and in regions where population was increasing as households were forced to move away from regions with inadequate housing supply. Elevated vacancy rates, where they developed, are best explained by unexpected declines in population growth. Declining population trends had already become problematic by 2007 in cities where high vacancies and collapsing prices were the worst after the recession. Yet, in 2007 and throughout the crisis, Federal Reserve officials acted explicitly on the perception that excess supply was an impediment to a recovery in residential investment, construction employment, and general economic stability. In short, an incorrect perception of housing oversupply rather than actual oversupply fueled the deep recession and slow recovery by prompting the Federal Reserve to accept or induce negative trends in economic activity.

JEL codes: R31, N12, E520

Keywords: Home building; housing, housing supply; regional housing market, stabilization, monetary policy

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Over the course of the 20th century, political developments such as zoning and other forms of land use regulation led to very inelastic housing supply in some key metropolitan areas.¹ The resulting lack of adequate housing in some important cities has led to very high rents and home prices. Yet also after the turn of the century, a national housing boom developed in which rising home prices coincided with increased building.

This presents an apparent paradox. If high home prices in the early 2000s were jointly a result of an endemic problem of inadequate urban building and a cyclical spike in credit-fueled demand, then should a subsequent decline in prices have been associated with decreased building or increased building? In 2005, were there too many houses or too few?

I will show that the increase in housing construction before the Great Recession was mild. According to various measures, consumption of housing was either moderately rising or even declining relative to other income and consumption trends. Temporary increases in housing units per capita were moderate compared with both past American housing consumption trends and current trends in some international markets. The eventual collapse in housing production was engineered because of misperceptions about excess supply—that excessively high prices had triggered unsustainable building. But the evidence shows that excessively high prices were the result of severe local limits on housing supply. Moderate increases in housing demand led to high prices and to upheavals in intermetropolitan migration rates. Eventually, several major metropolitan areas were burdened with excess housing inventory. This has widely been accepted as evidence of previous excess building, but to the contrary, it was the result of hard downward shifts in migration rates that were the result of intentional

1. William A. Fischel, *Zoning Rules!* (Cambridge, MA: Lincoln Institute of Land Policy, 2015), 163–218; David Schleicher, “Stuck! The Law and Economics of Residential Stability,” *Yale Law Journal* 127 (January 2017).

public policy decisions aimed at allowing or creating a slowdown in construction, borrowing, and general nominal economic activity.

Conventional wisdom has overwhelmingly settled on the conclusion that there were too many houses in 2005. Misallocation of capital into housing is a central feature of the debates and retrospectives of the housing boom and bust, the Great Recession, and the financial crisis. There are many disagreements about the causes and consequences of the recession and the financial crisis, but overinvestment in housing is settled canon. In other words, in tertiary research, it can be asserted without evidence.

In the following sections, I will elaborate on the following points:

- The presumption that there had been an unsustainable increase in housing construction before the Great Recession was explicit and broadly accepted, leading to expectations that a deep housing contraction was inevitable. There has been extensive debate about what caused excessive construction, but little debate about whether construction was actually excessive.
- The standard practice of presenting housing starts and home sales data as an absolute value—rather than, for instance, as a portion of the existing housing stock—was an important element favoring that incorrect presumption.
- These first two points were important factors leading the Federal Reserve (the Fed) to alter its cyclical policy choices before, during, and after the financial crisis. The contraction that seemed inevitable became inevitable because of Fed inaction at points where historically it would have acted to stabilize economic activity. That inaction was, to a great degree, due to the belief that overbuilding had negated the potential for the Fed to stimulate residential investment.
- At the national level, the evidence for pre-recession overbuilding is weak.
- In regions where building at the local level was not greatly constrained by political obstructions, it was responsive to population flows and real demand for shelter.
- An increase in units per capita in metropolitan areas with very inelastic housing supply created a migration event out of those metropolitan areas. The demand for housing units per capita has not been stationary over time. Some international data as well as comparisons across US metropolitan level data suggest that supply trends before 2006 largely reflected the tension created between long-term trends in demand for more or larger houses and localized limits on supply.

- Vacancies and rents are sensitive to housing supply. Construction was increasing where vacancies were low. Where vacancies became unusually high, it was associated with unpredicted declines in population growth and not the result of previously inflated building.

UNIVERSAL PRESUMPTIONS OF OVERSUPPLY

Is there a clear definition of “oversupply,” or lack thereof? This question proves difficult because supply is necessarily a concept entangled with demand. In this particular topic, demand is further complicated by the fact that most households act simultaneously as producers (owners) and consumers (tenants). So supply is entangled with demand through both the price of the asset and its rental value.

The claim of oversupply can apply at several levels. The most basic claim is that simply too many units were created, leading to a glut of housing that necessitated an extreme decline in residential investment after 2005. One example of this type of claim comes from former Federal Reserve Chairman Alan Greenspan in the summer of 2008, as reported by Andrew Ross Sorkin. “He did have one suggestion about the housing crisis, but it was a rhetorical flourish befitting his supply-and-demand mind-set: He suggested that there was too much housing supply and that the only real way to really fix the problem would be for government to buy up vacant homes and burn them.”²

Another example comes from Dean Baker at the Center for Economic and Policy Research. “The bubble and the risks it posed should have been evident to any careful observer. We saw an unprecedented run-up in house prices with no plausible explanation in the fundamentals of the housing market. Rents largely rose in step with inflation, which was inconsistent with house prices being driven by a shortage of housing. Also, the vacancy rate was high and rising through the bubble years.”³

These comments give the impression of houses sitting empty because we simply had no use for them. Similarly, Federal Reserve critic John Taylor estimated that a more neutral monetary policy before 2007 would have dampened the supply of houses by about 1 million units. In an address to Federal Reserve officials in 2007, he criticized previously low interest rate targets by the Fed by noting that “there would have been a much smaller increase in housing starts with the counterfactual simulation of a higher federal funds rate. Hence, a higher

2. Andrew Ross Sorkin, *Too Big to Fail* (New York: Penguin Books, 2009), 190.

3. Dean Baker, “The Housing Bubble and the Great Recession: Ten Years Later” (Washington, DC: Center for Economic and Policy Research, September 2018), 4.

federal funds rate path would have avoided much of the housing boom, according to this model.”⁴

Andrew Haughwout, Richard Peach, John Sporn, and Joseph Tracy at the Federal Reserve Bank of New York reviewed housing supply during the boom and the bust. Comparing the actual rate of home building with an estimated trend rate and also looking at vacancies, they estimated the national excess supply at about 3 million units.⁵ Their paper also suggests that oversupply was already canonized as a presumptive fact in 2012 (the paper’s publication date). In their introductory paragraphs, they wrote, “While it is now clear that too much housing was built in the US in the boom phase, identifying how much and where overbuilding occurred remain important issues.” Yet at the time of their writing, little empirical research on the scale of pre-recession building had been published.

A frothy building boom in single-family homes may not necessarily lead to rising vacancies. When the market for home ownership is overly optimistic, home buyers might overpay for homes and overconsume housing because their consumption of housing is bundled with their investment in the housing asset. When sentiment shifts and even overcorrects, prices might collapse, construction might decline, and vacancies might rise *after* the boom because potential buyers become cyclically pessimistic and buyers cannot be found.

In that conception of a boom market, higher prices, which are generally associated with inelastic supply, are associated with a boom-and-bust building cycle. When prices decline, speculators are driven from the market and construction corrects back down.

Mian and Sufi documented the ways in which the housing boom seemed to follow that pattern.

The speculators use leverage to bid for an asset, and such bidding boosts the asset’s price. The increase in price brings in more speculators creating a positive feedback between credit and speculation. This feedback effect generates “euphoria” or “mania” in the market as prices and trading volume rise rapidly. . . . Consequently, the boom in credit and asset prices leads to a

4. John B. Taylor, *Getting Off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis* (Stanford, CA: Hoover Institution Press, 2009); John B. Taylor, “Housing and Monetary Policy” (NBER Working Paper 13682, National Bureau of Economic Research, Cambridge, MA, December 2007).

5. Andrew Haughwout, Richard W. Peach, John Sporn, and Joseph Tracy, “The Supply Side of the Housing Boom and Bust of the 2000s” (Staff Report No. 556, Federal Reserve Bank of New York, March 2012), 7–8.

predictable bust. . . . The sudden acceleration of the PLS [private label mortgage securities] market created a natural experiment in which housing markets in the United States that were more exposed to non-core deposit financed lenders (which we refer to as non-core liability lenders, or “high NCL lenders”) experienced an immediate and large relative rise in mortgage originations. . . . Both house prices and construction rose more substantially in more exposed areas from 2003 to 2006. Moving from the bottom to top quartile of the NCL-lender exposure distribution led to a 12.1 percentage point increase in house prices and a 19.0 percentage point increase in construction of new housing units. . . . From 2002 to 2006, . . . the average individual became more pessimistic about the direction of future house prices in cities most exposed to high NCL lenders. Consistent with models of heterogeneous beliefs, credit expansion fueled purchases by more optimistic speculators while pessimism increased among the general population.⁶

In that model, speculative purchasers in the frothiest markets created buyer demand near the end of the boom, buoying prices and maintaining construction activity even after more sustainable sources of demand had retracted, leading to an inevitable bust where prices and construction activity collapsed.⁷

Mian and Sufi document that prices and construction subsequently declined more where this financial activity had been most prominent. However, construction activity collapsed in cities of all types after 2005, not just in those

6. See Atif R. Mian and Amir Sufi, “Credit Supply and Housing Speculation” (Working Paper, March 26, 2019), 1–4. The parenthetical explanation is mine.

7. Speculators and “flippers” can influence the market for homes in many ways. For estimates of their effects see, for example, Patrick Bayer, Christopher Geissler, and James W. Roberts, “Speculators and Middlemen: The Role of Flippers in the Housing Market” (NBER Working Paper 16784, National Bureau of Economic Research, Cambridge, MA, February 2011).

But the ability of short-term speculators to affect housing supply is limited. If 10 percent of the purchases in a given market are speculative short-term purchases, then this can have a measurable effect on prices for buyers and sellers. But broadly speaking, about 5 percent of the housing stock might be sold in a given year, so this amounts to a fraction of a percentage point of the local housing stock, and relative short-term changes in speculative activity would amount to an exceedingly small fraction of the local housing stock. To the extent that flippers are active, their units would be considered vacant—either for sale or under renovation—and vacancy rates in those categories were not elevated during the peak periods of speculation. This is not because there was not an increase in speculative buying and selling. It is because that activity is not large enough to create a noticeable shift in local housing supply. Later, after the crisis, units such as those held off-market after foreclosure amounted to a much larger fraction of the housing stock than speculative flipping had during the boom.

where construction had increased and prices had risen substantially. The work of Edward L. Glaeser, Joseph Gyourko, and Albert Saiz provided a theoretical explanation for this result. Their 2008 paper, “Housing Supply and Housing Bubbles,” posits that

if we are going to understand boom-bust housing cycles, we must incorporate housing supply. In this paper, we present a simple model of housing bubbles that predicts that places with more elastic housing supply have fewer and shorter bubbles, with smaller price increases. However, the welfare consequences of bubbles may actually be higher in more elastic places because those places will overbuild more in response to a bubble.⁸

Empirically, housing markets across the country seemed to confirm the Glaeser, Gyourko, and Saiz model. Oversupply seems like a plausible reason why both prices and housing starts collapsed in cities where prices had remained relatively moderate during the boom and in cities with large price fluctuations. In a study of the effect of lending on housing markets, Griffin and Maturana concluded:

In summary, the fact that a high concentration of the worse (mortgage) originators is related to house price crashes in areas of elastic land supply indicates that the relation between dubious origination and crashes is not due to the worse originators solely concentrating in areas of tight land supply. The increase in credit in areas of elastic supply seemingly led to unwarranted housing construction and a subsequent crash of house prices.⁹

There is a broad agreement about excessive construction being an element in the unfolding contraction, but there are a variety of explanations about exactly how that was translated into declining prices or rising vacancies. The effects of the asserted oversupply differ from model to model. So, approaching this topic as an attempt at replication or falsification of the existing literature is difficult.

The scale of overbuilding implied by the various observations above is massive. The 10 metropolitan areas that had the highest permitting rates per capita

8. Edward L. Glaeser, Joseph Gyourko, and Albert Saiz, “Housing Supply and Housing Bubbles,” *Journal of Urban Economics* 64, no. 2 (2008): 198–217.

9. John M. Griffin and Gonzalo Maturana, “Did Dubious Mortgage Origination Practices Distort House Prices?,” *Review of Financial Studies* 29, no. 7 (July 2016): 1692.

in 2005 all suffered declines of more than 70 percent by 2010.¹⁰ Either oversupply had to have been extreme and universal, or other factors had to be the primary cause of the eventual collapse. In the sections below, I will address the notion of misallocation of capital into housing—oversupply—on its own terms. I searched for evidence of excessive pre-recession building not justified by factors such as rising population or high costs of preexisting local housing. The evidence is surprisingly scant compared to those massive implications.

Even some basic related economic data fails to support the presumption of oversupply—rent inflation, for instance. Contrary to Baker’s assertion, rent inflation has been running above general consumer inflation for many years. In 2005, at the height of the construction expansion, both the shelter component of the Consumer Price Index (CPI) and the composite of other core CPI components were both briefly running at about 2 percent. Housing starts began to decline in early 2006, and rents increased. Rent inflation was higher than other inflation until August 2008. By then, housing starts had been in steep decline for 2.5 years and were more than 60 percent below the January 2006 peak. After a temporary postcrisis dip, rent inflation continued to be elevated after the crisis. If housing had been massively oversupplied, it is puzzling that (1) rent inflation over the preceding decade had run at nearly double the annual rate of core inflation in other categories, (2) those inflation rates were only just beginning to converge at the peak of the housing boom, and (3) rent inflation turned sharply higher again as soon as housing starts began to decline. Figure 1 shows how rent inflation has been higher than general inflation for most of the past 20 years, including during the housing boom and well into the housing contraction.¹¹

Further, American households had not increased their consumption of housing relative to other spending (in current dollar terms) before the Great Recession (see figure 2). The total estimated rental value of American homes had amounted to a little more than 13 percent of total personal consumption expenditures since 1990. It increased from that level after the contraction in construction. Even with fewer new units, American households have been spending more on housing since the crisis. Oversupply of housing leading to a correction should be associated with rising spending on housing during the boom and then a decline in spending on housing as rents soften in the oversupplied market. If

10. Among the largest forty-nine MSAs with data. Sources: US Census Bureau, “Building Permits Survey,” Census.gov, n.d., and US Bureau of Economic Analysis, “CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income” (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm.

11. Shelter inflation is primarily composed of the estimated change in rental value of both owned and rented homes.

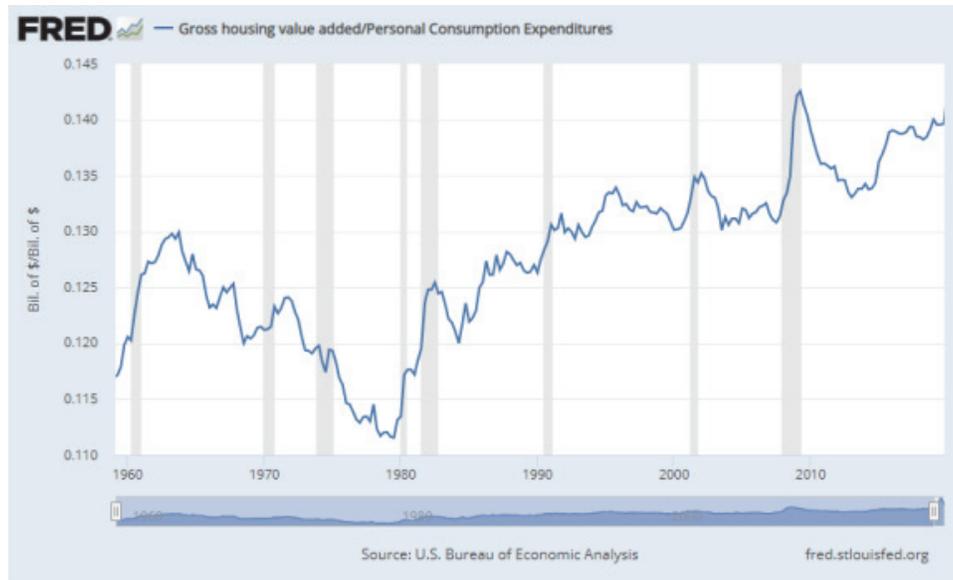
FIGURE 1. SHELTER INFLATION AND HOUSING STARTS, 2000 TO 2013



Source: US Census Bureau, "New Residential Construction," census.gov, accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, "Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)" (graph), FRED Economic Research, n.d.; US Bureau of Economic Analysis, "Consumer Price Index for All Urban Consumers: Shelter in U.S. City Average (CUSR-0000SAH1)" (graph), FRED Economic Data, n.d.; US Bureau of Economic Analysis, "Consumer Price Index for All Urban Consumers: All Items Less Food and Energy in U.S. City Average (CPILFESL)" (graph), FRED Economic Data, n.d.

Note: SAAR=Seasonally Adjusted Annual Rate.

FIGURE 2. GROSS HOUSING VALUE ADDED/PERSONAL CONSUMPTION EXPENDITURES



Source: US Bureau of Economic Analysis, "Gross Housing Value Added/Personal Consumption Expenditures" (graph), FRED Economic Data, 1952-2019, accessed March 15, 2021, <https://fred.stlouisfed.org/graph/?g=z9tm>.

prices and housing starts collapsed because of lower expectations of potential buyers about future American spending on housing, it appears that those lower expectations were unwarranted.

A DIGRESSION: THE WAY HOUSING STARTS ARE ANALYZED CREATES BIAS

In figures 1 and 2, I displayed these measures as they usually are displayed: inflation as an annual percentage change in the price index, gross rental expenditures as a ratio (here, with total personal consumption expenditures), and housing starts as annualized units.¹² Most financial data follow an exponential growth pattern. Because of this, presenting a time series of most measures as raw data is generally fairly useless. Recent changes will be very large and noticeable while changes from decades in the past, which were momentous at the time they occurred, will show up as barely a blip. In housing data, some measures are commonly transformed: vacancy rates or months of inventory, for instance.

12. A version of this section has been published separately as "A Plea for Presenting Housing Starts the Same Way We Present Most Other Economic Data" at <https://www.mercatus.org/bridge>.

Others are rarely transformed: housing starts or new home sales, for example. All of these measures should be transformed. One reason that housing starts are not usually transformed is that they have a mean that appears to be relatively stationary over a long period of time, so when they are displayed on a chart, distortions that are very obvious for other measures do not seem to be a problem here.

This is an error that wreaks havoc on housing analysis. Housing starts are not a measure with a truly stationary long-term mean. They are (approximately) the first derivative of an exponentially growing measure (the housing stock) that is growing at a declining rate.

Gross domestic product (GDP) is another measure that increases exponentially but at a rate that has been declining. Usually, GDP growth is presented as a percentage change of the level. Because it is transformed this way, the “Great Moderation” of the past 40 years is clear. GDP growth has slowed on average but with much less volatility than was typical before the 1980s.

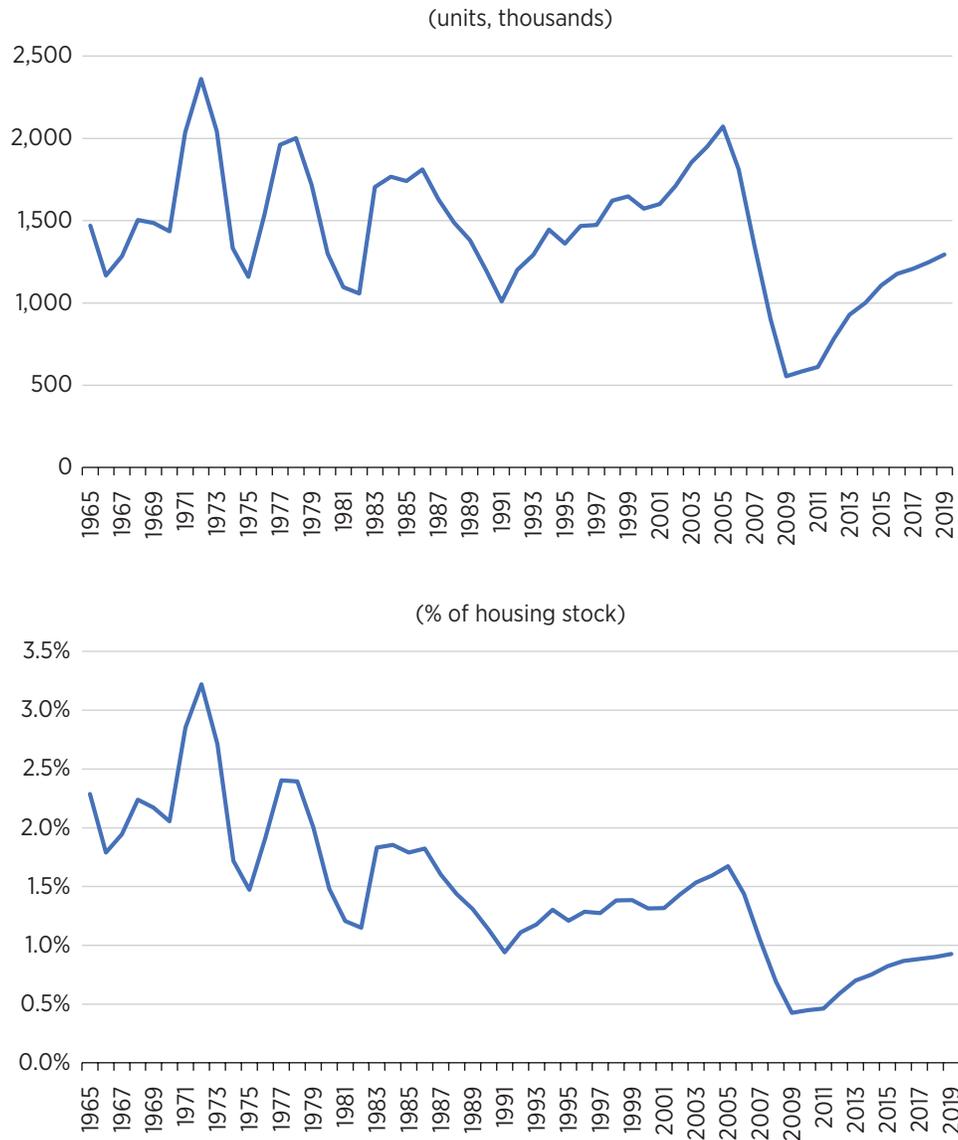
Figure 3 shows charts for housing starts in absolute values (left panel) and as a percentage of the existing housing stock (right panel). Here, the transformations do not appear to be visually necessary. The growth of the housing stock does not appear to be unbounded like GDP growth is. But even though it does not seem visually necessary to transform housing starts, it is conceptually necessary.

Since the transformation is rarely performed, analysis of housing markets begins with the sorts of analytical bias we would have if we only viewed GDP growth on a normal scale with absolute values. The public dialogue on the housing market should begin where dialogue on GDP growth begins—with a common understanding that the past 40 years have mostly been characterized by the lengthening of the business cycle and less volatile growth from year to year. Instead, public dialogue revolves around the opposite presumption. As a result, there is constant pressure to lower housing production from a macroprudential standpoint because any production is associated with volatility.

Figure 4 compares the change over time in the 15-year rolling average and rolling standard deviation of the annual GDP growth rate and annual housing starts stated as a percentage of the housing stock. They follow remarkably similar patterns. Moderation (the reduction in standard deviation) in housing starts—even at the top of the so called “housing bubble” in 2005—has been at least as strong in housing as in GDP growth.¹³

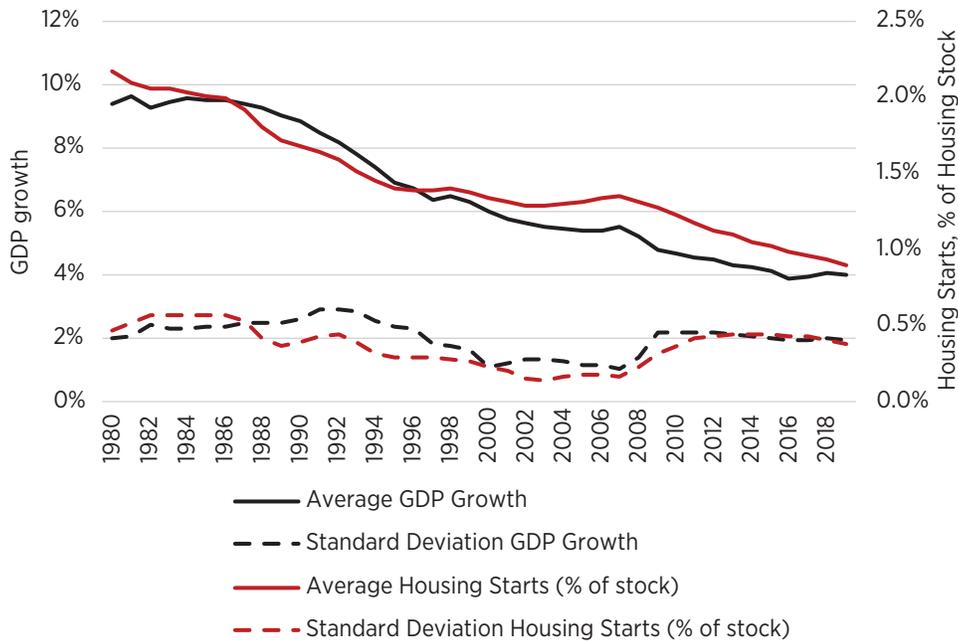
13. Much of the decline in volatility in housing starts has been among multiunit developments. For instance, in 1966, units in multiunit developments amounting to 0.6 percent of the existing housing stock were permitted. That increased to 1.6 percent in 1972, and decreased back to 0.3 percent by 1975. There is not a single year since 1988 when multiunit permits have topped 0.4 percent.

FIGURE 3. HOUSING STARTS



Sources: US Census Bureau, "New Residential Construction," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, "Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)" (graph), FRED Economic Research, n.d.; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Historical Tables," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/histtabs.html> (Table 7 Annual Estimates of the Total Housing Inventory for the United States: 1965 to Present).

FIGURE 4. GDP GROWTH AND HOUSING STARTS, 15-YEAR ROLLING AVERAGES AND ANNUAL STANDARD DEVIATION



Sources: US Census Bureau, “New Residential Construction,” Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, “Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)” (graph), FRED Economic Research, n.d.; US Census Bureau, “Housing Vacancies and Homeownership (CPS/HVS): Historical Tables,” Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/histtabs.html>; US Bureau of Economic Analysis, “1.1.5 Gross Domestic Product” (table), Regional Data: GDP and Personal Income, n.d., <https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey>.

There may be good reasons for housing production to decline over time as a percentage of the existing stock. If population growth is slowing, a decline in the growth rate of the housing stock is not necessarily a problem. However, at least before the financial crisis, population growth had not been slowing nearly as much as the rate of housing starts had. Changing household size has had a stronger effect on changing rates of housing production than changing population growth has. From 1965 to 1990, US population grew by about 29 percent, but the number of houses grew by about 63 percent. From 1990 to 2015, US population grew by about 29 percent again, and the number of households grew by 33 percent.¹⁴

14. US Bureau of Economic Analysis, “Population (POPTHM),” FRED Economic Data, 1965–2015; US Census Bureau, “Table HH-6 Average Population Per Household and Family: 1940 to Present,” Census.gov, December 2020.

The effect of changing household size scales with the size of the housing stock and the population. Additionally, vacancies, seasonal homes, second homes, and so on, also scale with the size of the housing stock and the population.

This is why housing starts should be transformed. An increase of 1 million housing units means much less to an economy that has 120 million households than it did to an economy that had only 60 million households. A 1 percent decline in average household size would require the construction of many more houses in 2020 than it would have required in 1960. Analysis of cyclical fluctuations in construction must account for this changing scale.¹⁵

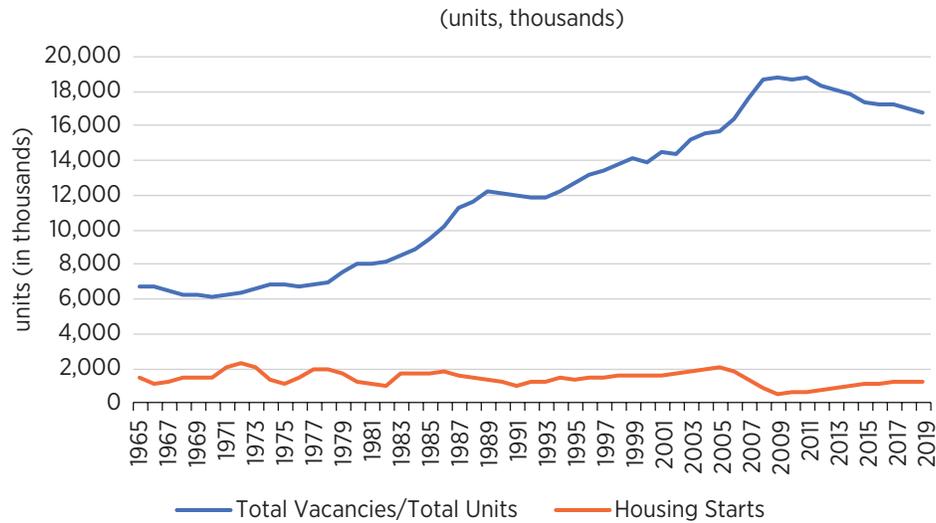
Consider also housing vacancies. Figure 5 compares vacancies and housing starts over time without a transformation. Vacancies are rarely presented this way because it is visually obvious that this chart is not going to convey very much useful information about relative vacancies at different times.

The number of vacant homes has increased over time for the simple reason that the country is larger and there are more homes, in general. Housing starts have just moved along sideways. Not only is the American housing market much less volatile than it used to be (in terms of supply), but the ability of the market to absorb what volatility there is should be much greater than it used to be. Fifty or more years ago, housing was different than most other products. Each family generally had one—and only one—house. Short-term fluctuations in the market could not be absorbed very easily.

In 1970, there were about four vacant homes for every new home started that year. Some were for rent or sale, and some were second homes, seasonal homes, homes under repair, and so on. In 2005, there were about 8 vacant homes for each home started. In 2019, there were nearly 13 vacant homes for every new start.

15. Haughwout et al., “The Supply Side of the Housing Boom and Bust of the 2000s” (cited above) do transform housing starts in some of their analysis by stating the measure in per capita terms. Figure 2 in their analysis looks more like the right panel of figure 3 above than the left panel. They acknowledge that housing production has been on a long-term downward trend. They conclude that much of that downward trend can be explained by lower rates of household formation related to baby-boomer-dominated demographic trends. This may indeed be a reasonable explanation for the downshift in housing production relative to population growth after 1990. However, even if there are reasons for the decline in housing starts per capita, that decline still means housing has become naturally less cyclical. Yet when the authors add up the estimated quantity of above-trend building, they return to absolute values. The 2000s building boom amounted to much less growth in housing starts on a per capita basis or as a percentage of the housing stock than was common in the booms in the 1970s and 1980s. That comparison creates a difficult challenge for housing supply as a causal force in the deep housing contraction. Why was the contraction as deep as the pre-1990 cyclical downturns in per capita terms when the boom was so much smaller?

FIGURE 5. HOUSING VACANCIES AND STARTS



Sources: US Census Bureau, “New Residential Construction,” Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, “Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)” (graph), FRED Economic Research, n.d.

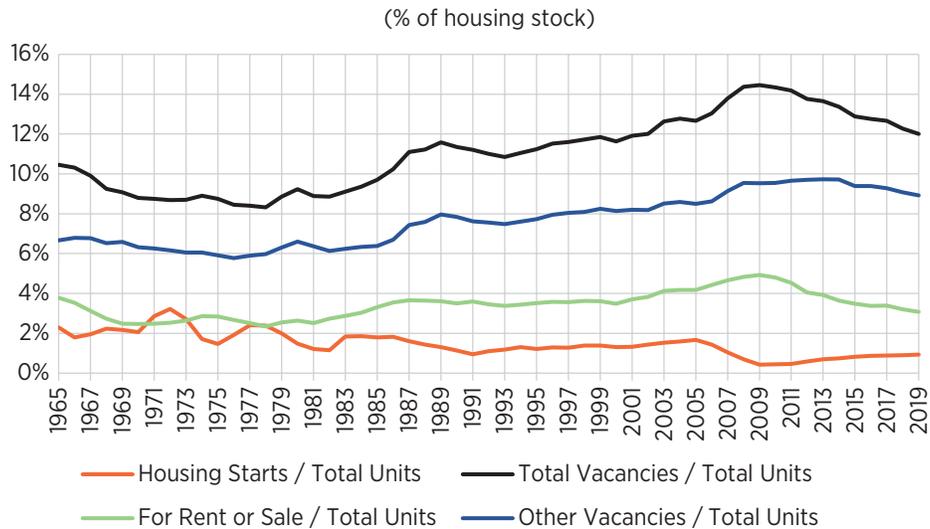
Figure 6 compares housing starts and vacancies in the way that vacancies are usually stated—as a percentage of the housing stock. Here, I show vacancies of homes for rent or sale and other vacancies (seasonal, second homes, etc.) in addition to the total.¹⁶ Even if the long-term downward trend in housing starts is a reflection of demographic trends, it is hard to see evidence for a generation-defining boom cycle in housing starts when they are displayed in the same fashion as other routinely transformed measures, such as vacancies.

THE EVOLUTION OF THE FEDERAL RESERVE POSITION ON HOUSING SUPPLY

The appropriate price level, the appropriate amount of building, and triggers for changes in sentiment and expectations are important factors to consider in the review of home-building trends. This is made more complicated by the fact that the Federal Reserve is charged with actively managing economic sentiment. The posture of the Federal Reserve during the period when construction activity

16. The rise in other vacancies in the mid-1980s is partially attributable to changes in measurement standards. See US Census Bureau, “Housing Vacancies and Homeownership (CPS/HVS): Fourth Quarter 2008—Source and Accuracy of Estimates,” Census.gov, August 29, 2012.

FIGURE 6. VACANCIES AND HOUSING PRODUCTION



Sources: US Census Bureau, "New Residential Construction," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, "Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)" (graph), FRED Economic Research, n.d.

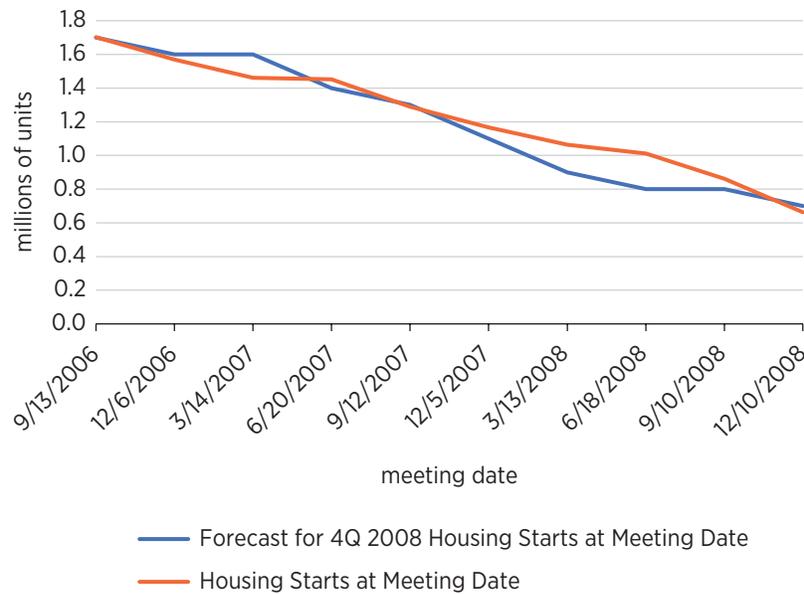
declined after 2005 provides an important window through which to view the interactions between supply and demand.

Federal Reserve officials had been focused on housing since at least June 2005, when the Federal Open Market Committee (FOMC) held a meeting focused on the dangers of coming down from an overheated housing market. They continued raising their target interest rate until July 2006. One explicit goal of those rate hikes was to slow down construction growth.¹⁷ Yet, the Fed didn't initially forecast a steep decline in housing starts. The leveling off of residential investment in 2006 was mostly seen by Fed officials as one important aspect of moderating nominal economic activity at a level associated with approximately 2 percent inflation and maximum sustainable employment growth.

Starts began to decline in early 2006 at about 2.1 million units annually and bottomed out in late 2008 at just over half a million units. As shown in figure 7, the Fed did not initially expect this collapse. In 2006 and early 2007, at each

17. See Federal Open Market Committee (FOMC), "Meeting of the Federal Open Market Committee on March 27–28, 2006" (transcript, Federal Reserve Board of Governors, Washington, DC, March 27–28, 2006), 139, <https://www.federalreserve.gov/monetarypolicy/files/FOMC20060328meeting.pdf>. Some examples of discussion about raising rates to slow construction down appear on pp. 13, 36, 96, 139.

FIGURE 7. TRAILING HOUSING STARTS VS. FEDERAL RESERVE FORECASTS



Sources: US Census Bureau, "New Residential Construction," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, "Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)" (graph), FRED Economic Research, n.d.; Board of Governors of the Federal Reserve System, "Other Macroeconomic Indicators" (table), in *Greenbook of the Federal Reserve Board of Governors* (Washington, DC: Federal Open Market Committee, 2006–2010), accessed March 15, 2021, https://www.federalreserve.gov/monetarypolicy/fomc_historical_year.htm.

meeting, housing starts declined more than the Fed staff had expected them to, and so they reduced their forecast of future housing starts by a similar amount (the 2 measures shown in the graph). The notion that oversupply required a retrenchment in construction activity was not a presumption that Fed officials carried with them into the housing contraction. Instead, it developed gradually after housing starts kept declining more than they had forecast. Housing starts declining more than they were expected to could be a sign that the Fed had underestimated the previous amount of oversupply or that they were pushing down on demand harder than they had intended to.

The budding consensus that declining housing starts reflected previous overbuilding is probably characterized most strikingly in a presentation by economist Ed Leamer at the annual summit held by Fed officials at Jackson Hole, Wyoming. The summit was held on August 31 and September 1, 2007, and focused on housing. This was an auspicious moment. The Fed had held their target interest rate at 5.25 percent in August in spite of signs of economic distress.

That was immediately followed by panic in some mortgage-related credit markets. Home prices would begin to break down across the country, but until then they had held relatively firm.

Leamer approached Fed officials with a powerful review of historical housing data. He noted that “residential investment consistently and substantially contributes to weakness before the recessions, but business investment in equipment and software does not. And the recovery for residences begins earlier and is complete earlier than the recovery for equipment and software.”¹⁸

At the moment he was making his presentation, housing starts were down about 35 percent from their 2005 peak levels and were falling fast. The message that his data conveyed was that the previous 60 years of economic experience suggested the Fed should consider a reversal of collapsing housing starts to be an imminent goal. “The bottom line: Housing provides an extremely accurate alarm of oncoming recessions.”¹⁹

The next part of his message was:

Now that we know how important housing is to the US business cycle, the next step is to try to figure out why. One very big clue is that housing has a volume cycle, not a price cycle. Home prices are very sticky downward, and faced with a decline in demand, it is the volume of sales that adjusts not the prices. With the decline in sales volume comes a like decline in jobs in construction, finance and real estate brokerages.²⁰

Leamer came with an artillery of data that said: Collapsing housing starts is a big red flag. Do not wait for a price contraction before aiming for stimulus. Yet he did not make that recommendation. He explained why he did not make that recommendation.

The inevitable effect of the low rates²¹ has been an acceleration of the home building clock, transferring building backward in time from 2006–2008 to 2003–2005. Our Fed thus implicitly made the decision: more in 2003–2005 at the cost of less in 2006–2008. That strikes me as a very risky choice. The historical record

18. Edward E. Leamer, “Housing Is the Business Cycle,” *Proceedings—Economic Policy Symposium—Jackson Hole, Wyoming* (Kansas City, MO: Federal Reserve Bank of Kansas City, 2007), 164.

19. Leamer, “Housing Is the Business Cycle,” 173.

20. Leamer, “Housing Is the Business Cycle,” 177.

21. The Fed target interest rate before 2006.

strongly suggests that in 2004 and 2005 we poured the foundation for a recession in 2007 or 2008 led by the collapse in housing we are currently experiencing.²²

With no lost sales to transfer forward in time, the low interest rates in 2002–2004 transferred sales backward in time, stealing sales that otherwise would have occurred in 2006–2009. In 2007 the housing sector of the economy is now paying the Piper with very little possibility that a rate cut would make much of a difference. Once the wave has peaked and is crashing, there is not much that can be done to quiet the waters.²³

The Federal Reserve is tasked with asserting its will on the business cycle. This presentation is an extraordinary historical document. It just so happened to be given at the most crucial turning point in the housing contraction. It contained a thorough, historically informed argument that housing starts are a key leading indicator in business cycles. And, yet, after making that argument, even its author did not counsel to act on it.

This brings our attention back to the question of how to define overbuilding. Perhaps the Leamer presentation represents the most important definition. Here, he is explicitly referring to the most basic idea of overbuilding—units built in excess of demand. Houses that should have been built in 2006–2008 had been built too early—in 2003–2005. This leads to sort of a metadefinition of overbuilding: Overbuilding is whatever the Federal Reserve perceives it to be. The perception of overbuilding led to a fear at the Fed of overstimulus or at least of a complacency about declining demand.

Possibly the most important factor leading Leamer and Federal Reserve officials to this conclusion is the problem I discussed above with the way housing starts are commonly reported. In one set of analysis, Leamer showed that housing starts tend to rise more than 20 percent above trend before a recession and then drop to 20 percent below trend leading into a recession. This assumes that trends in housing starts have a stable economic importance over time. But, surely a 20 percent change in starts was more economically important when starts peaked at 3 percent of the housing stock than it was when starts peaked at 1.7 percent. Yet, even with that bias, those signals were still very clearly pointing to the imminent need for the Fed to aim for a sharp trend reversal to rising housing starts.²⁴

22. Leamer, “Housing Is the Business Cycle,” 154.

23. Leamer, “Housing Is the Business Cycle,” 193.

24. Leamer, “Housing Is the Business Cycle,” 178–182.

In other analysis, Leamer treated housing starts as if they have a stable mean—approximately 1.5 million units annually. He analyzed the behavior of inflation and housing starts over the course of every business cycle since 1961. His analysis tracked how far from the mean housing starts deviated over each business cycle. Yet even if housing starts had a stable long-term mean, surely when considering the cyclical importance of housing, a cyclical shift of 500,000 housing starts means much less in an economy with 120 million units than it did in an economy with 70 million units. Leamer made no adjustment for that shift.

So he gave the Fed an “A” for managing the housing cycle from 1966 to 1970 when housing starts, as a percentage of the housing stock, started at 1.4 percent and increased to 2.5 percent. He gave them an “F” for, then, tightening monetary policy when it fell back to 1.8 percent in 1970. He gave them various passing grades for the subsequent cycles. But he gave the Fed an “F” for managing the housing cycle from 2000 to 2006 when housing starts began at 1.3 percent, and rose to 1.7 percent. By the time of his presentation, starts had declined back to 1.1 percent. (They would bottom out at 0.4 percent, years later.)²⁵

Leamer referenced the lack of a contraction in housing starts in 2000 and 2001 as a reason why there was not room for the Fed to induce more starts after that recession. But the reason there had not been a contraction in 2000 and 2001 is because there had not been much of a building boom in the 1990s from which to contract. As figure 8 shows, housing has become decreasingly cyclical since the 1980s. The post-2000 anomaly was not a building boom before 2006; it was the crash after 2006. We were well into the anomalous crash by the time Leamer was describing the continuation of the anomaly as a *fait accompli*.

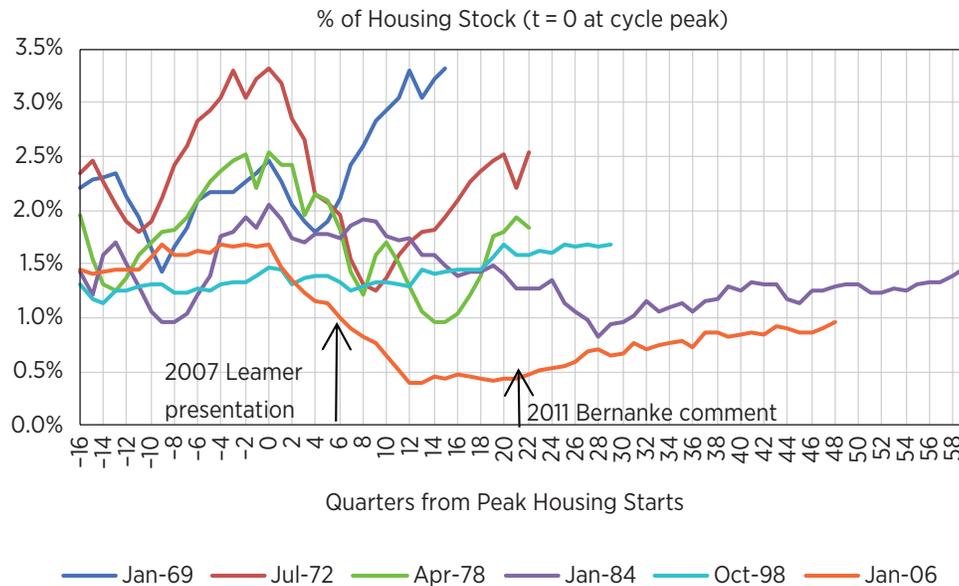
Treating housing starts as a time series with a stationary mean instead of a series with exponential growth at a slowing rate means that it appears to be more cyclically important over time as it becomes less cyclically important.

In previous business cycles, the inventory of vacant new homes for sale has typically eventually started to decline because new home sales (demand) picked up—in line with the standard historical patterns that Leamer had described. But in 2008, Fed staff and voting members described declining housing starts as the key to lowering inventory instead of rising sales.²⁶ Starting in March 2007,

25. Based on quarterly averages, housing starts from 1966 to 1970 started at 931,000, rose to 1,678, then declined to 1,236. From 2000 to 2007, they began at 1,504,000, rose to 2,100,000, and then declined to 1,451,000 (eventually falling to 526,000).

26. One example, from the transcript of the August 2008 meeting of the FOMC, a year *after* Leamer’s presentation. “We also have starts continuing to come down materially from their current level. So we think that the process will begin to get inventories into a more normal alignment.” FOMC, “Meeting of the Federal Open Market Committee on August 5, 2008,” 30.

FIGURE 8. HOUSING STARTS



Sources: US Census Bureau, “New Residential Construction,” Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, “Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)” (graph), FRED Economic Research, n.d.

in its meeting press releases, the Fed had referred to the housing downturn as an “ongoing adjustment”—changing its verbiage to “ongoing correction” in August—and had maintained the “correction” verbiage for a few more months.

Before September 2007, the Fed had been simply following the housing market down, forecasting future housing starts at the new lower level with each meeting. But looking back at figure 7, in the months after their Jackson Hole meeting, Fed forecasters actually accelerated the declines in their forecasts. Their forecasts seem to convey Leamer’s message that a collapse in housing starts was an inevitable result of previous overbuilding and that the Fed could not induce a recovery similar to previous recessions. Comparing the forecasts and their implied long-term trends in early 2006 with the forecasts in early 2009, the Fed lowered its expectation of cumulative housing starts for the years 2007 through 2011 by 6 million units over those 3 years.²⁷ That is more than the

27. Board of Governors of the Federal Reserve System, “Other Macroeconomic Indicators” (table), in *Greenbook of the Federal Reserve Board of Governors* (Washington, DC: Federal Open Market Committee, 2006–2010), accessed March 15, 2021, https://www.federalreserve.gov/monetarypolicy/fomc_historical_year.htm.

entire 3-year production of houses in the peak years of 2003, 2004, and 2005. It is implausible by a long shot that the decline in housing starts was an inevitable result of having built those units too early.

Ben Bernanke wrote in his memoir: “Builders would start construction on only about 600,000 homes in 2011, compared to more than 2 million in 2005. To some extent, that drop represented the flip side of the pre-crisis boom. Too many houses had been built, and now the excess supply was being worked off.”²⁸ The years 2009 and 2010 saw fewer new houses as a percentage of the existing stock of housing than any other 2-year period since at least 1965. In fact, the same can be said for the 3 years leading up to 2010, the 4 years leading up to 2010, and so on. For every period of any length of time since 1965, the period ending in 2010 is the period with the lowest number of permits and shipments as a percentage of the existing stock of homes.²⁹

The Federal Reserve explicitly noted the intention and power to create a downturn in construction activity in early 2006. When they asserted that intention, housing starts did begin to decline. Then, when housing starts would have recovered according to long-standing experience, the Fed declined to create enough monetary stimulus to facilitate that recovery. Even years later, at a point where it was simply implausible for there to have been excessive cumulative building, Chairman Bernanke explicitly blamed continuing slow economic growth on previous overbuilding. Bernanke’s 2011 comment suggests that the Fed accepted a slow recovery because they thought that either more housing starts would be disruptive or that a stimulus could not induce more housing starts.

These Fed positions were based, in part, on a basic estimate of appropriate housing supply—that some number of units had been shifted back in time by earlier Fed stimulus. All of this points to a 2-way cause and effect of perceptions of the housing market motivating Fed policy and Fed policy moving housing

28. Ben Bernanke, *The Courage to Act: A Memoir of a Crisis and Its Aftermath* (New York: W. W. Norton, 2017), 503.

29. These estimates are for the sum of both housing units permitted and manufactured homes shipped. The same can also be said of all periods ending in 2009 with just a handful of exceptions. US Census Bureau, “Current Manufactured Housing Survey (MHS) Tables,” n.d., <https://www.census.gov/programs-surveys/mhs/data/tables.html>; US Census Bureau, “Housing Vacancies and Homeownership (CPS/HVS): Historical Tables,” Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/histtabs.html> (Table 7 Annual Estimates of the Total Housing Inventory for the United States: 1965 to Present); US Census Bureau, “New Residential Construction,” Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, “Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)” (graph), FRED Economic Research, n.d.

markets. Before 2006, if there are signs of oversupply, they can be attributed to cyclical bubble activity with some confidence. After 2006, some putative signs of oversupply, such as rising vacancies, are more likely to be attributable to negative demand shocks. They are more likely to be related to a lack of capital or market frictions that were caused by Fed policy decisions than to cyclical overbuilding. Fed acquiescence to an anomalous deep decline in housing starts happened before (and extended throughout) the deep declines in prices and the sharp increases in foreclosures that have frequently been identified as causes of overcorrections downward in housing supply.

A careful review of housing supply can help to illuminate what seems to be a relatively binary set of choices. Should the Federal Reserve have aimed for fewer housing starts earlier—as in, before 2005? Or should they have aimed for more housing starts by 2007? Should they have aimed to follow the historical patterns highlighted by Ed Leamer in his 2007 presentation, or should they have diverged from historical patterns as Leamer recommended and as they subsequently did? This has ramifications for informing Federal Reserve demand management in future cycles. At the base of this dilemma is the question: “Was there a massive oversupply of homes in 2007 which called for a turning away from historical experience?”

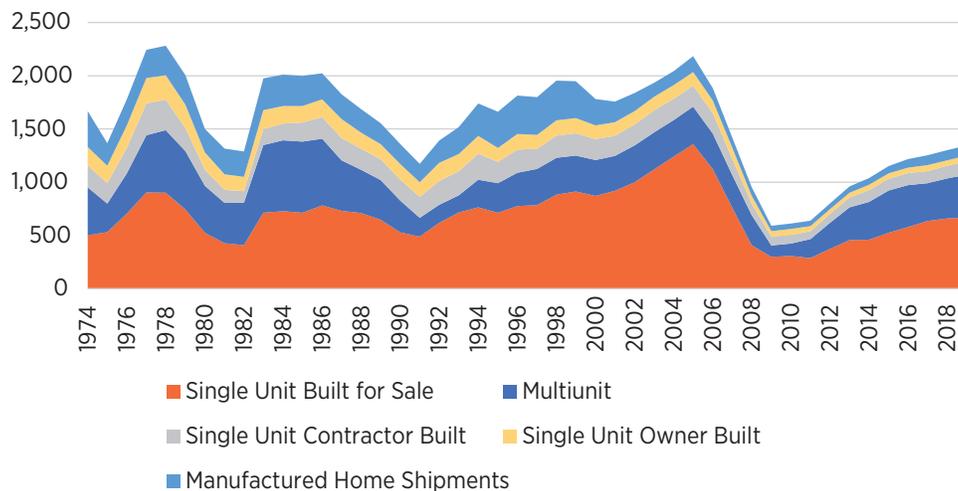
AT THE NATIONAL LEVEL, THE EVIDENCE FOR PRE-RECESSION OVERBUILDING IS WEAK

The strongest signals of apparent excessive housing supply in the United States before the Great Recession were (1) the number of new single-family homes sold and (2) residential investment as a portion of GDP. New single-family homes sold reached nearly 1.3 million units by 2005.³⁰ In the 20th century, no single year had seen more than 900,000 units. Residential investment as a proportion of GDP had averaged 4.6 percent of GDP from 1960 to 2000, with a range roughly 1 percentage point above or below the average. By 2005, residential investment had reached 6.5 percent.³¹

30. US Census Bureau, “New Home Sales,” New Residential Sales: Time Series/Trend Charts, webpage (Washington, DC: US Census Bureau, 1960–2005).

31. US Bureau of Economic Analysis, “Table 1.1.5. Gross Domestic Product; Table 5.4.5. Private Fixed Investment in Structures by Type,” Tools: National Data: GDP & Personal Income (Begin using the data . . .)—National Income and Product Accounts, webpage, n.d., accessed March 15, 2021, https://apps.bea.gov/iTable/index_nipa.cfm. I used Line 35, Residential, from Table 5.4. and divided it by Line 1, Gross Domestic Product, from Table 1.1.5.

FIGURE 9. TOTAL HOUSING STARTS AND SHIPMENTS (BY TYPE)



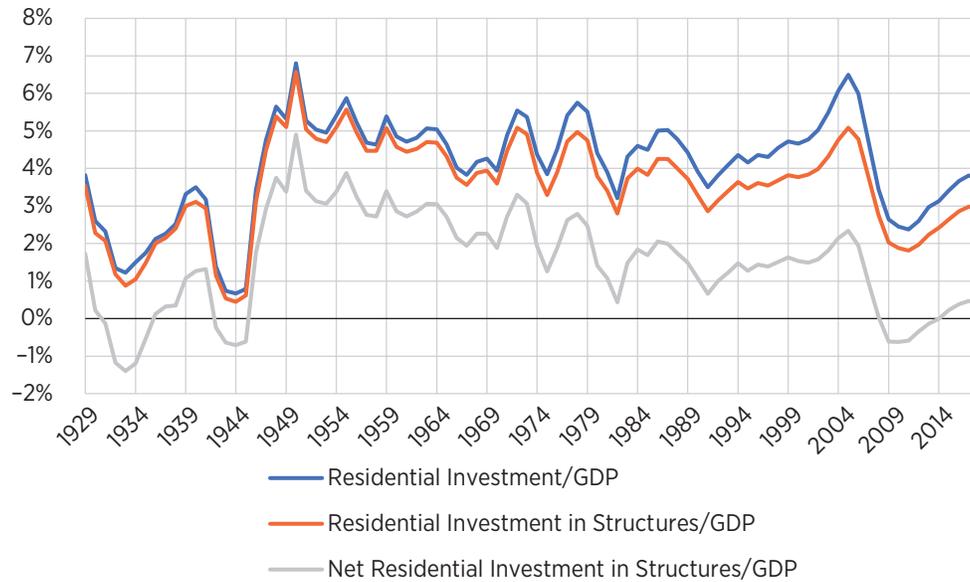
Sources: For manufactured home shipments, US Census Bureau, "Current Manufactured Housing Survey (MHS) Tables," n.d., <https://www.census.gov/programs-surveys/mhs/data/tables.html>. For all other measures, US Census Bureau, "New Residential Construction," Census.gov, n.d., "Table Q-1. New Privately Owned Housing Units Started in the United States, by Intent and Design," https://www.census.gov/construction/nrc/historical_data/index.html.

However, these measures are somewhat selective. For instance, most of the rise in single-family homes sold was a shift in market share from other types of units, as shown in figure 9. Multiunit developments and units built by owners or by contractors for individual households have been stagnant or in decline.³² Most of the rise in single-family homes built for sale was due to a shift in relative market shares rather than an increase in total building. As discussed above, that is one reason why housing starts (taking all types of site-constructed units into account) were weak compared with earlier cycles—if expressed as a percentage of the housing stock. Shipments of manufactured homes, which are not included in the data that tracks housing starts for site-constructed units, have also experienced a significant long-term decline and were at especially low levels after the turn of the century.³³

32. For a discussion of the history of regulatory developments that may have both reduced both the production of manufactured homes and productivity growth in home building, see James A. Schmitz Jr., "Monopolies Inflict Harm on Low- and Middle-Income Americans" (Staff Report No. 601, Federal Reserve Bank of Minneapolis, Minneapolis, MN, May 15, 2020), 172–239.

33. For a brief discussion of various measures of housing production, see Kevin Erdmann, "Housing Was Undersupplied During the Great Housing Bubble" (Mercatus Policy Brief, Mercatus Center at George Mason University, Arlington, VA, April 2018).

FIGURE 10. RESIDENTIAL INVESTMENT OVER TIME



Source: US Bureau of Economic Analysis, "Table 1.1.5. Gross Domestic Product; Table 5.4.5. Private Fixed Investment in Structures by Type; Table 7.4.5. Housing Sector Output, Gross Value Added, and Net Value Added," Tools: National Data: GDP & Personal Income (Begin using the data . . .)—National Income and Product Accounts, webpage, n.d., accessed March 15, 2021, https://apps.bea.gov/iTable/index_nipa.cfm.

Note: (a) Data for Residential Investment/GDP is from Table 5.4.5, Line 35, Residential, divided by Table 1.1.5, Line 1, Gross Domestic Product. (b) Data for Residential Investment in Structures/GDP is from Table 5.4.5, Line 47, Residential Structures, divided by Table 1.1.5, Line 1, Gross Domestic Product. (c) Data for Net Residential Investment in Structures/GDP is (b) minus Table 7.4.5, Line 12, Consumption of Fixed Capital, divided by Table 1.1.5, Line 1, Gross Domestic Product.

Likewise, residential investment was also not as clear a signal of excess supply as it appears to be at first glance. Looking more closely at residential investment, the official measure of private fixed investment in residential structures includes the costs of brokers' commissions and other ownership transfer costs. The US Bureau of Economic Analysis (BEA) publishes a breakdown of residential investment without those costs. Additionally, the housing stock depreciates over time. The BEA estimates this separately as consumption of fixed capital.

Figure 10 compares these 3 measures of residential investment. The gross measure peaked at a long-term high, bucking a somewhat downward trend with a brief investment boom. However, the measure of residential investment in structures with brokers' commissions excluded does not have such a high peak in 2005. The long-term downward trend is steeper in this measure, and the peak in 2005 is no higher than peak levels in the 1970s and earlier.

Brokers' commissions have been high, in part, because some urban centers have suffered from constraints on housing supply, pushing up prices. Higher prices have led to inflated brokers' commissions. Ironically, the gross BEA estimate of residential investment is inflated in this way because of a lack of residential investment.

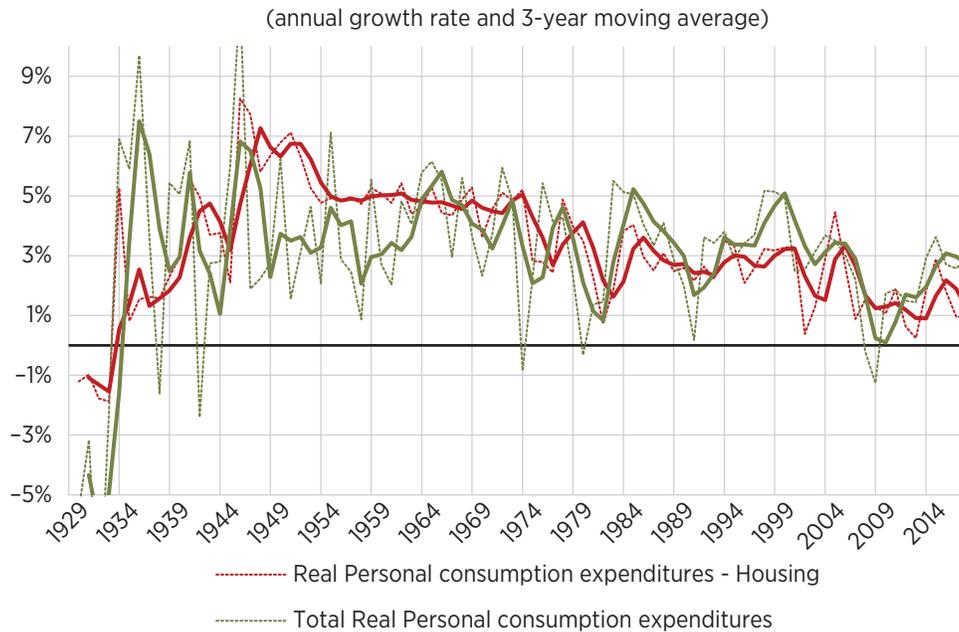
The third measure is an estimate of net residential investment, in which I have deducted brokers' commissions and also deducted the BEA's separate estimate of depreciation of existing housing from the measure of residential investment to estimate the net growth in the real value of the stock of housing as a portion of GDP. Over time, a larger portion of residential investment has gone to replacing or maintaining the existing stock of homes. So this measure of residential investment has an even steeper long-term downward trend, and the peak in 2005 is lower than most previous peaks of net residential investment as a portion of GDP.

The BEA also tracks the rental value of the aggregate stock of housing. This is another way of estimating the relative scale of American investment into residential structures. The red lines in figure 11 show the BEA's estimate of the annual growth in real consumption of housing. (The solid line is the three-year moving average because the annual data is a bit noisy.) In other words, adjusting for inflation, how much did the value of the size, location, and amenities of American housing change each year? Of the three estimates of residential investment in figure 11, the annual growth in real consumption of housing most closely parallels the measure of residential investment that deducts both brokers' commissions and depreciation. They both follow a long-term downward trend with a relatively weak peak in housing growth in 2005.

In his 2007 paper, "Understanding Recent Trends in House Prices and Home Ownership," Robert Shiller reviewed both residential investment and housing expenditures. He limited his analysis of residential investment to the gross measure that includes brokers' commissions. But he noted that real housing expenditures were relatively flat and that the boom in home ownership largely reflected a transition from renting to owning properties with comparable rental values rather than an increase in housing consumption. He noted that "a housing supply response to high prices will tend to bring prices down, but the increment to housing supply in any one year is necessarily tiny given the nature of construction technology, and that supply can be absorbed easily if expectations are still strengthening."

One way to measure investment in housing in a neutral way is to compare the real growth in housing expenditures with the real growth in other types of spending. The green lines in figure 11 are the annual and the 3-year moving average growth in real personal expenditures of all goods and services. Again, this

FIGURE 11. REAL HOUSING EXPENDITURES VS. TOTAL PERSONAL EXPENDITURES

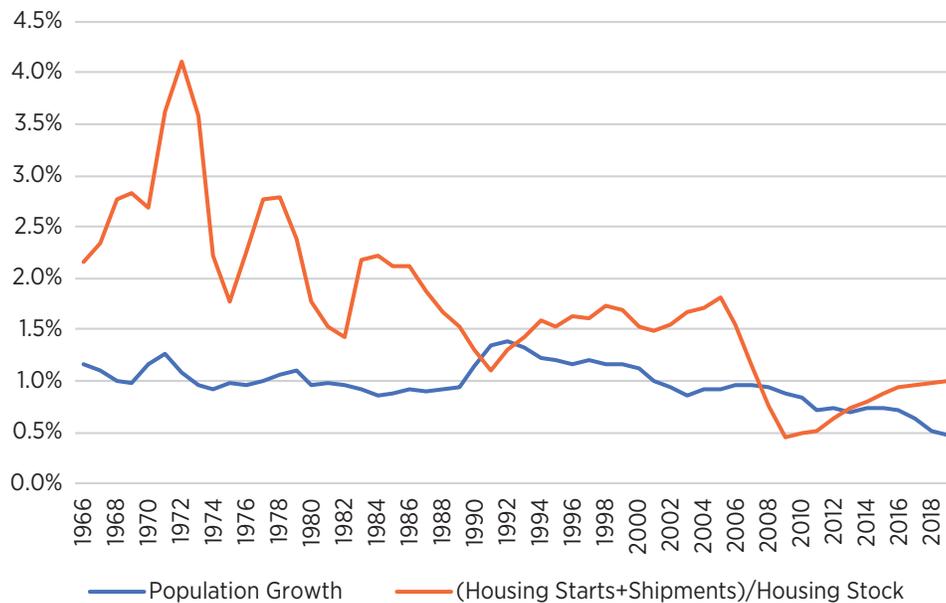


Source: US Bureau of Economic Analysis, "Table 2.5.3. Real Personal Consumption Expenditures by Function, Quantity Indexes," Tools: National Data: GDP & Personal Income (Begin using the data . . .)—National Income and Product Accounts, webpage, n.d., accessed March 15, 2021, https://apps.bea.gov/iTable/index_nipa.cfm. Data from Line 1, Personal consumption expenditures, and Line 19, Housing.

points to strong growth in housing expenditures coming out of World War II. Then after the 1970s, there was a downshift in spending on housing relative to other spending. Even during the pre-recession housing boom, the 3-year rolling average growth in housing expenditures was never higher than the real growth of all personal expenditures. In 2008 and 2009, housing expenditures did grow faster than other expenditures because other expenditures were hit so hard in the recession. Real housing expenditures are sticky. Houses do not disappear when incomes decline. So, there have been a few brief periods in the past 40 years when cyclical declines in general personal expenditures temporarily pushed growth in other expenditures below the growth rate of real housing expenditures, but there has not been any period where real housing expenditures have outpaced other expenditures because of growth in housing expenditures.

Finally, a comparison of housing production and population growth may be useful. (To fully account for new housing production over time, this figure includes both housing starts and shipments of manufactured homes.) As figure 12

FIGURE 12. ANNUAL POPULATION GROWTH AND HOUSING PRODUCTION



Sources: US Census Bureau, “New Residential Construction,” Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/construction/nrc/index.html>; US Census Bureau and US Department of Housing and Urban Development, “Housing Starts: Total: New Privately Owned Housing Units Started (HOUST)” (graph), FRED Economic Research, n.d.; US Census Bureau, “Current Manufactured Housing Survey (MHS) Tables,” n.d., <https://www.census.gov/programs-surveys/mhs/data/tables.html>; World Bank, Population, Total for United States [POPTOTUSA647NWDB], retrieved from FRED, Federal Reserve Bank of St. Louis, accessed on March 23, 2021, <https://fred.stlouisfed.org/series/POPTOTUSA647NWDB>.

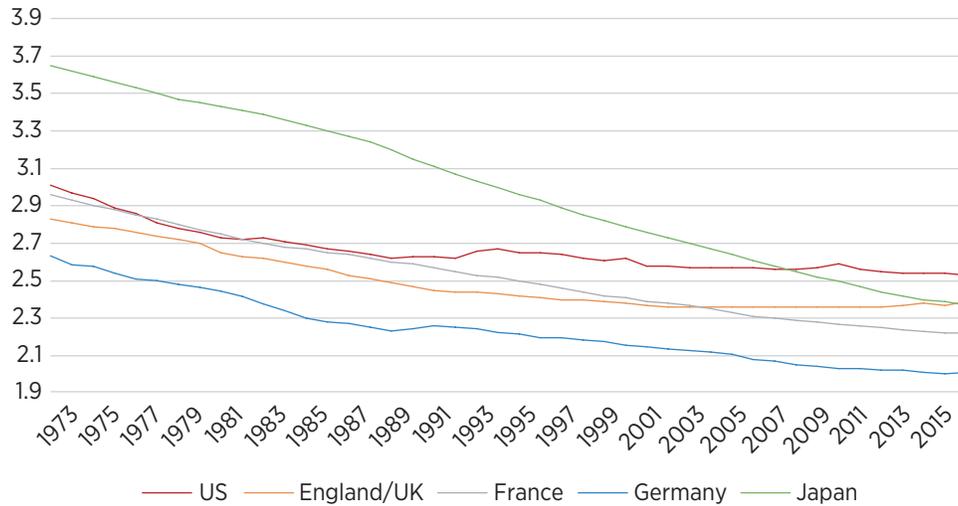
shows, population growth was relatively stable from the mid-1960s to 2008. The high rates of housing production before 1990 were due to a changing composition of households and housing—fewer members per household; more second homes, seasonal properties, and so on.

Figure 13 gives an indication of how important declining household size was as a source of demand for housing before 1990. The figure includes several international comparisons, and, interestingly, in several cases, household size continued to decline after the 1990s. In the United States and the United Kingdom, household size leveled off.

Why should we have expected the relatively small temporary increase in units per capita implied by rates of housing production before 2006 to exhibit mean reversion when that expectation is not borne out by either American historical trends or international comparisons?

Germany and Japan decidedly avoided the housing price bubble that characterized the pre-2006 US market and markets such as the United Kingdom,

FIGURE 13. INTERNATIONAL HOUSEHOLD SIZE OVER TIME



Sources: US data from US Census Bureau, "Table HH-6. Average Population Per Household and Family: 1940 to Present," Census.gov: Historical Households Tables, n.d., accessed March 15, 2021, <https://www.census.gov/data/tables/time-series/demo/families/households.html>. International data from forthcoming work by James Gleeson, Housing Research and Analysis Manager, Greater London Authority. Contact the author for details.

Note: Data from Japan and France is smoothed from surveys conducted in intervals of 5 to 9 years.

Canada, and Australia before and after 2006. Yet in Germany and Japan, declining household size continued to contribute to significant demand for new shelter relative to population growth. Could it be possible that Americans also continue to prefer a decline in household size? How would we know?

One interesting element visible in figure 12 is that the increases in building in the mid-1990s and from 2002 to 2005 coincided with declines in population growth. I will revisit that point in the analysis of individual metropolitan statistical areas (MSAs), below.³⁴

GIVING LOCALIZED SUPPLY CONSTRAINTS THEIR DUE

One factor that may be limiting a decline in household size is the high cost of housing in cities where production is limited. The lack of adequate urban housing has led to a reversal of long-standing beneficial migration patterns. Workers with lesser prospects now are more likely to move away from the costly housing-

34. Nationally, much of the decline in population growth appears to have been related to declining foreign immigration. See Jeffrey S. Passel and Roberto Suro, *Rise, Peak and Decline: Trends in U.S. Immigration 1992–2004* (Washington, DC: Pew Hispanic Center, 2005).

hungry cities that present economic opportunity and into less promising cities where housing is more affordable.³⁵ Research has been accumulating about the problem of inadequate urban housing. Peter Ganong and Daniel Shoag, and also Elisa Giannone, have done important work documenting how inadequate housing has led to economic discontent and rising income inequality.³⁶ It has also likely put a drag on productivity and economic growth as documented by Chang-Tai Hsieh and Enrico Moretti, among others.³⁷

That new migration pattern was in place by the turn of the century. The housing boom of the early 2000s was an acceleration of that migration. If an adequate number of houses cannot be built in New York City and Los Angeles, they will need to be built somewhere else. The apparent housing bubble in cities like Phoenix was not a separate event from the endemic urban housing shortage; it was a result of it.

To further examine this question, I will review the evidence for excessive cyclical building at the metropolitan-area level by utilizing housing permits and Census Bureau estimates of vacancy rates in 49 metropolitan areas from 1995 to the present.³⁸

Analyzing the MSA-level data for evidence of cyclical excess requires bringing the broader urban supply problem back into focus as an important factor in the outcome. The difference between Los Angeles and Detroit and the difference between 2005 and 2009 both need to be accounted for.

Harvard economist Edward Glaeser has written on both topics. Glaeser and Joseph Gyourko have documented the importance of limited urban supply, including its impact on migration.³⁹ Together with Raven Saks, they looked specifically at the problem in New York City. Along with Los Angeles, San Francisco, and Boston, New York City is a metropolitan area where supply is especially limited.⁴⁰ Glaeser and Gyourko have documented the problematic lack

35. Peter Ganong and Daniel Shoag, “Why Has Regional Income Convergence in the US Declined?,” *Journal of Urban Economics* 102, no. C (November 2017).

36. Elisa Giannone, “Skilled-Biased Technical Change and Regional Convergence” (presented to the Annual Meeting of the Society for Economic Dynamics, Edinburgh, Scotland, June 2017).

37. Chang-Tai Hsieh and Enrico Moretti, “Why Do Cities Matter? Local Growth and Aggregate Growth” (NBER Working Paper No. 21154, National Bureau of Economic Research, Cambridge, MA, May 2015). For a good, broad overview of the challenges of the current wave of urbanization, see Enrico Moretti, *The New Geography of Jobs* (Boston, MA: Mariner Books, 2013); see also work by Richard Florida, such as Richard Florida, *The New Urban Crisis* (New York: Basic Books, 2017).

38. Some analysis only includes 48 MSAs because of limited data in Virginia Beach.

39. Edward Glaeser and Joseph Gyourko, “The Economic Implications of Housing Supply,” *Journal of Economic Perspectives* 32, no. 1 (2018): 3–30.

40. Edward L. Glaeser, Joseph Gyourko, and Raven Saks, “Why is Manhattan So Expensive? Regulation and the Rise in House Prices,” *Journal of Law and Economics* 48, no. 2 (2005): 331–370.

of supply which pushes up prices and prevents people from moving to favored locations.

Glaeser has also teamed up with Charles Nathanson to discuss cyclical boom and bust cycles. They found that buyers may benchmark expectations to recent trends, leading to excessive prices and/or building during temporary housing booms.⁴¹

Both elements were surely at work during the housing boom. But these factors interact in a peculiar way among metropolitan areas. When favored urban centers are severely supply constrained, even moderate increases in housing demand lead to outmigration into other areas. Rising demand for housing in New York City led to higher home prices in New York and to the demand for new homes in *other* cities.⁴²

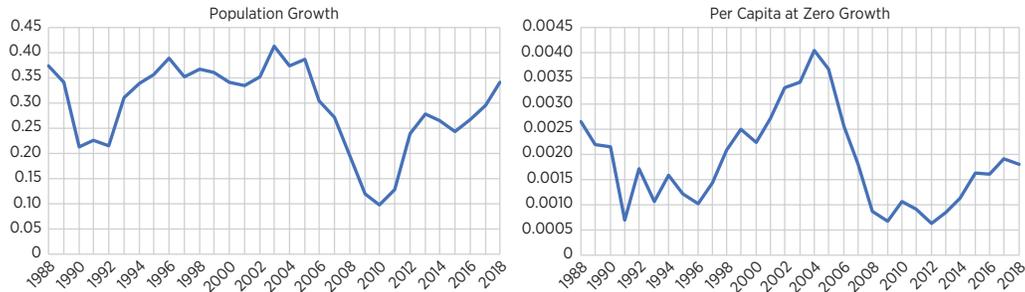
Population Growth and Housing Permits Among Metropolitan Areas

As noted above, the relative cyclical increase in housing supply from 2001 to 2005 owed as much to declining population growth as it did to rising production. The same had been true during the modest building boom in the 1990s. Measured at the national level, relative changes in housing production appear to reflect simple cyclical ups and downs. However, looking more closely at the individual metropolitan areas, changes in housing production can be disaggregated into at least 2 factors. Since there is a large difference in population growth rates among MSAs, population growth is highly correlated with housing production in cross-sectional analysis, even when it is not in national time-series data. Cross-sectional regressions of housing permits against population growth generally have a correlation between 70 and 90 percent during periods of strong building. So, there are 2 components of building as building cycles ebb and flow, and these can be estimated with the intercept (permits issued where population growth is zero) and the coefficient (permits per new resident) on a cross-sectional regression across MSAs. Figure 14 shows the cross-sectional correlation between population growth and housing permits (left panel) and

41. See Edward L. Glaeser, and Charles G. Nathanson, “Chapter 11—Housing Bubbles,” *National Bureau of Economic Research*, no. 5 (2015): 701–751. Also see, Edward L. Glaeser and Charles G. Nathanson, “An Extrapolative Model of House Price Dynamics,” *Journal of Financial Economics* 126, no. 1 (2017): 147–170.

42. See Gregor Schubert, “House Price Contagion and US City Migration Networks”, March 4, 2021 Joint Center for Housing Studies of Harvard University <https://www.jchs.harvard.edu/research-areas/working-papers/house-price-contagion-and-us-city-migration-networks>.

FIGURE 14. HOUSING PERMITS ACROSS METROPOLITAN AREAS: CORRELATION WITH POPULATION GROWTH AND BASE RATES, 1988–2018



Source: US Census Bureau, “Building Permits Survey,” Census.gov, n.d.; US Bureau of Economic Analysis, “CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income” (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm, for all MSAs listed in Table 1, except Virginia Beach.

the base rate of building in a city with no population growth (right panel) for the years 1988 to 2018.

First, as the coefficient shows, active building helps facilitate migration across metropolitan areas. As shown in figure 13, during this period, the average American household had between about 2.5 and 2.7 members. The average number of new homes per new resident in growing metropolitan areas from 1993 to 2005 ranged between about 0.33 and 0.4.⁴³ So, during growth periods, the relative activity of new building in growing cities appears to roughly correspond to the increase in households, and during periods with less activity, growing cities struggle to produce enough homes to match population growth. (The rate of building below 0.35 units per resident in growing metropolitan areas from 2006 to 2018 suggests that laggardly building has been slowing down migration since the crisis.)

The right panel of figure 14 shows the secular increase in building rates across metropolitan areas; the rates bottomed at 0.0007 units per capita in 1991 and peaked at 0.004 units per capita in 2004. There was clearly a long period of increasing building across cities which reversed after 2004. This can reflect a variety of factors—replacement of condemned structures, changing household size, more non-primary and seasonal residences, and so on. For instance, a general decline in the average household size from 2.51 to 2.50 members would require a 1-time increase in the base rate of building across metropolitan areas of 0.004 units per capita. It is difficult to construct a stable mean value for the base rate of building as shown in the right panel. Idiosyncratic cultural factors

43. New homes per new resident is the inverse of Americans per household. $\frac{1}{2.6} = 0.38$.

and regional trends that might affect the rate at which homes are torn down and replaced, for instance, can differ over time and space. Before the 1980s, it was common for the base rate of building to be much higher than 0.004 units per capita. That was related primarily to declining household size. It may have possibly been influenced by other factors as well, such as the high number of teardowns associated with mid-twentieth-century urban renewal projects. While it is difficult to pin down a neutral number for the base rate of building, the fact remains that the base rate persistently increased from 1993 to 2004. Relatively more units were being constructed in both slow-growing and fast-growing cities over that time.

To get more clarity about the shift in population and building trends, I have created 4 equal periods of time: 1989–1993, 1993–1997, 1997–2001, and 2001–2005. Referencing figure 12 and figure 14, the first period saw a relative decline in housing production, the second period saw rising production while national population growth declined, the third period again saw a (very mild) decline in housing activity, and the fourth period saw rising production while population growth declined again. Of course, the fourth period was followed by the severe contraction in housing production.

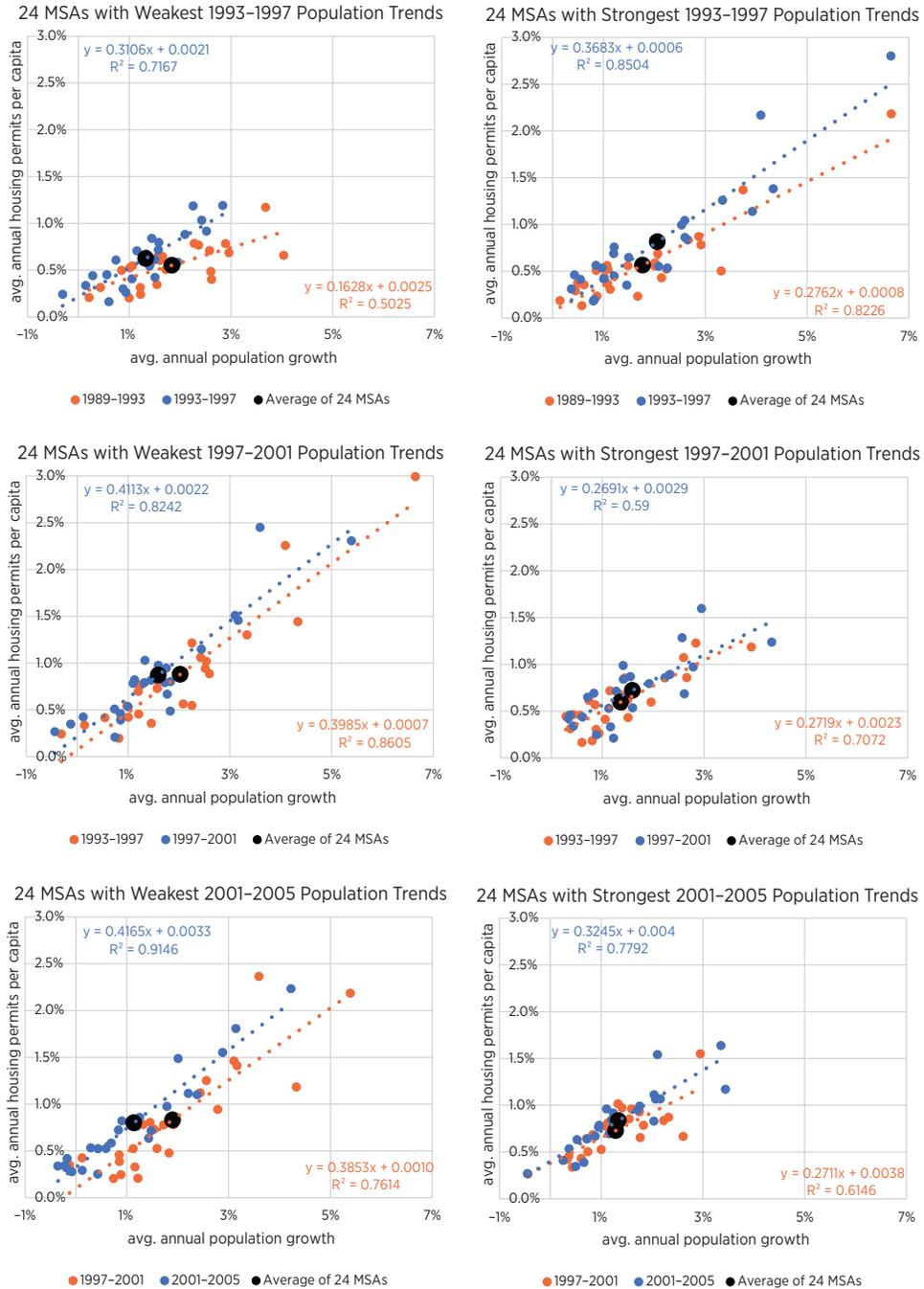
For the latter three periods, I have sorted the 48 MSAs by the second difference in the population growth rate—how fast did the MSA grow in this 4-year period compared with the previous period? This can help to highlight how sensitive trends in construction are to changing local demand for housing.

The years 1993–1997 were an expansion period, and during that time, average construction rates increased. (The average of the blue plots of the later period is higher than the average of the orange plots of the earlier period. Averages are designated by the large black circles.) For the 24 MSAs with the lowest trends in population growth (the left panel), average annual growth was 0.5 percent slower from 1993 to 1997 than it had been from 1989 to 1993, but in spite of slowing growth, home building increased by 0.1 percent units per capita, on average, compared with the earlier period.

The years 1989–1993 had been a particularly constrained period for home building, so this was generally a return toward sustainable rates of building (see figure 14). As the top panels of figure 15 show, the correlations between housing growth and population growth strengthened compared with the earlier period, and the coefficient increased toward the sustainable rate of about 0.35 to 0.4 new homes per new residents.

In the next period is 1997 to 2001 (shown in the middle panels of figure 15). In the right panel, where population growth rates increased, construction increased proportionately. In the left panel, where population growth rates

FIGURE 15. HOUSING PERMITS AND POPULATION GROWTH IN 48 MSAs



Source: US Census Bureau, "Building Permits Survey," Census.gov, n.d.; US Bureau of Economic Analysis, "CAINC1 Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm, for all MSAs listed in Table 1, except Virginia Beach.

declined, construction declined slightly but not proportionately, moving the regression line slightly to the left.

The final period, from 2001–2005, looks similar to the previous period. Where population growth was rising (MSAs in the right panel), construction increased slightly on average. Where population growth was declining (MSAs in the left panel), construction decreased slightly. Trends in the “bubble” period do not appear much different than they had been in the previous period. The rising baseline level of construction unrelated to population growth (as shown in the right panel of figure 14) from the 1997–2001 period to the 2001–2005 period appear to be influenced by 2 factors as shown in figure 15.

1. In MSAs with increasing population growth rates, home builders appear to have anticipated that growth. The bottom right panel of figure 15 contains the 24 MSAs that had the strongest changes in population growth from the 1997–2001 period to the 2001–2005 period. The intercept for those MSAs is higher than it is in the other periods; 0.0038 homes per capita were constructed in the 1997–2001 period, unrelated to population growth during that period. But since population growth increased in those MSAs after 2001, that extra building had been anticipatory rather than disruptive. In contrast, construction in the MSAs that would subsequently grow at slower rates was highly correlated with population growth from 1997 to 2001, and the number of homes built in those MSAs unrelated to population growth was low (a 0.001 intercept in the lower left panel for 1997–2001). So changes in growth rates appear to have been anticipated in both sets of MSAs.
2. In MSAs with the weakest trends in population growth rates, construction declined slightly as it had for the MSAs with weak population growth trends in the previous period. Among those MSAs, from 2001 to 2005, home building was highly sensitive to population growth (a coefficient of 0.42). The main change in the 2001–2005 period was that the trend toward declining population growth became more intense. Several MSAs had declining populations during this period (blue plots to the left of the y-axis in the bottom left panel), and the average annual population growth in the bottom 24 MSAs was 0.8 percent lower than annual population growth had been for those MSAs in the previous period.

There is a strong cross-sectional relationship between population growth and housing construction, and the primary change in that relationship during the 2001–2005 boom years was that during those years there was a sizable set of MSAs with low and steeply declining population growth. At very low or negative

population growth rates, the relationship between population and construction breaks down. In declining cities, rates of new construction tend to find a floor because of idiosyncratic changes within the metropolitan area—declining areas and growing areas. And, as I will discuss in the following sections, several of the MSAs with very low population growth were not, in fact, in economic decline. They were depopulating because they attract new residents with high incomes and local housing supply was politically prevented from meeting a rising demand for housing per capita.

MSAs as Categories

I have placed the 49 MSAs into 4 categories. In *Shut Out*,⁴⁴ I discussed the 2 different kinds of metropolitan areas that played pivotal roles in the housing boom and bust. I referred to these as the closed access cities and the contagion cities. The closed access cities have a distinct signature that sets them apart from other cities, most clearly in their extremely high cost of housing, both in terms of rent and home prices. Household incomes also tend to be high in the closed access cities, and those high incomes are created, in part, by the geographical capture of certain highly productive labor markets (tech, finance, etc.) and an exclusionary context created through very low rates of permitting for new homes. Those metropolitan areas have endemic patterns of domestic outmigration, especially in households with lower incomes that cannot cope with the high cost of housing. In *Shut Out*, I described how a spike and then a collapse in that migration was a key element that fueled the housing boom and bust.

The contagion cities are cities that tend to permit new housing at higher rates. What especially sets them apart from other cities is that they were the main landing points for the housing migrants that flooded out of the closed access cities during the housing boom. These cities tend to share various characteristics, such as home prices that briefly rose very sharply and then collapsed sharply during the Great Recession. They can roughly be categorized by geography: cities in Florida, Arizona, Nevada, and inland California. *Shut Out* contains more empirical evidence regarding the closed access and contagion categories.

Here, I have defined the remaining MSAs according to growth—high growth and low growth. The cities in the low growth category generally do not have a problem with constrained housing supply because of their low growth

44. Kevin Erdmann, *Shut Out: How a Housing Shortage Caused the Great Recession and Crippled Our Economy* (Lanham, MD: Rowman & Littlefield, 2019).

TABLE 1. MSA CATEGORIES

Type	Cities
Closed Access	New York City, Los Angeles, Boston, San Francisco, San Diego, San Jose
Contagion	Miami, Phoenix, Riverside, Tampa, Orlando, Sacramento, Las Vegas, Jacksonville, Tucson
More growth	Dallas, Houston, Washington, DC, Atlanta, Seattle, Minneapolis, Denver, Charlotte, San Antonio, Portland, Austin, Columbus, Indianapolis, Nashville, Raleigh, Richmond, Salt Lake City
Less growth	Chicago, Philadelphia, Detroit, St. Louis, Baltimore, Pittsburgh, Cincinnati, Kansas City, Cleveland, Virginia Beach, Milwaukee, Oklahoma City, Memphis, Louisville, Birmingham, Grand Rapids, Tulsa

rates. The high growth cities have varying levels of supply constraints. Seattle and Washington, DC, have had higher and more volatile housing costs because of local supply constraints, whereas Texas cities tend to allow more building, and their housing costs remain moderate. The categories are listed in table 1 for the 49 MSAs in the analysis here.⁴⁵

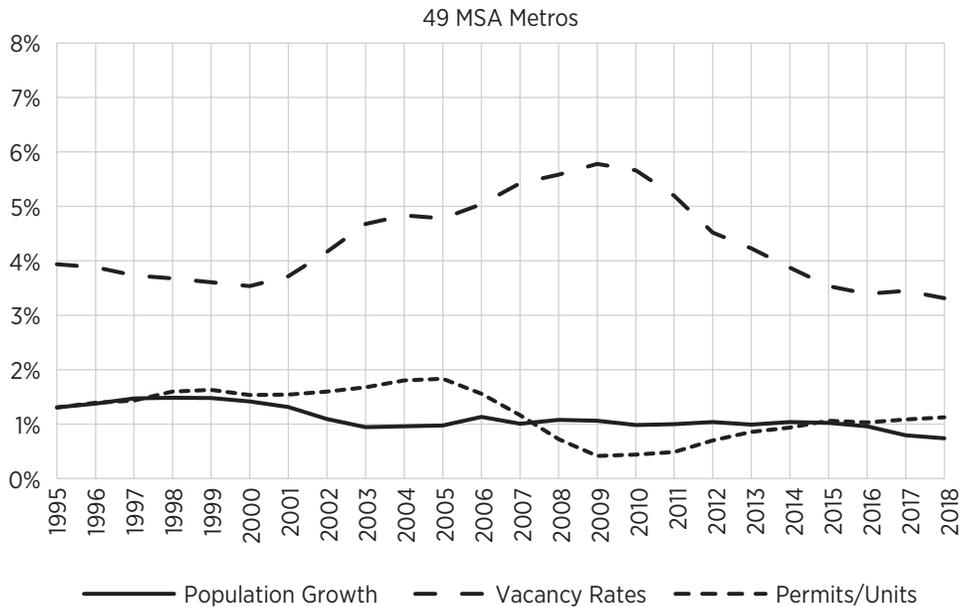
The following figures will compare population growth, the annual rate of housing permits issued, and vacancies. For the 49 MSAs in aggregate, figure 16 shows a modest increase in the rate of new building after the turn of the century. At the same time, population growth declined. In 1995, permits were issued in these MSAs equal to about 1.3 percent of the existing housing stock, and the population grew by about 1.3 percent. In 2004 and 2005, the rate of new permits had increased to 1.8 percent, and population growth had declined to 1.0 percent.

Then, over the next 4 years, population growth remained at about 1 percent while building rates plummeted. By 2009, permits were issued at a rate of only 0.4 percent of the existing stock.

Figure 17 is similar to figure 16, but here the combined vacancy rate, population growth rate, and permit issuance rate are shown specifically for the “less growth” and “more growth” MSAs. In both the low growth and the high growth MSAs, building rates were relatively flat, remaining near the rates common in the late 1990s. The divergence between building and population growth came primarily from a downshift in population growth. Figure 18 shows the same measures for the contagion and closed access cities. In these metros, the rate of permitted new units increased during the boom.

45. In the analysis above, such as that in figure 15, Virginia Beach was excluded because of a lack of permit data in earlier years.

FIGURE 16. POPULATION GROWTH, VACANCY RATES, AND PERMITS/UNIT

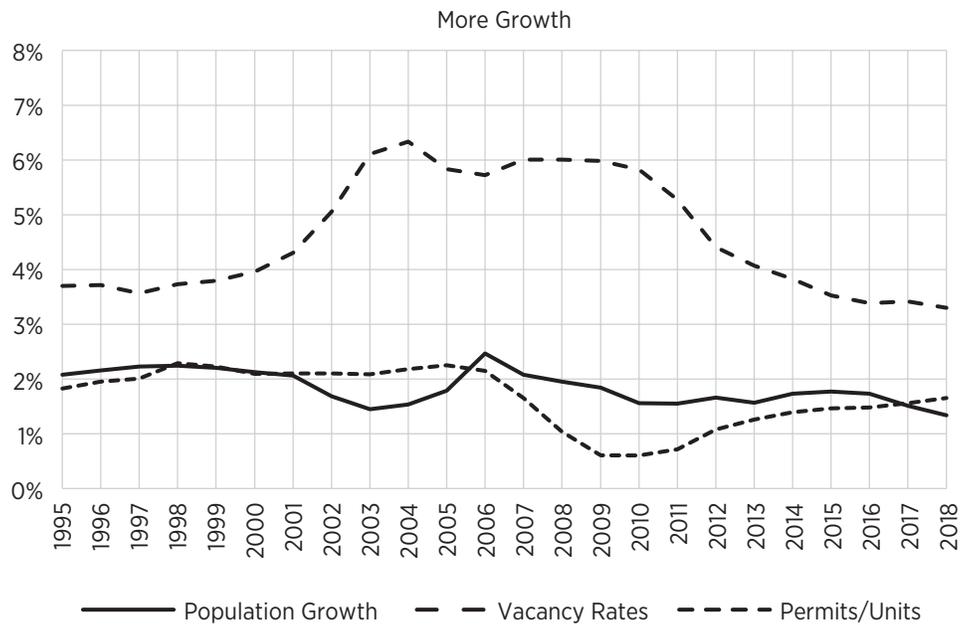
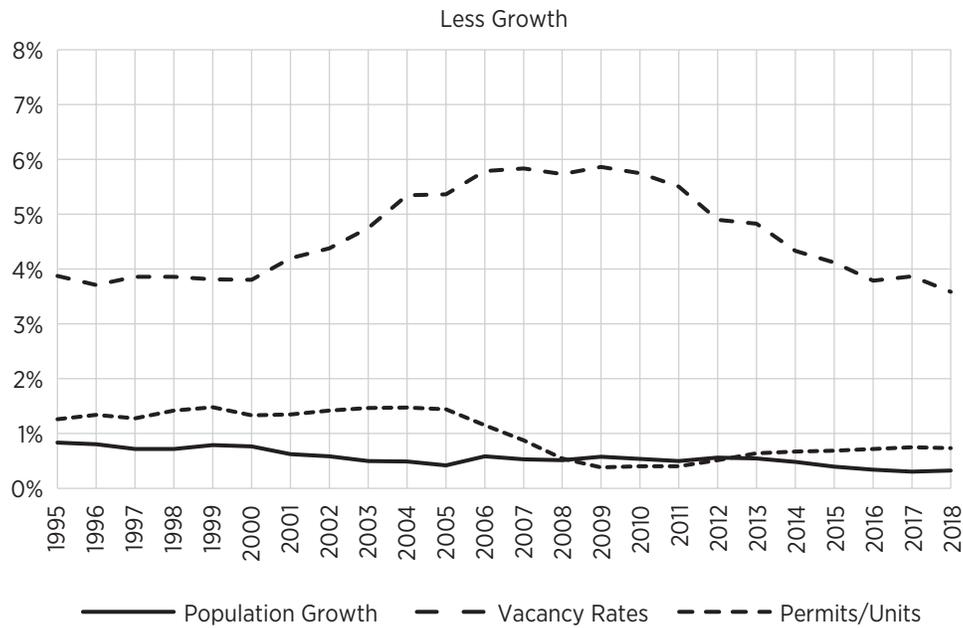


Source: US Census Bureau, "Building Permits Survey," Census.gov, n.d.; US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm, for all MSAs listed in Table 1, except Virginia Beach; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/ann10ind.html>.

Looking at the 4 types of MSAs, only 1 type matches the national pattern of rising construction and declining population. In the closed access cities, population growth declined from about 1 percent annually in the late 1990s to 0 percent by 2005. At the same time, the issuance of new housing permits increased by more than 50 percent. These trends not only matched national trends, they exceeded them. Yet, oddly, this was the only category of MSAs where vacancies were never elevated. In fact, this group is characterized by their long-standing lack of adequate building that has led to high rents and a perpetual outmigration of households with lower incomes.

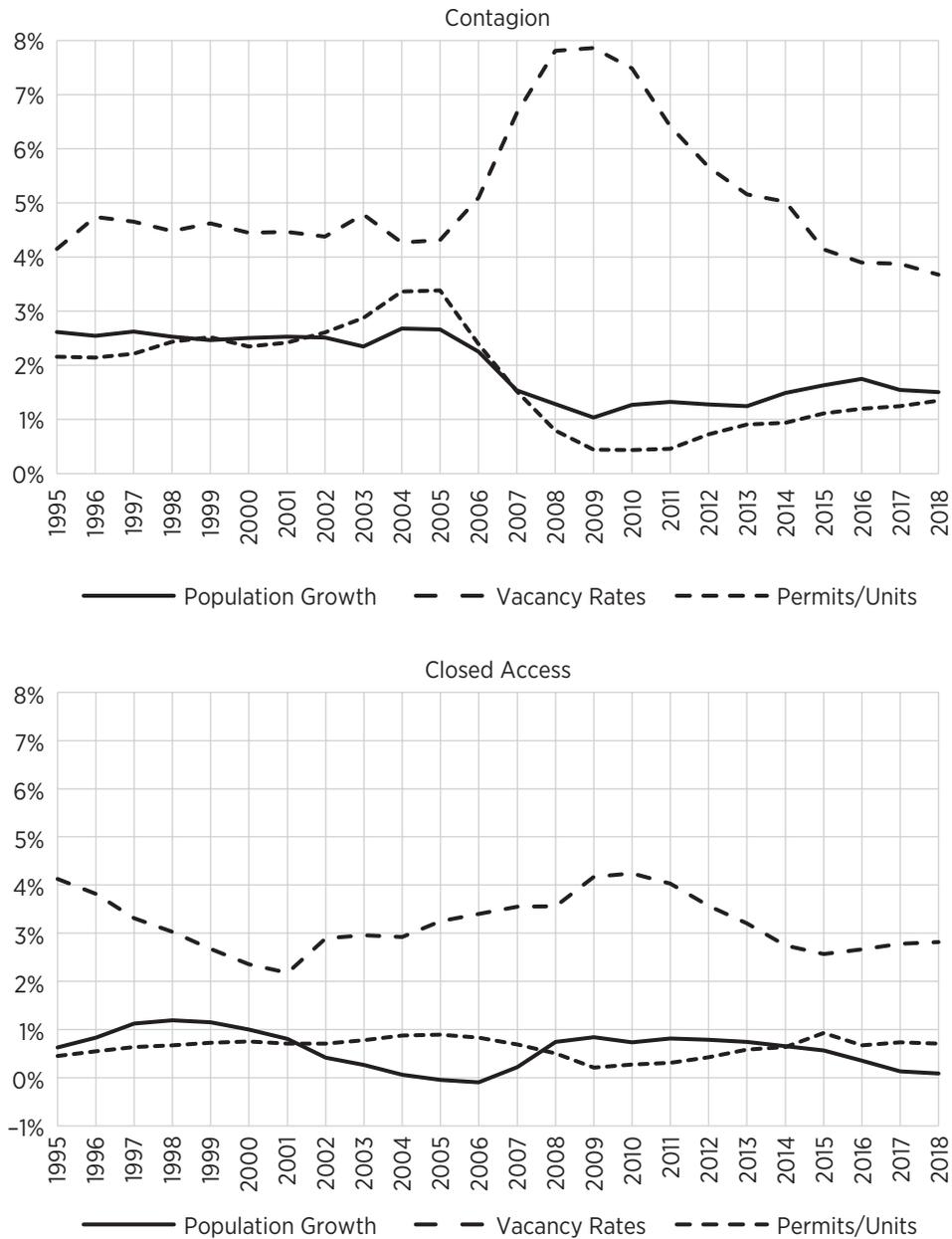
The closed access MSAs were also the MSAs with the highest property values that spiked during the boom years, suggesting that there was a rise in demand for housing during that time, likely related to new forms of mortgage lending and so on. However, it is implausible to suggest that those metropolitan areas developed an unsustainable amount of excess housing supply. In the decade since the

FIGURE 17. POPULATION GROWTH, VACANCY RATES, AND PERMITS/UNIT



Source: US Census Bureau, "Building Permits Survey," Census.gov, n.d.; US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm, for all MSAs listed in Table 1, except Virginia Beach; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/ann10ind.html>.

FIGURE 18. POPULATION GROWTH, VACANCY RATES, AND PERMITS/UNIT



Source: US Census Bureau, "Building Permits Survey," Census.gov, n.d.; US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm, for all MSAs listed in Table 1, except Virginia Beach; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/ann10ind.html>.

crisis, this is the only category where housing permits have recovered to boom-era levels. Local political pressures against homebuilding tend to maintain a low maximum rate of housing activity in the closed access MSAs. They were building near that maximum rate before and after the crisis.

The contagion MSAs also experienced a significant increase in building rates during the boom; however, this category was unique in that its population growth was higher than it had been in recent years. The rise in building was in reaction to and/or in anticipation of continued population pressure. These are also MSAs that are highly unlikely to develop a systemically important amount of excess supply due to overbuilding. Population growth of more than 2.5 percent annually can quickly claim a large quantity of new homes.

Note that population growth receded quickly in the contagion MSAs as construction activity declined. When the Federal Reserve met in 2007, as discussed above, population growth in the contagion MSAs had already declined from the highs of 2.7 percent in 2004 and 2005 down to 1.5 percent, and housing permits had declined even more rapidly. Whereas population trends in the other categories were countercyclical—declining during the building boom and recovering during the recession—population trends in the contagion MSAs were pro-cyclical. This was a key factor that loaded much of the damage of the crisis onto the contagion MSAs.

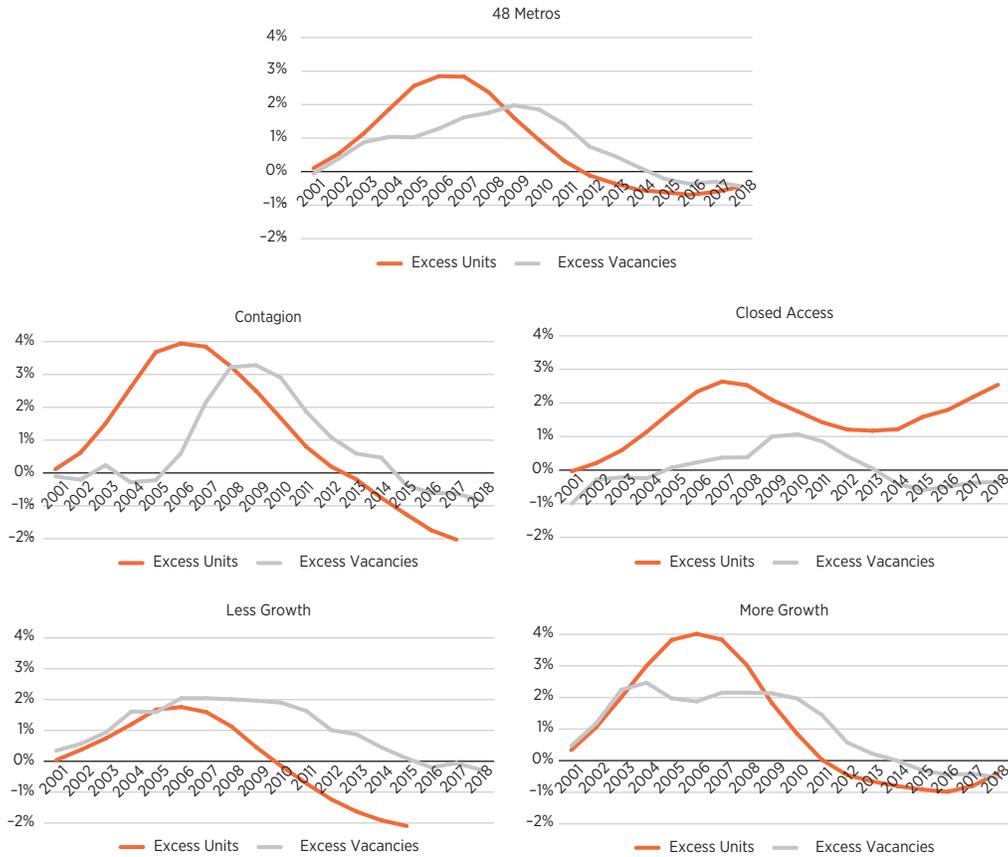
THREE PHASES: DECLINING POPULATION GROWTH, DECLINING HOUSEHOLD SIZE, AND CONTAGION CITY CRISIS

I have created a simple estimate of neutral building rates for each MSA based on population growth and housing permit issuance from 1988 to 2001. Using this, I estimated the number of new homes required after 2001 to match population growth based on the same building rates.

Figure 19 shows the relative number of homes above or below the number required to maintain the 1988–2001 trend for all 48 MSAs and for the 4 groups of MSAs. By 2006, approximately 3 percent of the housing stock that had been built since 2001 was in excess to the 1990s trend. This is roughly the level of excess building found by Haughwout et al.⁴⁶

46. Haughwout et al., “The Supply Side of the Housing Boom and Bust of the 2000s.”

FIGURE 19. RELATIVE NUMBER OF HOMES REQUIRED TO MAINTAIN THE 1988–2001 TREND FOR MSAS AND MSA CATEGORIES VS. MEASURED VACANCY RATE



Source: Author's calculations. US Census Bureau, "Building Permits Survey," Census.gov, n.d.; US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm, for all MSAs listed in Table 1, except Virginia Beach; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/ann10ind.html>.

Separately, figure 19 shows vacancy rates, relative to the 1994–2001 averages. For the 48 metros, in the aggregate, vacancies rose in 2 separate periods: first from 2001 to 2003 and second from 2005 to 2010.⁴⁷

Taking these measures together, there are 3 periods with excess homes of one kind or another. First, from 2001 to 2003, the increase in excess homes and

47. This is also similar to the levels found in Haughwout et al., "The Supply Side of the Housing Boom and Bust of the 2000s." However, the vacancy figures used here only include vacant properties for rent or sale. Haughwout et al.'s estimates include other vacancies, such as properties held off market.

the increase in vacancies match relatively closely, mostly due to the “less growth” and “more growth” categories. As shown in figure 17, this was related to declining population growth in those MSAs.

Second, from 2003 to 2006, building accelerated with little effect on vacancy rates. This pattern was shared among all MSAs except the “less growth” MSAs. As shown in figure 13, household size has been relatively flat in the United States since the 1990s. Yet an increase in occupied housing units above the rate of population growth is likely related to short-term changes in household size.

As shown in figure 19, new building above population trends exceeded the change in vacancies by about 1.6 percent by 2006. The stated average household size in the United States in 2006 was 2.57. A change of this magnitude would suggest a decline in average household size to 2.53. In the 3 countries shown in figure 13 where household sizes have continued to decline since the 1990s, average household size was declining at a pace of more than 0.01 persons annually. The decline in US household size was too short-lived to register as more than a blip in Census Bureau estimates. For the short time that it did decline, it appears to have been in line with trends in other countries that are not as constrained by urban supply obstacles.

Third, after 2006, construction declined sharply in all MSAs. During this period, vacancies increased in the contagion MSAs and, to a lesser extent, the closed access MSAs.

So, there are 3 phases of housing supply and demand:

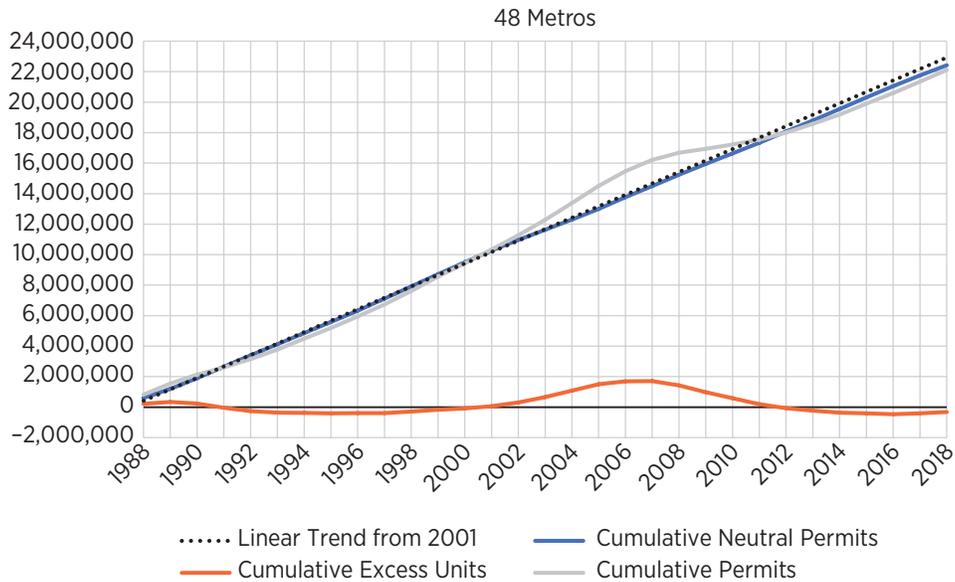
1. Vacancies and excess units rise in unison in select MSAs (2001–2003)
2. Excess units rise with no effect on vacancies, generally in growing MSAs (2003–2006)
3. Housing production retracts while vacancies rise or remain stable (2006–2010)

Three Phases of Supply/Demand Mismatch

To further analyze these 3 phases of housing supply and demand, it is helpful to look more closely at housing production within these MSA groups and individual MSAs and to disaggregate vacancies between vacant units for rent (which are generally in multiunit developments) and owned units for sale (which are generally single-family homes).

First, figure 20 shows the cumulative number of housing permits in all 48 MSAs in this data set (gray line), the cumulative number of permits that would

FIGURE 20. CUMULATIVE NUMBER OF HOUSING PERMITS VS. ESTIMATED PERMITS FOR NEUTRAL GROWTH



Source: US Census Bureau, "Building Permits Survey," Census.gov, n.d.; US Bureau of Economic Analysis, "CAINC1 Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm, for all MSAs listed in Table 1, except Virginia Beach.

meet population growth needs with 1990s housing production trends (blue line), and the relative number of units above or below the trend.

Here, a conventional tale appears to be told, with relatively stable housing needs from population growth, and a rise in excess production (which was shown as a percentage of the housing stock in figure 19) from 2003 to 2006 that is reversed from roughly 2006 to 2011, when Bernanke commented that we were still working off oversupply.

Figure 21 shows similar measures for the 4 MSA types. Figure 22 shows the aggregate vacancy rate for each MSA group for both units for rent and units for sale.

First, consider the closed access MSAs. Vacancy rates have been low throughout all periods in these MSAs. There was some relative rise in vacancies at times, but during the key periods, it was always below the vacancy rates of other types of MSAs and at or below vacancy rates in the closed access MSAs in the mid-1990s. Other indicators—such as high rents, both in absolute terms and in terms of local incomes—also suggest that the closed access MSAs have a housing supply well below the sustainable level. Additionally, the Census Bureau

estimates that from 2000 to 2003, net domestic outmigration from New York City, Los Angeles, Boston, and San Francisco averaged 1.1 percent, 0.9 percent, 0.8 percent, and 1.4 percent annually, respectively.⁴⁸ In fact, of the top 20 MSAs, these were the 4 most negative rates of net domestic migration. This is partly what defines them as closed access.⁴⁹

We can surmise that the measured rise in “excess” units in the closed access MSAs was at least 1 percent annually below the lower bound of a neutral rate of building necessary to accommodate and retain their native populations and other sources of rising demand for local housing. Three facts loom:

1. The outmigrants largely moved due to prohibitively high housing costs.
2. Without housing constraints, the closed access MSAs would have positive net migration rates rather than simply neutral migration.
3. The rate of net domestic migration became even more negative from 2003 to 2006.

These estimated building trends point to approximately 450,000 excess units in the closed access MSAs by 2007. Several hundred thousand more would have been necessary to maintain stable population growth and to reverse net domestic migration. So the increase in housing supply in the closed access MSAs relative to population growth is likely to underestimate the increase in housing demand per capita during the boom.

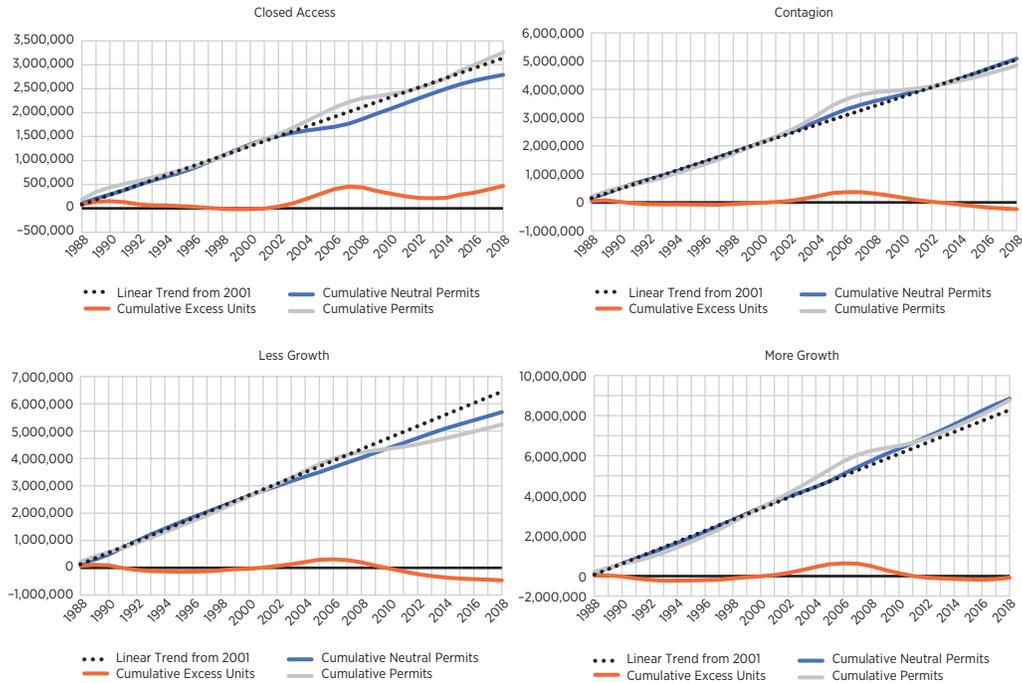
48. Paul J. Mackun, “Population Change in Metropolitan and Micropolitan Statistical Areas: 1990–2003” (Current Population Report P25-1134, US Census Bureau, Washington, DC, September 2005).

49. See Cristobal Young, Charles Varner, and Douglas S. Massey, *Trends in New Jersey Migration: Housing, Employment, and Taxation* (Princeton, NJ: Policy Research Institute for the Region, Princeton University, September 2008).

The states with migration patterns most similar to New Jersey are California, New York, and Massachusetts. These states, like New Jersey, are experiencing net outmigration driven by lower-income individuals. All of these states have a high cost of living and high housing prices. . . . Outmigration from New Jersey is a byproduct of prosperity, not decline. (Young, Varner, and Massey, *Trends in New Jersey Migration*, 4)

It is better to understand New Jersey’s net out-migration as (1) removing labor supply (creating job vacancies and reducing the number of unemployed), as well as (2) increasing the supply of available housing, helping to bring down the high price of houses and rents. The fact that out-migrants continue earning income in other states is not a loss for New Jersey—if their jobs did not migrate, the positions they vacated can be filled by someone else. In fact, out-migrants are helping to raise wages, lower unemployment, and reduce the cost of housing for those who work (or look for work) in New Jersey. (Young, Varner, and Massey, *Trends in New Jersey Migration*, 39)

FIGURE 21. CUMULATIVE NUMBER OF HOUSING PERMITS VS. ESTIMATED PERMITS FOR NEUTRAL GROWTH FOR THE 4 MSA TYPES

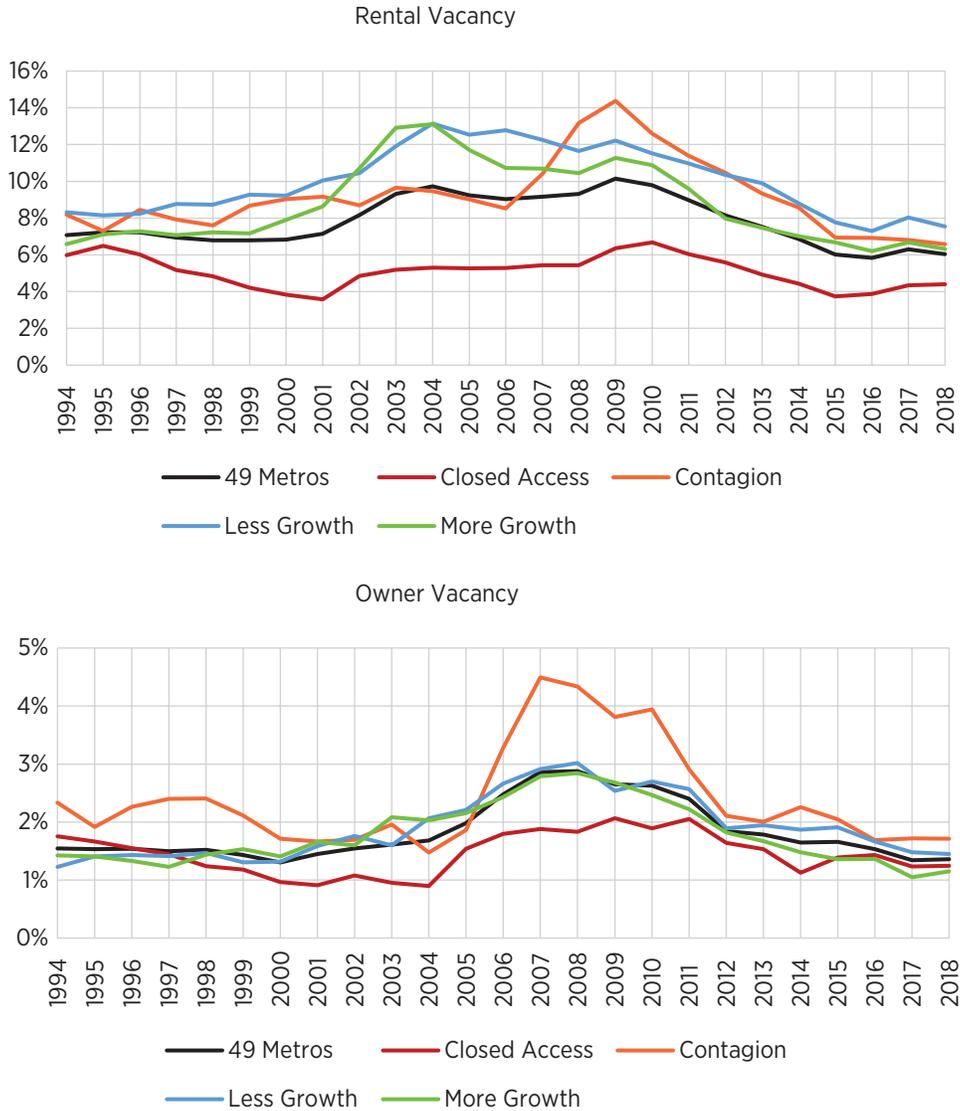


Source: US Census Bureau, "Building Permits Survey," Census.gov, n.d.; US Bureau of Economic Analysis, "CAINC1 Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm, for all MSAs listed in Table 1, except Virginia Beach.

It is likely that the various demand factors, such as loose underwriting standards, facilitated some of the increase in housing demand per capita. However, the persistence of measured excess units in the closed access MSAs and the return of negative population pressures after 2014 suggest that there is a persistent change in cultural housing demand that is held to a fraction of the changes seen in Germany, France, and Japan due to the constrained supply imposing high costs on rising demand. New forms of lending facilitated the demand for more housing per capita in the closed access MSAs by increasing home prices, lowering the population (by inducing sellers who moved to less expensive cities) and raising local housing production.

As seen in figure 21, for every above-trend extra housing unit built in the closed access MSAs from 2003 to 2007, there was more than 1 household that moved away relative to previous population trends. So because of the perpetual inadequacy of closed access housing supply, rising consumption of housing for some households necessarily was paired with declining consumption of housing for other households. This further confuses attempts at quantifying housing

FIGURE 22. AGGREGATE VACANCY RATE FOR EACH MSA GROUP FOR RENTAL AND OWNER VACANCIES



Sources: US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; Tables 6a, 7a, and 17a are found at <https://www.census.gov/housing/hvs/data/ann10ind.html>. Total vacancy rates for MSAs were estimated using vacancy rates for homes for sale, homes for rent, and homeownership rates. US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," Census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvx/data/ann10ind.html>; US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., https://apps.bea.gov/iTable/index_regional.cfm.

demand at the time because the closed access outmigrants typically reduced their nominal expenditures on housing while increasing attributes like square footage.

Returning to the panel for the closed access MSAs in figure 19 then, the oddity about the measure of “excess” housing production that rose from about 2003 to 2007 in the closed access MSAs is that it is the net effect of (1) discretionary increases in housing demand for some closed access residents, necessitating (2) the elimination of housing demand for some other (now former) closed access residents.

The contagion MSAs might provide a better estimate of rising per capita demand. Excess units equaling roughly 4 percent of the existing housing stock by 2006 reflect rising demand closer to the persistent changes seen in Germany, Japan, and France. Vacancies in the contagion MSAs were relatively flat until 2006, so residents per unit was declining during the boom. Vacancies of homes both for rent and for sale were much higher in the contagion MSAs in 2006 and after because, in addition to the market frictions that created some increase in vacant homes for sale, the contagion MSAs were hit with a particularly sharp decline in population growth as the migration out of the closed access MSAs abated during the financial crisis.

Finally, the “less growth” and “more growth” MSAs were the only groups to experience rising vacancies in phase 1. This was related to a downward trend in population growth, which is not easy to spot in the cumulative graph but is more noticeable in figure 17. That temporary shift led to rising vacancies in rented units as shown in figure 22. After the initial rise, vacancies in units for rent declined slowly from their phase 1 highs, and vacancies in units for sale increased slightly. The rental vacancies from phase 1 could run off more quickly in the “more growth” MSAs than they did in the “less growth” MSAs. So, after phase 1, vacancies were relatively flat in total with a slightly positive change in the “less growth” MSAs and a slightly negative change in the “more growth” MSAs.

Vacancies and their causes could be described during the three periods, thusly

1. Rising rental vacancies followed downward trends in local population growth in “less growth” and “more growth” MSAs (2001–2003).
2. Relatively stable vacancies in spite of rising housing production, likely reflecting declining household size (2003–2006).
3. Rising vacancies in both units for rent and for sale followed sharp downward trends in population growth in contagion MSAs (2006–2010).

THE CAUSES OF VACANCIES OVER TIME

To attempt to quantify the factors influencing vacancies over time, I performed cross-sectional regressions against 48 MSAs for each year from 1998 to 2018, using the following equation:

$$\Delta\text{Vacancies} = \beta_1 + \beta_2\Delta\text{Permits} + \beta_3\Delta\text{Price} + \beta_4\Delta\text{Population} + \beta_5(P*P*P) + \beta_6\text{Lagged Vacancies} + \varepsilon.$$

The variables—for the year 2000, for example—are:

Dependent Variable

$\Delta\text{Vacancies}$: The 2000 Vacancy Rate minus the 1998 Vacancy Rate⁵⁰

Independent Variables:

$\Delta\text{Permits}$: 1998–1999 Average Annual Permits per Capita minus 1996–1997 Average⁵¹

ΔPrice : Log change in MSA median home price from 1998 to 2000⁵²

$\Delta\text{Population}$: Population growth rate from 1998 to 2000 minus growth rate from 1996 to 1998⁵³

Control Variables:

$(P*P*P)$: An interaction variable. A multiple of the Price, Permit, and Population Variables, each set proportionately to a scale from 0.5 to 1.5

Lagged Vacancies: The 1998 Vacancy Rate

Figure 23 compares the estimated effects of permits, population growth, and home prices on changes in vacancy rates. The figure compares the estimated effect of a 1 standard-deviation change in the given variables on an MSAs vacancy rate, in each year, with 95 percent confidence bands.

The change in the rate of new permits never produces a consistent statistically significant effect on the subsequent change in the vacancy rate. Of course, this is not the final word; this is only one particular specification with relatively broad annual data. It is plausible that if one searched hard enough, one could find a better specification that pointed to a more powerful relation-

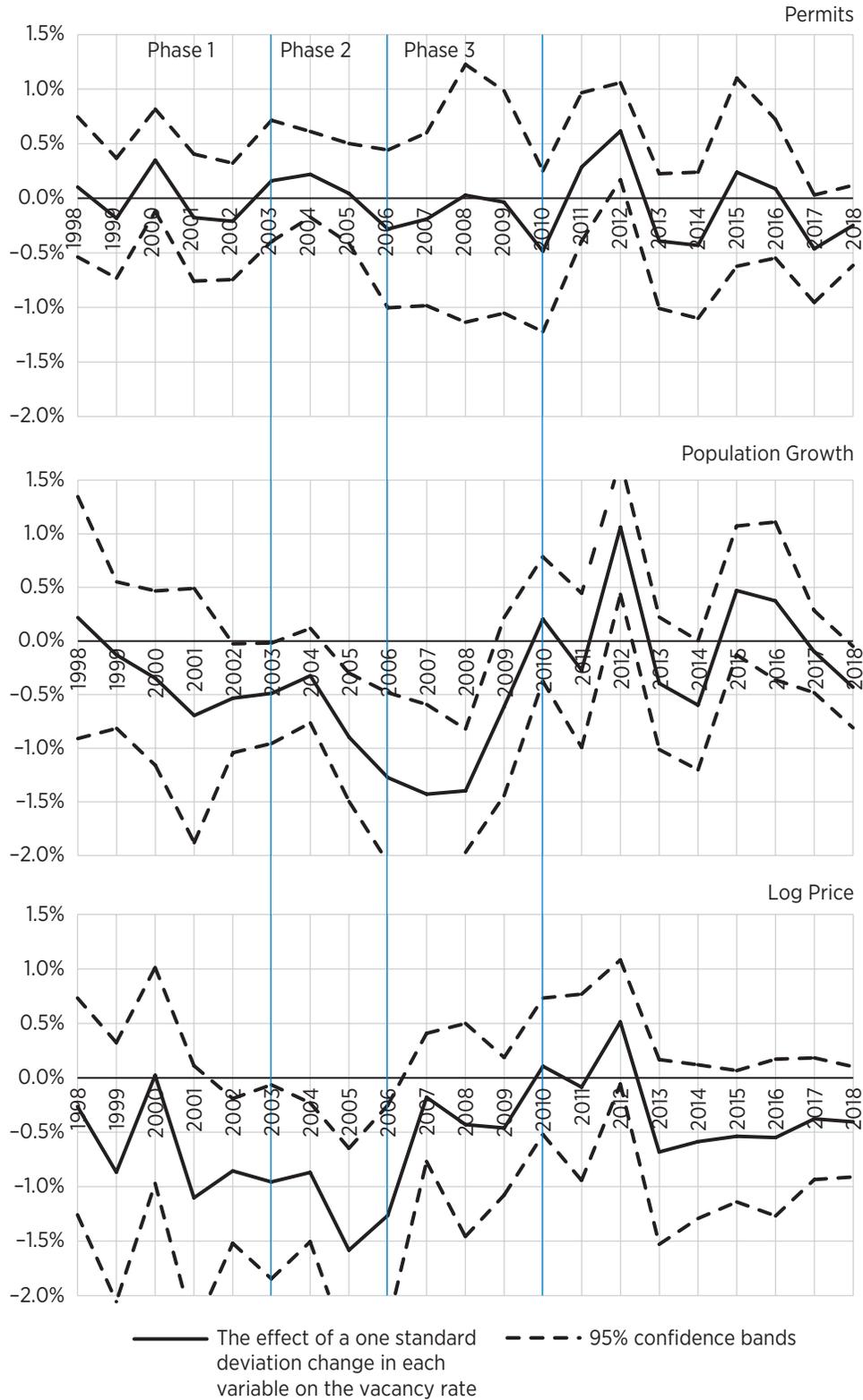
50. The vacancy rates used here are the combined estimated number of homes for rent and for sale as a percentage of the total stock of housing.

51. The permits were lagged 1 year to account for the time to build. Also, some reverse causality is likely to influence same-year permits. In tests of various specifications, same-year permitting rates did not have reliable coefficients, probably for these reasons.

52. Source: Zillow, “Home Values: Zillow Home Value Index (ZHVI),” Zillow Research: Housing Data, n.d., accessed March 15, 2021, <https://www.zillow.com/research/data/>.

53. Population changes were also measured as natural logarithms.

FIGURE 23. COMPARISON OF THE EFFECTS OF PERMITS, POPULATION GROWTH, AND HOME PRICES ON CHANGES IN VACANCY RATES



Source: Output from the regression described on p.50. For home prices, see Zillow, "Home Values: Zillow Home Value Index (ZHVI)," Zillow Research: Housing Data, n.d., accessed March 15, 2021, <https://www.zillow.com/research/data>. For permits, see US Census Bureau, "Building Permits Survey," Census.gov. For vacancies, see US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; Tables 6a, 7a, and 17a are found at <https://www.census.gov/housing/hvs/data/ann10ind.html>. Total vacancy rates for MSAs were estimated using vacancy rates for homes for sale, homes for rent, and homeownership rates. US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvx/data/ann1010ind.html>. For population, see US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., <https://apps.bea.gov/iTable/indexregional.cfm>.

ship. However, this specification does produce statistically significant results for the other variables during key years using the same broad annual data. None of the variables have been strongly correlated with changes in vacancy rates since 2009.

During the phase 1 period, when rising vacancies were largely limited to rentals in the “less growth” and “more growth” MSAs, declining prices and population growth were related to rising vacancy rates. Price appreciation that lagged the average MSA by about 4 percent annually and population growth that trended down by about 0.8 percent annually in those years, compared with the average MSA, were associated with rising vacancy rates of about 1 percent and about 0.5 percent in an MSA over 2 years.

Vacancy rates were generally stable during phase 2, yet during this period, relative differences in price trends and population growth trends were becoming more important factors in changing vacancy rates among MSAs. By 2006, annual home price growth (about 5 percent lower than average) or a change in population growth (about 1.1 percent below the average trend) were both associated with a rising vacancy rate of about 1.3 percent over 2 years.

Perhaps the most interesting period is phase 3. This is the period where home prices were collapsing sharply. In this data, by 2009, the median home price in the average MSA had declined by more than 18 percent over the previous 2 years, and the standard deviation of home price changes among MSAs was nearly 16 percent.⁵⁴ Prices were moving wildly, and they were very sensitive to location. Home prices became especially volatile in the contagion MSAs. Yet collapsing home prices were not significantly correlated with rising vacancy rates during phase 3. Instead, changing population growth became more statistically significant and economically important during that time.

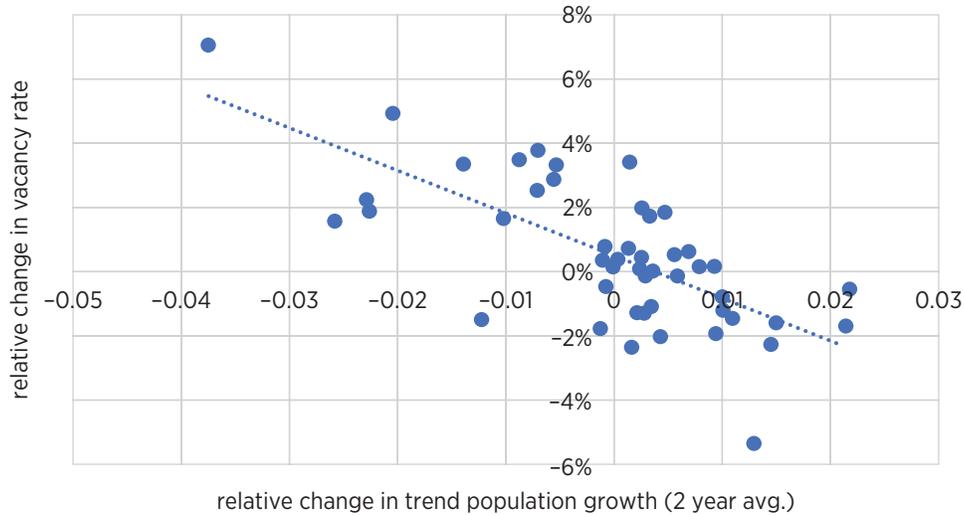
From 2006 to 2008, the aggregate vacancy rate among the contagion MSAs increased by about 2.6 percent. Approximately 2.1 percent of that increase was correlated with the sharp decline in population growth in those MSAs. Figure 24 shows the simple correlation in 2008, without the control variables, between changes in population growth and changes in vacancy rates.

This was more than a reversal of boom-era population shifts. Decades-old migration patterns were halted. In a paper I wrote with Scott Sumner,⁵⁵ we found similar correlations at the state level, using construction employment

54. Median home prices were measured on a natural log scale for symmetry, so this is the continuously compounded percentage change.

55. Scott Sumner and Kevin Erdmann, “Housing Policy, Monetary Policy, and the Great Recession” (Research Paper, Mercatus Center at George Mason University, Arlington, VA, August 2020).

FIGURE 24. MSA CORRELATION IN 2008 BETWEEN CHANGES IN POPULATION GROWTH AND CHANGES IN VACANCY RATES



Source: Output from the regression described on p.50. For vacancies, see US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; Tables 6a, 7a, and 17a are found at <https://www.census.gov/housing/hvs/data/ann10ind.html>. Total vacancy rates for MSAs were estimated using vacancy rates for homes for sale, homes for rent, and homeownership rates. US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvx/data/ann1010ind.html>. For population, see US Bureau of Economic Analysis, "CAINC1 Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., <https://apps.bea.gov/iTable/indexregional.cfn>.

as the proxy for construction activity. Growth in construction employment during the boom at the state level was associated with *lower* vacancy rates in both 2005 and 2009. Vacancy rates increased where there had already been high construction employment in 1998 rather than where construction employment had recently increased. Further, from 2007 to 2010, unemployment increased in states where construction employment had been high in 1998, but there was no correlation between increased construction activity from 1998 to 2005 and rising unemployment during the recession. Finally, the collapse in construction employment from 2005 to 2017, at the state level, was significantly correlated with preexisting construction activity in 1998 but not with growth in construction activity during the boom.

All of these correlations suggest that where building was increasing, it was meeting demand for housing, and that the recession was not triggered by an unsustainable short-term increase in construction activity. The decline in con-

TABLE 2. COEFFICIENTS

R ²		Coefficients*				
		Interaction Variable P*P*P	Lagged Vacancies	Log Price Change	Change in Log Population Growth	Change in Permits per capita
33%	1998	-0.012	-0.73	-0.05	0.29	1.08
30%	1999	0.013	-0.59	-0.18	-0.18	-1.37
21%	2000	-0.009	-0.02	0.00	-0.48	2.39
25%	2001	0.020	-0.61	-0.14	-1.13	-1.29
63%	2002	0.011	-0.60	-0.11	-0.64	-2.01
53%	2003	0.008	-0.59	-0.10	-0.48	1.43
31%	2004	0.006	-0.21	-0.07	-0.42	1.70
58%	2005	0.022	-0.41	-0.11	-1.11	0.30
49%	2006	0.031	-0.32	-0.12	-1.17	-1.38
50%	2007	0.018	0.07	-0.02	-1.18	-1.07
64%	2008	0.010	-0.30	-0.04	-1.19	-0.49
46%	2009	0.000	-0.52	-0.03	-0.47	-0.14
31%	2010	-0.001	-0.35	0.01	0.18	-1.88
31%	2011	0.002	-0.24	-0.02	-0.33	1.51
55%	2012	-0.040	-0.32	0.10	1.85	9.13
24%	2013	0.029	-0.28	-0.06	-0.68	-5.03
20%	2014	0.029	-0.22	-0.07	-1.33	-3.59
48%	2015	-0.003	-0.65	-0.11	0.84	2.77
57%	2016	-0.002	-0.73	-0.12	0.66	1.17
39%	2017	0.011	-0.39	-0.09	-0.17	-5.42
37%	2018	0.013	-0.38	-0.10	-0.76	-2.82

* Coefficients in bold have p values < 0.05.

Source: Output from the regression described on p.50. For home prices, see Zillow, "Home Values: Zillow Home Value Index (ZHVI)," Zillow Research: Housing Data, n.d., accessed March 15, 2021, <https://www.zillow.com/research/data>. For permits, see US Census Bureau, "Building Permits Survey," Census.gov. For vacancies, see US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; Tables 6a, 7a, and 17a are found at <https://www.census.gov/housing/hvs/data/ann10ind.html>. Total vacancy rates for MSAs were estimated using vacancy rates for homes for sale, homes for rent, and homeownership rates. US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvx/data/ann1010ind.html>. For population, see US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., <https://apps.bea.gov/iTable/indexregional.cfn>.

struction during and after the recession was a reversal of long-term migration patterns, not a reversal of short-term cyclical building activity.

In other words, focusing on housing supply rather than home prices, what the contagion MSAs had needed desperately by the time of the Jackson Hole Fed meeting in August 2007 was a countercyclical stimulus.

Tables 2–5 show summary statistics and output from the cross-sectional regressions.

TABLE 3. STANDARD ERRORS

	Standard Errors				
	Interaction Variable P^*P^*P	Lagged Vacancies	Log Price Change	Change in Log Population Growth	Change in Permits per capita
1998	0.02	0.20	0.10	0.75	3.34
1999	0.02	0.15	0.12	0.47	2.03
2000	0.02	0.15	0.07	0.55	1.59
2001	0.02	0.17	0.08	0.96	2.09
2002	0.01	0.09	0.04	0.30	2.51
2003	0.01	0.11	0.05	0.23	2.49
2004	0.01	0.11	0.03	0.28	1.52
2005	0.01	0.10	0.03	0.37	1.60
2006	0.02	0.12	0.05	0.36	1.76
2007	0.02	0.11	0.03	0.34	2.19
2008	0.01	0.11	0.03	0.24	2.30
2009	0.01	0.10	0.02	0.31	1.96
2010	0.01	0.09	0.03	0.26	1.41
2011	0.01	0.09	0.08	0.43	1.77
2012	0.01	0.06	0.05	0.54	3.28
2013	0.02	0.08	0.04	0.53	3.92
2014	0.02	0.09	0.04	0.66	2.76
2015	0.02	0.11	0.06	0.53	4.98
2016	0.02	0.11	0.08	0.64	4.25
2017	0.01	0.09	0.07	0.32	2.86
2018	0.01	0.10	0.06	0.33	2.07

Source: Output from the regression described on p.50. For home prices, see Zillow, “Home Values: Zillow Home Value Index (ZHVI),” Zillow Research: Housing Data, n.d., accessed March 15, 2021, <https://www.zillow.com/research/data>. For permits, see US Census Bureau, “Building Permits Survey,” Census.gov. For vacancies, see US Census Bureau, “Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA,” census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; Tables 6a, 7a, and 17a are found at <https://www.census.gov/housing/hvs/data/ann10ind.html>. Total vacancy rates for MSAs were estimated using vacancy rates for homes for sale, homes for rent, and homeownership rates. US Census Bureau, “Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA),” census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvx/data/ann1010ind.html>. For population, see US Bureau of Economic Analysis, “CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income” (table), Regional Data: Population, n.d., <https://apps.bea.gov/iTable/indexregional.cfn>.

CONCLUSION

The consensus view of the housing bubble is that excessive lending and speculation led to overbuilding and that macroprudential policies failed to curb excessive housing supply until it was too late. Pro-cyclical building had already happened, it seemed. Vacancies, measured nationally, were relatively high by 2005. So, by 2007, it seemed that policy responses—tightened monetary policy and

TABLE 4. AVERAGES

	Averages				
	Interaction Variable P^*P^*P	Lagged Vacancies	Log Price Change	Change in Log Population Growth	Change in Permits per capita
1998	1.02	0.0381	0.085	0.0005	0.0003
1999	1.04	0.0368	0.110	-0.0012	0.0005
2000	0.89	0.0378	0.131	-0.0019	0.0007
2001	1.06	0.0387	0.132	-0.0022	0.0001
2002	0.96	0.0385	0.122	-0.0045	-0.0006
2003	1.23	0.0414	0.127	-0.0066	-0.0003
2004	1.00	0.0448	0.162	-0.0039	0.0003
2005	1.02	0.0508	0.196	0.0013	0.0006
2006	0.94	0.0517	0.137	0.0053	0.0007
2007	0.89	0.0511	0.010	0.0039	-0.0003
2008	1.56	0.0529	-0.138	-0.0025	-0.0023
2009	1.66	0.0563	-0.181	-0.0050	-0.0037
2010	1.57	0.0587	-0.111	-0.0045	-0.0037
2011	1.39	0.0606	-0.102	-0.0037	-0.0024
2012	0.95	0.0582	-0.019	-0.0005	-0.0006
2013	0.66	0.0528	0.141	0.0013	0.0007
2014	0.64	0.0463	0.145	0.0009	0.0014
2015	0.70	0.0432	0.100	0.0009	0.0013
2016	0.73	0.0400	0.118	0.0004	0.0007
2017	0.94	0.0367	0.132	-0.0020	0.0005
2018	1.09	0.0348	0.128	-0.0038	0.0004

Source: Output from the regression described on p.50. For home prices, see Zillow, "Home Values: Zillow Home Value Index (ZHVI)," Zillow Research: Housing Data, n.d., accessed March 15, 2021, <https://www.zillow.com/research/data>. For permits, see US Census Bureau, "Building Permits Survey," Census.gov. For vacancies, see US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; Tables 6a, 7a, and 17a are found at <https://www.census.gov/housing/hvs/data/ann10ind.html>. Total vacancy rates for MSAs were estimated using vacancy rates for homes for sale, homes for rent, and homeownership rates. US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvx/data/ann1010ind.html>. For population, see US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., <https://apps.bea.gov/iTable/indexregional.cfm>.

stricter lending regulations, for instance—also had to be pro-cyclical. Attempts to soften the landing would only worsen the consequences.

The contraction in housing markets that began in 2006 was eventually associated with a number of destructive developments. Among them was a large decline in real estate values and household wealth, especially for younger home owners and home owners with lower incomes and few financial assets; a large and widespread decline in construction employment from about 2007 to 2010; a deep decline in construction of low-priced single-family homes; and a number

TABLE 5. STANDARD DEVIATION

	Standard Deviation				
	Interaction Variable P^*P^*P	Lagged Vacancies	Log Price Change	Change in Log Population Growth	Change in Permits per capita
1998	0.44	0.0109	0.048	0.0075	0.0010
1999	0.42	0.0127	0.048	0.0072	0.0013
2000	0.31	0.0130	0.072	0.0073	0.0015
2001	0.46	0.0131	0.078	0.0061	0.0014
2002	0.57	0.0168	0.080	0.0084	0.0011
2003	0.53	0.0155	0.091	0.0102	0.0011
2004	0.52	0.0135	0.117	0.0077	0.0013
2005	0.59	0.0145	0.142	0.0081	0.0014
2006	0.48	0.0165	0.104	0.0109	0.0020
2007	0.41	0.0143	0.085	0.0121	0.0018
2008	0.64	0.0158	0.148	0.0117	0.0022
2009	0.68	0.0181	0.158	0.0131	0.0026
2010	0.63	0.0204	0.091	0.0113	0.0026
2011	0.54	0.0185	0.056	0.0083	0.0019
2012	0.44	0.0179	0.052	0.0058	0.0007
2013	0.35	0.0159	0.106	0.0058	0.0008
2014	0.34	0.0148	0.082	0.0045	0.0012
2015	0.45	0.0145	0.051	0.0057	0.0009
2016	0.44	0.0147	0.048	0.0057	0.0007
2017	0.48	0.0122	0.042	0.0060	0.0009
2018	0.41	0.0111	0.042	0.0056	0.0009

Source: Output from the regression described on p.50. For home prices, see Zillow, "Home Values: Zillow Home Value Index (ZHVI)," Zillow Research: Housing Data, n.d., accessed March 15, 2021, <https://www.zillow.com/research/data>. For permits, see US Census Bureau, "Building Permits Survey," Census.gov. For vacancies, see US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; Tables 6a, 7a, and 17a are found at <https://www.census.gov/housing/hvs/data/ann10ind.html>. Total vacancy rates for MSAs were estimated using vacancy rates for homes for sale, homes for rent, and homeownership rates. US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvx/data/ann10ind.html>. For population, see US Bureau of Economic Analysis, "CAINCI Personal Income Summary: Personal Income, Population, Per Capita Personal Income" (table), Regional Data: Population, n.d., <https://apps.bea.gov/iTable/indexregional.cfm>.

of secondary developments (like reduced mobility and rising rents) related to the decline in building.⁵⁶

Analysis of the housing boom and bust has typically used supply elasticity as a central source of intuition. If demand was high, then naturally the

56. See Fernando V. Ferreira, Joseph E. Gyourko, and Joseph Tracy, "Housing Busts and Household Mobility" (NBER Working Paper No. w14310, National Bureau of Economic Research, Cambridge, MA, September 2008), for a discussion of the effects of negative equity on mobility.

extra demand would cause rising prices where supply is inelastic and rising quantities where supply is elastic. But in a national market that consists of a mixture of inelastic and elastic markets, changes in demand create interactions between those markets. Looser lending can increase demand for housing and likely did in the years leading up to the Great Recession. Yet for the contagion cities, a significant and volatile factor shifting demand was migration. In 2000, net migration into the major contagion cities consisted of about 28,000 households from the closed access cities and 21,000 households from other areas.⁵⁷ By 2005, net migration from the closed access cities was up to 54,000 households, and population pressure from the closed access cities had actually turned contagion city migration (with the rest of the country) negative. By 2008, net migration from the closed access cities had dropped back to 9,000 households, and net migration into the major contagion cities from the rest of the country remained negative—about 10,000 net households moving away.

It is ironic that the contagion cities, filling with hundreds of thousands of vacant units by 2009, became the poster children for cities with years' worth of unsalable inventory. That conclusion seems indisputable at first glance, but for a city growing at more than 2 percent annually, it does not take long to grow into some extra inventory.⁵⁸ In an *all else being equal* analysis, it is implausible that the contagion cities could still have had supply-induced vacancies in 2010. The *only way* for vacancies to build in those cities for years is for *something else* to change. What changed is that they suddenly stopped growing by more than 2 percent annually. The cumulative net migration in the contagion MSAs was 459,000 households less by 2010 than it would have been if 123,000 households had continued moving there each year—as they had in 2004 and 2005. Builders

57. These figures are from a separate analysis that only includes Miami, Phoenix, Riverside, and Tampa. The figures in the following paragraph do, however, include all the contagion MSAs in this data set. Migration data is from the Internal Revenue Service, “SOI Tax Stats—Migration Data” County-to-County Migration Data, accessed from : <https://www.irs.gov/statistics/soi-tax-stats-migration-data>. Permits data is from US Census Bureau, “Building Permits Survey,” Census.gov.

58. Charles Nathanson and Eric Zwick, “Arrested Development: Theory and Evidence of Supply-Side Speculation in the Housing Market” (NBER Working Paper No. w23030, National Bureau of Economic Research, Cambridge, MA, January 2017). Nathanson and Zwick argue that market dynamics could have caused short-term supply to become more inelastic in cities with characteristics like the Contagion cities. A rise in housing demand, either from migration or from other factors, could have focused developers more on land speculation as they hit short-term limits on home building. In some Contagion cities at the peak of the boom, builders were unable to obtain enough permits to sell homes to all willing buyers. Conditions on the ground along with the evidence presented by Nathanson and Zwick suggest that excessive speculative building in the Contagion cities was unlikely.

more than matched that change in growth. The cumulative issuance of housing permits in the contagion MSAs was 1 million less by 2010 than it would have been if 312,000 permits had continued being issued—as they had in 2004 and 2005. Yet, those were the years when contagion MSA vacancies climbed so sharply.

Before the worst outcomes from that migratory whiplash were experienced, the presumptive lessons from those eventual calamities had already been attached to the boom—the “bubble.” Ed Leamer was not rocking the boat when he told Federal Reserve officials in September 2007, “Once the wave has peaked and is crashing, there is not much that can be done to quiet the waters.” Thus, calamities from pro-cyclical Federal Reserve policies *during a recession* have been widely blamed on pro-cyclical policies during the preceding economic expansion.

These unfortunately misplaced lessons reach far beyond monetary policy. Regulatory standards on mortgage lending have tightened severely, also based on the notion that it was pro-cyclical lending during the boom rather than pro-cyclical lending during the bust, leading to the eventual calamities associated with the crisis. This tightening has constrained some home prices and construction activity in ways that have cost millions of construction jobs, declining home equity wealth in housing markets where mortgages have become less available, and rising rents for the millions of households who cannot qualify for mortgages in the new regime.⁵⁹ Loosening those standards would increase the number of houses being built today and in the future, which would convey widespread benefits to American families and workers.

The implications of this are unfortunately far-reaching. Most of the analysis of post-housing-boom economic volatility has assumed a widespread oversupply of housing, and the high vacancy rates that peaked in 2009 seemed like a confirmation of that assumption. Lacking other explanations, this has provided a background explanation for many of the negative developments of the time. Malinvestment into the real estate sector has become canonized as an economic force shaping the financial crisis and its aftermath—in other words, in tertiary research, it can be asserted without evidence. A tremendous amount of potentially misplaced background support for a broad variety of social, political, and economic hypotheses is being embedded throughout academic and public policy literature. Even proponents of more building today see the perceived pre-Great

59. Scott Sumner and Kevin Erdmann, “Housing Policy, Monetary Policy, and the Great Recession” (Research Paper, Mercatus Center at George Mason University, Arlington, VA, August 2020).

Recession oversupply as a caveat warning against excessive growth.⁶⁰ To this day, that fear nudges policy norms toward more tepid lending norms and growth expectations.

How could the chairman of the Federal Reserve, without controversy, state that there was excess supply to be “worked off” even in 2011, a year that surely would rank as the least likely time to have excess supply since at least 1965? Could the answer, paradoxically, be found in the literature on overbuilding itself? Proposed causes of overbuilding include “both statistical and reputation-based herding. The former refers to developers learning from each other, and so tending to copy. The latter refers to developers copying each other in order to reduce the probability of a loss of reputation that can result from making an unconventional choice.”⁶¹ These sorts of attempts at rational economic activity in a context of imperfect information are plausible elements at work in residential construction markets.

Perhaps researchers and policymakers have spent a decade learning from each other and so have a tendency to copy one another. Maybe this has happened, in part, to reduce the probability of a loss of reputation that can result from making an unconventional choice. Maybe illusory oversupply can arise from the same human herding tendencies that can create an actual oversupply. It is possible that, in the case at hand, the former has been more predominant than the latter.

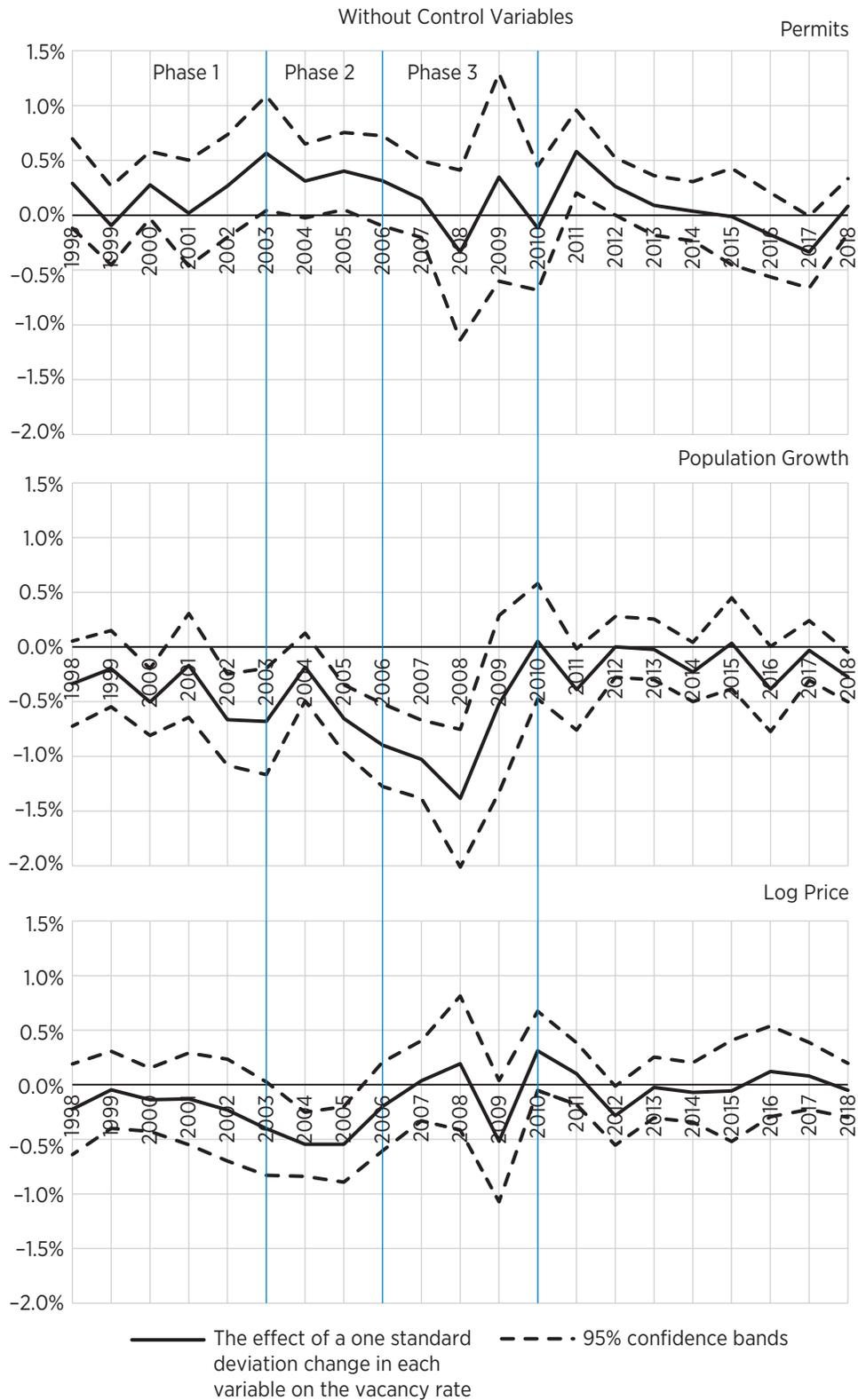
APPENDIX

Figure 25 shows the results of the vacancy rate regressions without the control variables. Population growth remains the dominant factor correlated with vacancies in phase 3. Without the control variables, during phase 2, rates of permitting gain significance while changing prices lose significance.

60. Two recent examples of the canonized assertion in the mainstream media were: <https://www.wsj.com/articles/the-pandemic-ignited-a-housing-boombut-its-different-from-the-last-one-11615824558>. “Too much new construction led to an oversupply of houses.” <https://www.politico.com/news/2021/03/08/soaring-home-prices-alarm-policy-makers-474433> “. . . in the early 2000s, when there were too many homes . . .”

61. Gregory DeCoster and William C. Strange, “Developers, Herding, and Overbuilding,” *Journal of Real Estate Finance and Economics* 44, nos. 1–2 (2012), 7–35.

FIGURE 25. VACANCY RATE REGRESSIONS WITHOUT CONTROL VARIABLES



Source: Output from the regression described on p.50. For vacancies, see US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Quarterly Vacancy and Homeownership Rates by State and MSA," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvs/data/rates.html>; Tables 6a, 7a, and 17a are found at <https://www.census.gov/housing/hvs/data/ann10ind.html>. Total vacancy rates for MSAs were estimated using vacancy rates for homes for sale, homes for rent, and homeownership rates. US Census Bureau, "Housing Vacancies and Homeownership (CPS/HVS): Annual Statistics: 2010 (Including Historical Data by State and MSA)," census.gov, n.d., accessed March 15, 2021, <https://www.census.gov/housing/hvx/data/ann1010ind.html>.

