Finance and Economics Discussion Series
Divisions of Research & Statistics and Monetary Affairs
Federal Reserve Board, Washington, D.C.

Long-Term Vacancy in the United States

Raven Molloy

2014-73

Long-Term Vacant Housing in the United States

Raven Molloy

September 2014

Abstract

Because housing is durable, the housing supply is slow to adapt to declines in demand. This paper uses long-term vacancy—defined as nonseasonal housing units that have been vacant for an unusually long period of time—to quantify the extent of excess supply in the housing market. I find that long-term vacancy is less than 2 percent of all nonseasonal housing units and accounts for only one quarter of the aggregate increase in nonseasonal vacancy from 2001 to 2011. Thus, at the national level, excess supply is considerably less extensive than indicated by traditional measures of vacancy. However, the stock of long-term vacant housing is concentrated in a small number of neighborhoods that do have appreciably high long-term vacancy rates. Some of these neighborhoods have characteristics suggesting that excess supply is related to overbuilding during the housing boom, while others have characteristics that are symptomatic of persistently weak housing demand.

The analysis and conclusions set forth are those of the author and do not indicate concurrence by other members of the research staff or the Board of Governors. I would like to thank Andrew Paciorek and Jordan Rappaport for helpful comments, and Tyler Petersen for research assistance.

I. Introduction

The durability of housing is one of the main features that set it apart from other types of goods. Because physical structures will exist for many years even when no one is occupying or maintaining them, a contraction in the demand to live in a particular location or type of housing unit will lead to vacant structures. Not all vacancy is a sign of an excess supply: Some units are held vacant for seasonal use, and others are vacant for a relatively short time when the residents of the unit change over. But in most cases, long periods of vacancy are a physical manifestation of the inability of the housing supply to fully adapt to changes in housing demand.

The recent housing market contraction has brought issues related to vacant housing to the forefront, as the contraction resulted in a rapid and largely unforeseen shift in the number and types of housing demanded and so coincided with a substantial increase in the number of vacant housing units. According to the decennial Census, which provides the most accurate data on vacant residential structures in the US, 8 percent of non-seasonal housing units stood vacant in April 2010 (see Figure 1). This fraction was the largest recorded since the statistics were first collected in 1950. Although surveys indicate that vacancy has come down a little since 2010, it still appears high by historical standards. For example, the Housing Vacancy Survey (HVS), which has tracked vacant housing units since 1965, shows that the non-seasonal vacancy rate in the first half of 2014 was still higher than any reading prior to 2007 (see Figure 1).[1]

Long periods of unintended vacancy are a waste of resources because the structure has failed to provide the housing services that were intended when the structure was built.

[1] The level of the vacancy rate as measured in the HVS has been higher than that in the decennial Census since 2000. In the HVS, using weights based on occupied housing units rather than population seems to generate a smaller number of occupied housing units, and perhaps therefore a higher fraction of vacant housing units (Cresce, Cheng and Grieves 2014). This discrepancy is the topic of ongoing investigation by Census Bureau staff.

Moreover, homes that stand vacant for a long period of time are less likely to be maintained adequately, thereby requiring renovation in order to become fully functional once again. Vacant homes also may pose problems for local communities if they attract crime or otherwise detract from the quality of the neighborhood (Apgar, Duda and Gorey 2005, Griswold and Norris 2007, Immergluck and Smith 2006, Mikelbank 2008, US GAO 2011, Whitaker and Fitzpatrick 2013).

Because only homes that are not intended to be vacant reflect a mismatch between supply and demand, distinguishing between intentional and unintentional vacancy is critical for understanding the extent that the housing stock may be underutilized. However, most datasets with information on vacant housing do not provide enough detail to allow researchers to make this distinction. For example, Table 1 shows the categories of vacant housing that are available in the 2010 Census. While units in some categories, like those designated as vacant for seasonal, recreational or occasional use, are likely intended to be vacant, units in other categories likely contain a mixture of intended and unintended vacancy.

In this paper, I use data on duration of vacancy to gain insight into underutilization of the housing stock. I begin by presenting a simple theoretical framework to illustrate the connection between vacancy and excess supply in the housing market, and discuss why data on duration of vacancy can help refine estimates of the excess supply. Using the American Housing Survey (AHS), I estimate the aggregate fraction of housing units that have been vacant for an unusually long period of time, which I refer to as "long-term" vacancy. Long-term vacancy has been less than 2 percent of the nonseasonal housing stock from 1989 to 2011, and it accounts for only about one quarter of the increase in the aggregate nonseasonal vacant stock from 2001 to 2011. Thus, at the national level underutilization of the housing stock is not nearly as extensive as indicated by traditional measures of vacancy.

If all neighborhoods had a long-term vacancy rate equal to the national average, one could conclude that the excess supply of housing is not a significant issue. However, an excess supply could be important in some locations if the stock of long-term vacant property is concentrated in a small number of locations. To examine the distribution of long-term vacant property across neighborhoods, I use data on duration of vacancy by Census tract from the US Postal Service (USPS). This data source has only been used in a handful of academic studies, and as far as I am aware this paper is the first to use it to examine geographic distribution of vacancy across the entire United States. I find that the stock of long-term vacant housing is highly concentrated in a small number of neighborhoods with high vacancy rates: In 2013, 13 percent of Census tracts had a long-term vacancy rate more than one standard deviation above the mean, and these tracts accounted for 39 percent of all long-term vacant units. By contrast, nearly two thirds of tracts had a long-term vacancy rate below the mean.

Next, I examine the characteristics of tracts that had an unusually high long-term vacancy rate in 2013. Such tracts can be found in many regions and metropolitan areas across the US. Using principal component analysis, I find that these neighborhoods can be categorized into four basic types: housing boom neighborhoods, declining inner-city neighborhoods, poor-but-stable inner city neighborhoods, and declining suburban neighborhoods. The fact that these neighborhoods have different characteristics illustrates the multiple factors that can lead to long-term vacancy. For example, in the housing boom neighborhoods, high levels of construction from 2000 to 2009 suggest that overbuilding during the boom has contributed to long-term vacancy. By contrast, the declining inner-city and suburban neighborhoods have suffered population losses and high vacancy rates for decades, suggesting that these areas suffer from persistent weakness in housing demand.

In summary, long-term vacancy can be used as a measure of excess supply in the housing market. At the aggregate level, long-term vacancy is a small share of all vacant units, indicating that the extent of underutilization of the housing stock is not as great as implied by a casual reading of aggregate vacancy statistics. Nevertheless, a small number of neighborhoods do have an appreciable number of long-term vacant housing units. The diverse characteristics of these neighborhoods suggest that long-term vacancy has multiple causes. Thus, policies that may be effective at reducing the long-term vacant stock in one location may be less effective in other locations.

II. Vacancy as a Measure of Housing Market Conditions

Basic economic theory starts with a downward-sloping demand curve and an upward-sloping supply curve, with shifts in these curves resulting in changes in the equilibrium price and quantity of a good. However, the durability of housing implies that the quantity of housing units does not decrease in response to a drop in demand. Glaeser and Gyorko (2005) model the durability of housing with a supply curve that is vertical at all quantities below the initial equilibrium (see Figure 2). Thus, in a frictionless market a decrease in demand would result in a drop in the equilibrium price of housing, with no change in the number of occupied units in the market—illustrated by a move from point A to point B in Figure 2.

However, a number of housing market frictions may prevent the price of housing from falling all the way to point B. For one reason, owners tend to overestimate the value of their property (Goodman and Ittner 1992) and some might not be willing to sell a property for less than they think it is worth (Genesove and Mayer 2001). In addition, property owners tend to use past transaction prices when setting list prices, which can make transaction prices slow to adjust to changes in market conditions (Anenberg 2013, Guren 2014). Moreover, if a buyer offers less

than the mortgage amount, the sale cannot occur unless the lender is willing to forgive the difference between the mortgage amount and the contract price or unless the borrower can make up this difference. This particular friction was extremely salient during the recent housing market contraction, when market values fell far below the amounts owed on many properties.

The presence of frictions implies that the price of housing will end up somewhere between point A and point B in Figure 2, with the result that the quantity of occupied housing will fall below its initial level. The observed price and quantity of occupied housing will therefore fall somewhere on the bold portion of the dashed demand curve in the figure. The difference between the initial and final quantity of occupied housing, illustrated as the difference between Q and Q' in the figure, is vacant housing. Thus, vacancy is the result of declines in housing demand coupled with frictions in the process of house price adjustment. Another result illustrated by Figure 2 is that the decline in the observed house price does not fully reflect the decline in housing demand. Consequently, data on vacancy can be a useful supplement to house prices in an analysis of housing market conditions.

Not only can data on vacancies provide additional information on housing market conditions, but they can be used to analyze market conditions for areas where high-frequency house price data are not readily available. For example, the American Community Survey (ACS) only reports house values for Census tracts—a geographic unit frequently used by researchers to approximate neighborhoods—in the five-year samples, which means that changes in house prices can only be observed in the ACS between two five-year periods. Private companies like CoreLogic and Zillow generally do not create house price or house value estimates for Census tracts, likely because there are not enough transactions in most Census

tracts to generate an accurate picture of changes in prices over time.[2] As I will discuss below, the Department of Housing and Urban Development tabulates quarterly vacancy data by Census tract based on data collected by the US Postal Service. Thus, vacancy rates can be observed at a much higher frequency than house prices for small geographic areas. As far as I am aware, no other study has used the USPS data to examine the aggregate distribution of vacancy. A few studies have used the USPS data to examine vacancy in specific locations: Whitaker and Fitzpatrick (2013) examine the effect of vacant property on housing markets in Cuyahoga County, OH; Hartley (2013) examines the effect of foreclosures on house prices and vacancy in Chicago, IL; and Silverman, Yin and Patterson (2013) examine the determinants of vacancy in Buffalo, NY.

In the simple framework illustrated by Figure 2, vacancy only exists when housing demand falls below supply. However, in the real world housing units can be vacant for a variety of reasons, not all of which necessarily indicate an imbalance between supply and demand. For example, 31 percent of the housing stock in 2010 was vacant because it was held for seasonal or occasional use (see Table 1). Another 4 percent of the stock had been recently rented or sold and was awaiting occupancy. Even for the 40 percent of vacant units that are for sale or for rent, short periods of vacancy are needed when the residents of the property change over. A number of papers have examined the determinants of time on market for single-family housing or turnover-related vacancy in the rental market, including Kaserman, Trimple and Johnson (1989), Wheaton (1990), Rosen and Smith (1983) and Guasch and Marshall (1985).

[2] In principal, one could create one's own measure of house prices by Census tract using the sales prices reported in public records data, but most Census tracts probably have too few transactions to estimate changes in prices reliably.

Longer-than-normal spells on the market units indicate a failure of the market to clear, so it is long periods of vacancy that are more likely to reflect the imbalance between supply and demand illustrated in Figure 2. Consequently, in the next section of the paper I analyze the distribution of length of vacancy by type of vacancy and define a concept called "long-term" vacancy that includes units that have been vacant for an unusually long period of time.

III. Aggregate Statistics on Length of Vacancy

I obtain data on length of vacancy for different types of vacant units from the American Housing Survey (AHS). The AHS is the only nationally-representative dataset with information on duration of vacancy for all types of vacancy.[3] Similar to the Census and HVS, the AHS categorizes vacancy into six basic types: seasonal, for rent, for sale, rented or sold, occasional use, or "other."[4] The variable indicating length of vacancy is top-coded at 2 years, so I calculate longer periods of vacancy by tracking individual units in the panel over time. Since the first year of the panel is 1985 and the survey is biennial, the first year that I can consistently measure durations between 2 and 5 years is 1989.

Table 2 shows the distribution of duration by type of vacancy from 1989 to 2003. There was no trend in duration of vacancy during this period and it spans several housing market cycles, so the reported statistics should reflect the normal distribution of duration of vacancy. Homes for rent tend to be vacant for a short period of time, while homes for sale tend to be vacant for a somewhat longer time period. Specifically, about three out of four housing units for rent were vacant for less than 6 months, whereas only about half of the vacant for sale inventory was vacant for such a short period. Roughly three quarters of the stock of vacant homes for sale

[3] The Census and ACS do not record duration of vacancy. The HVS reports duration of vacancy for units for sale and units for rent, but not for the other categories of vacancy.
[4] The gross vacancy rate in the AHS is similar to that in the HVS (see Figure 1).

has been vacant for less than one year. Thus, it seems reasonable to conclude that homes for rent have been vacant for an unusually long time if they have been vacant for 6 months or more, while the same is true for homes for sale that have been vacant for one year or longer.

Homes that are vacant for "other" reasons tend to have been vacant for even longer than homes for sale, with more than half of this category vacant for one year or longer. In this case, it is not obvious that longer spells of vacancy are more likely to reflect an imbalance between supply and demand in the housing market. The 2012 HVS sheds some light on the myriad of reasons why a unit could end up in this category because in that year the survey began asking more detailed questions about units in this category.[5] Table 3 reports the distribution of the more detailed reasons for being in this category. Roughly half of these units are at least plausibly consistent with an imbalance between supply and demand: "in foreclosure or legal proceedings," "needed repairs," "possibly abandoned/to be demolished," and "intended for year-round occupancy but vacant for six months or more." The rest are less obviously consistent with a failure of the market to clear regardless of the length of vacancy.

Another way to gain insight into the "other" category is to examine the physical condition of the property, because properties that are allowed to fall into a state of disrepair are more likely to be vacant unintentionally. Table 4 reports the incidence among "other" vacant housing in the AHS of a number of housing unit characteristics that are associated with neglect. The table shows that housing units that have been vacant for a longer period of time are much more likely to have undesirable characteristics, such as holes in the roof or cracks in the walls. Similarly, they are less likely to have characteristics that make them fully functional, like a working toilet

[5] Like the Census and AHS, the HVS's "other" category includes units that are not for sale, for rent, rented or sold but awaiting occupancy, or held for seasonal or occasional use.

or refrigerator. Nevertheless, a long period of vacancy does not necessarily imply that a housing unit is in poor condition. For example, about 20 percent of the units that were vacant for five years or more did not have any of the negative housing characteristics listed in Table 4.

Because "other vacant" properties that have been vacant for a longer period of time are in worse physical condition, it seems reasonable to use long periods of vacancy to proxy for underutilization of these housing units. In sum, I define long-term vacancy as units that are in roughly the top quartile of the distribution of length of vacancy: 6 months or longer for units for rent, 12 months or longer for units for sale, and 5 years or longer for "other" vacant units. Seasonal, occasional use, and units that are rented or sold but awaiting occupancy are excluded no matter how long they have been vacant. [6]

Figure 3 shows the fraction of the nonseasonal housing stock that falls into this definition of long-term vacancy. It was fairly stable at about 1 percent from 1989 to 2001, and then rose gradually to 1½ percent in 2009 and 2011. Thus, it has been a fairly small share of the aggregate stock since at least the late 1980s. Even from the perspective of the market for owner-occupied housing, the stock of long-term vacant housing units seems small. In 2011, the long-term vacant stock was just 2 percent of the total number of housing units that were either owner-occupied or vacant and for sale. Not only is the aggregate stock of long-term vacant housing relatively small, the increase in long-term vacant housing from 2001 to 2009 accounts for only about one quarter of the increase in nonseasonal vacancy during that period.[7] As a result, the bulk of the rise in aggregate vacancy can be attributed to units that experienced relatively short periods of vacancy.

[6] By excluding all seasonal units from the analysis below, I am assuming that the designation of seasonal units in the AHS is accurate. To the extent that some owners may claim that a property is seasonal even though they do not intend to occupy it, I will underestimate the underutilization of the housing stock. However, there is no incentive for survey respondents to misrepresent the reason for vacancy.

[7] The aggregate nonseasonal vacancy rate shown in this figure is a little lower than the vacancy rates shown in Figure 1 because this figure excludes units for which length of vacancy is missing.

In this sense, aggregate vacancy statistics exaggerate the rise in the excess supply of housing over this period.

This definition of long-term vacancy may seem somewhat narrow in that some units in the "other" vacant category might reflect an imbalance between supply and demand even though they were vacant for less than five years. For example, units that are vacant due to foreclosure or legal proceedings reflect such imbalances no matter the length of vacancy. If I expand the definition of long-term vacancy to include "other" vacant units that have been vacant for more than one year, long-term vacancy still only amounts to 2 percent of non-seasonal housing units in 2011, and only accounts for about one third of the increase in non-seasonal vacancy since 2001.

IV. Distribution of Long-Term Vacant Property Across the US

If all neighborhoods had a share of long-term vacant housing equal to the national average, this type of vacancy would be too rare to have a meaningful effect on the housing market or local communities. On the other hand, if long-term vacancies are concentrated in certain metropolitan areas or neighborhoods, they could have important implications for those communities. The AHS is not well suited for examining the distribution of vacant property across locations because the sample is too small, so next I turn to data on vacant addresses from the US Postal Service (USPS).

The USPS data are derived from information collected by postal workers, who record an address as vacant if the mail has not been collected for at least 90 days. The data are tabulated by Census tract and duration of vacancy and the Department of Housing and Urban Development posts the data on their website.[8] The key advantage of this dataset is that it provides statistics for

[8] http://www.huduser.org/portal/datasets/usps.html

small geographic areas, thereby allowing researchers to observe the geographic distribution of vacancy. However, due to the way that the data are collected, vacant addresses in the USPS data will not always correspond to unoccupied housing units. For example, occupied units will be counted as vacant in the USPS data if the residents receive their mail at a PO Box. At the same time, units that have been unoccupied for less than 90 days will not be counted as vacant.

In order to make the USPS vacancy data line up more closely with traditional measures of vacancy, I impose a number of sample restrictions. First, I require that the total number of residential addresses in the tract in 2010 be no more than 15 percent higher and no less than 15 percent lower than the number of housing units in the 2010 Census.[9] Second, because many vacation homes will be counted as vacant in the USPS data, I exclude tracts with a share of seasonal housing that is greater than 10 percent as measured in the 2010 Census. Third, I require that the USPS vacancy rate in 2010 be no more than 15 percentage points greater and no less than 10 percentage points below the vacancy rate reported in the 2010 Census.[10] This restriction is useful because it increases the likelihood that the addresses categorized as vacant in the USPS data are actually vacant, and not addresses with residents that have their mail delivered to other locations. Fourth, I exclude tracts with fewer than 500 addresses. Fifth, I exclude tracts with an increase in total addresses in the previous four years that is greater than 50 percent because, as I will discuss below, units under construction are counted as vacant in the USPS data. Combined, these restrictions reduce the sample from 72,000 tracts to 53,000 tracts. Nevertheless, the tracts in the final sample account for roughly 75 percent of all housing units in the US. Figure 4 shows that the correlation of vacancy in the USPS data and 2010 Census data is fairly strong—the

[9] The USPS and Census data both use 2010 Census tract boundaries.
[10] These cutoffs roughly correspond to the 1st and 99th percentiles of the distribution of the difference between the USPS and 2010 Census vacancy rates. This restriction reduces the sample by only about 1,400 tracts, but it increases the correlation between the USPS and Census vacancy rate from 0.70 to 0.80.

correlation between these two vacancy rates is 0.80, and a regression line running through this plot has a slope of 0.95.

The USPS categorizes vacant units into two types: vacant, and "no-stat". The no-stat category includes addresses that are deemed uninhabitable by the postal carrier, which encompasses homes under construction as well as housing units that are in a state of severe disrepair. Because units in a state of severe disrepair could be important component of the excess supply of housing, I include the no-stat addresses in the USPS estimate of long-term vacancy. An advantage of including no-stat addresses is that this category will capture homes that have been started by a builder but left unfinished, or finished but unsold, if the demand for these units did not materialize. On the other hand, a drawback of including the no-stat addresses is that it means also including housing units that are actively under construction. In principal, units actively under construction should be in the no-stat category for a shorter period of time than units in a state of severe disrepair or units that were abandoned prior to completion, so limiting the no-stat category to a long period of vacancy should reduce the presence of units actively under construction. However, new addresses are first counted as no-stat upon the application of a building permit, and the time from initial permit to occupied structure could easily take several years in some locations. In order to reduce the probability that the addresses identified as long-term vacant are ones for which the permitting and construction process is actively ongoing, I exclude tracts that experienced a large increase in the total number of addresses as specified above.[11]

[11] This restriction only reduces the sample by 3 percent. Without this restriction, the analysis of neighborhood characteristics presented below is similar except that it identifies a group of tracts that appear to have a high long-term vacancy rate solely because they had a high rate of construction in the previous four years.

The USPS data do not distinguish between homes for sale, homes for rent, or other types of vacancy, so I define long-term vacancy as all residential addresses that have been in the vacant category for at least one year or in the no-stat category for at least 3 years. Technically, these addresses have been vacant for more than 15 or 39 months, respectively, since they are not counted as vacant or no-stat until mail has not been collected for 90 days. These cutoffs are chosen to avoid excluding too many homes that are for sale or for rent, while not including too many homes actively under construction. Even so, this measure of long-term vacancy likely excludes a fair number of units for rent that have been vacant between 6 and 15 months. On the other hand, it includes "other" vacant units that have been vacant between 15 months and 5 years, which were excluded from the AHS measure.

In the final USPS sample, about 5 percent of all addresses in 2013 fall into the definition of long-term vacant.[12] This fraction is substantially larger than in the AHS, which reports that 1¾ percent of nonseasonal housing units in 2011 were vacant for more than 15 months.[13] One reason for this discrepancy is probably because housing units that are occupied for part of the year will be counted as vacant for less than a year in the AHS data, but will be counted as vacant for the whole year in the USPS data if no mail is delivered to the address. Restricting the sample to tracts that do not have a high share of seasonally vacant housing does not exclude all seasonal housing because many tracts have at least some seasonal property. Consequently, for each tract I subtract the number of seasonally vacant housing units as measured in the 2010 Census. This subtraction reduces the estimate of long-term vacancy in the USPS to 4 percent in 2013.

[12] In 2010 the USPS improved their method of data collection, resulting in an increase in the fraction of vacant addresses. Because the additional vacant addresses were assumed to be vacant for less than one year in 2010, this methodological change causes the number of long-term vacant addresses to rise in the years after 2010. Consequently, I focus on data for 2013 and do not use the USPS to analyze changes in long-term vacancy over time.
[13] 2013 AHS data are not yet available, but based on the HVS data shown in Figure 1 it seems extremely unlikely that the AHS will show a large increase in long-term vacant housing from 2011 to 2013.

A second reason for the discrepancy between the USPS and AHS estimates is that the AHS excludes units that are in a state of severe disrepair, whereas these units are included (as a no-stat addresses) in the USPS data.[14] In that sense, the AHS may provide an underestimate of fraction of the housing stock that is underutilized. On the other hand, the USPS measure is likely an overestimate because it probably includes some housing units where the permitting and/or construction process has taken a long time. Despite the different long-term vacancy rates, the AHS and USPS have a similar distribution of long-term vacancy across the four Census regions, which is the only unit of geography reported for all observations in the AHS (see Table 5).

Table 5 shows the distribution of long-term vacant addresses across Census divisions in 2013 in the USPS data. For comparison, it also shows the distribution of occupied residential addresses. Long-term vacant property is somewhat more likely to be found in the East North Central, East South Central and South Atlantic, and correspondingly a little less likely to be found in the New England, Mid-Atlantic, and West. The bottom rows of the table shows that long-term vacant property is slightly more likely to be in rural counties, micropolitan counties, or outlying counties of metropolitan areas than in central counties of metropolitan areas.

To get a sense of whether long-term vacant housing is concentrated in certain metropolitan areas, Figure 5 plots the distribution of long-term vacancy rates across metropolitan areas in 2013. The long-term vacancy rate is defined as the number of long-term vacant addresses divided by the total number of residential addresses. Metropolitan areas with a very high long-term vacancy rate tend to be poor southern areas, like Birmingham, AL and Chattanooga, TN, as well as post-industrial areas like Flint, MI. Nevertheless, the distribution is

[14] On an unweighted basis, 0.4 percent of the AHS sample in 2011 was not interviewed (called a "type B" non-interview) because the interior of the home was exposed to the elements or occupancy was prohibited (possibly because the unit was condemned). The AHS does not provide weights for its non-interviewed sample. Units deemed unlikely to ever be inhabitable ("type C" non-interview) are not included in the publicly available data.

fairly concentrated; the standard deviation across metropolitan areas is only 2 percentage points, less than half of the average long-term vacancy rate of 4¾ percent. Moreover, the distribution of long-term vacancy rates across metropolitan areas is fairly symmetric with half above the mean and half below the mean. Thus, these data indicate that long-term vacancy is not highly concentrated in a small set of metropolitan areas.[15]

By contrast, long-term vacancy is highly concentrated by neighborhood. To illustrate, Figure 6 shows the distribution of long-term vacancy rates across Census tracts in 2013. The distribution is noticeably skewed to the right, with about two thirds of tracts below the mean and only one third above it. The standard deviation of long-term vacancy rates across tracts is 4¾ percentage points, more than twice the standard deviation of long-term vacancy rates across metropolitan areas. Clearly, long-term vacant housing units are concentrated in a small number of tracts that have a high long-term vacancy rate. For example, 13 percent of tracts have a long-term vacancy rate more than one standard deviation above the mean (the dashed line in Figure 6), and they account for 39 percent of the aggregate number of long-term vacant addresses. The median long-term vacancy rate in this group was 12 percent, which indicates that long-term vacancy is fairly common in this set of tracts.

Characteristics of Neighborhoods with High Long-Term Vacancy Rates

To understand why some neighborhoods have long-term vacancy rates that are so much higher than others, it is helpful to examine the characteristics of neighborhoods with high long-

[15] It may be somewhat surprising that more post-industrial metropolitan areas like Detroit and Cleveland do not have an appreciably high long-term vacancy rate. As I will discuss below, these metropolitan areas do have a substantial number of tracts with a high long-term vacancy rate. However, they also have many tracts with low long-term vacancy rates, causing the metropolitan-wide vacancy rate to be only modestly higher than average. This result is corroborated by Census population data. Even though a number of Census tracts in these metropolitan areas experienced severe population losses from 1990 to 2010 , the population of the entire metropolitan area only fell by 1 percent in Cleveland and rose by 1 percent in Detroit over this period.

term vacancy rates. To this end, I define a set of high long-term vacancy rate tracts as those with a long-term vacancy rate more than one standard deviation above the mean (i.e. more than about 9 percent). Based on their characteristics, I use principal component analysis to group the tracts with a high long-term vacancy rate into several types. Most of the information on tract characteristics is from the 5-year American Community Survey spanning 2008 to 2012:[16] housing unit density, fraction of housing units built from 2000 to 2009, fraction built prior to 1950, ln(median household income), ln(median house value), poverty rate, unemployment rate, fraction of adult population with less than a high-school degree, and fraction with a college degree or more. The remaining characteristics are from the 1990 and 2010 Census: ln(distance from metropolitan are center), non-seasonal vacancy rate in 1990, and population growth from 1990 to 2010.[17]

For ease of interpretation I express the following neighborhood characteristics relative to the metropolitan area average or median: distance to metropolitan center, housing unit density, median house value, and median income. Because these statistics cannot be calculated for tracts that are not in a metropolitan or micropolitan areas, tracts outside of these areas are dropped from this analysis. The dropped tracts account for 15 percent of the high vacancy rate tracts and their characteristics will be discussed separately below.

The principal component analysis identifies three components that have an eigen value greater than one, which is the standard cutoff used to identify meaningful groups in this type of analysis. Using the weights that each component places on each characteristic, I predict the value of each component for each tract. Then I assign each tract to a group based on its highest

[16] Both the USPS and ACS define tract boundaries using the 2010 Census definitions.
[17] I define the center of the metropolitan area using the internal point of the Census tract with the highest population density. The 1990 Census data are calculated for 2010 Census tract boundaries by Geolytics.

predicted component, with a fourth group that includes tracts that have a below-average predicted value for all three principal components. In this way, the analysis partitions the set of high long-term vacancy tracts into three groups that have similar characteristics and one residual category.

Table 6 reports summary statistics for the tracts in each group. The tracts in the largest group—which accounts for 40 percent of the non-rural tracts with a high vacancy rate—tend to be very far from the center of the metropolitan area, have a low density of housing units per square mile, have a large fraction of housing units built between 2000 and 2009, and experienced high population growth from 1990 to 2010. Thus, tracts in this group are likely neighborhoods on the periphery of metropolitan areas where large amounts of construction turned out not to be sustainable. Consequently, I will refer to these tracts as "housing boom" tracts. In fact, the non-seasonal vacancy rate of these tracts in 1990 was not much higher than that of tracts that did not have a high long-term vacancy rate in 2013, indicating that vacancy in these areas is a relatively recent phenomenon.[18] Unlike the other groups that will be discussed below, the "housing boom" neighborhoods do not have median incomes or house values that are substantially below the metropolitan median. Nor do they have unusually high unemployment or poverty rates.

An example of a tract that falls into the "housing boom" category is 1301180105, a tract near the northeastern border of the metropolitan area of Atlanta (in Barrow County). The population of this tract doubled from 1990 to 2010, and 28 percent of its housing stock was built from 2000 to 2009. Median income in this tract was 89 percent of Atlanta's median income,

[18] This statement also holds for the nonseasonal vacancy rate in 2000, which was 6.1 percent for the housing boom tracts and 3.8 percent for metropolitan tracts that did not have a high long-term vacancy rate in 2013. For parsimony, the vacancy rate in 2000 was not included in the principal component analysis.

while the poverty and unemployment rates were both around 7½ percent, much lower than the average poverty and unemployment rates in Atlanta more generally.

The next two groups of tracts are similar along many dimensions. They are frequently in dense neighborhoods close to the metropolitan center, and they tend to have low median incomes and high poverty and unemployment rates. They also had unusually high vacancy rates in 1990, indicating that vacancy in these areas has been a persistent issue. Despite these commonalities, they have a few notable differences. The tracts in the second group tend to have a large fraction of housing units built prior to 1950 and experienced large population declines from 1990 to 2010. Therefore I will refer to these tracts as "declining inner-city" neighborhoods. An example of a tract in this category is 42003111300, near the center of Pittsburgh, PA (in Allegheny County). It had a non-seasonal vacancy rate of 13½ percent in 1990, the population fell by 22 percent from 1990 to 2010, and 75 percent of housing units were built prior to 1950.

In the third group of tracts, the median population change between 1990 and 2010 was close to zero, and the housing stock is somewhat newer, with the median tract having only 23 percent of housing units built prior to 1950. Therefore I will refer to this group as "poor-but-stable inner-city" neighborhoods. An example of a tract in this group is 48201230400, near the center of Houston, TX. In this neighborhood, the population only fell about 3½ percent from 1990 to 2010, and 48 percent of the housing stock was built between 1950 and 1969. Yet it was still very poor: at $24,000, its median income was less than half that of Houston's median, and the median house value was 60 percent below that of Houston. Moreover, the poverty and unemployment rates were extremely elevated, at 36 percent and 13½ percent, respectively.

The residual set of tracts, which still account for 12 percent of long-term vacant tracts, tend to be a roughly average distance from the metropolitan center and have an average housing unit density relative to their metropolitan area. Thus, they appear to be in suburban areas. Like the "declining inner city" neighborhoods they have experienced large population declines and tend to have low median income, and high poverty and unemployment rates. Consequently I will refer to this group as "declining suburbs." An example of a tract in this group is 26163570800, in the southwest of Detroit, MI (in Wayne County). Consistent with a suburban nature, it is the same distance from the center of Detroit as the average tract in the metropolitan area, and 53 percent of the housing stock was built between 1950 and 1969. The population of this tract fell by 29 percent from 1990 to 2010, and the nonseasonal vacancy rate in 1990 was 14 percent. Its median income and house values were 60 percent and 50 percent, respectively, of Detroit's, and the poverty and unemployment rates were both around 28 percent.

The groups defined by principal component analysis depend, to some degree, on the characteristics included in the analysis. They also differ somewhat when alternate cutoffs are used to define high vacancy rate tracts or when different definitions of long-term vacancy are used. However, most specifications generally identify at least one group similar to the "housing boom" group, at least one group similar to the "declining inner-city" group, and at least one other group of suburban tracts. Therefore, this decomposition should be interpreted as a rough description of different types of neighborhoods that have high long-term vacancy rates, not as a definitive taxonomy.

Table 7 compares the characteristics of rural tracts that have a high long-term vacancy rate to other rural tracts. The high vacancy tracts tend to be less dense and had somewhat lower population growth from 1990 to 2010. They also display a number of characteristics that suggest

weaker economic conditions: median income and median house values are about 10 percent lower, and the poverty and unemployment rates are a few percentage points higher.

Thus far, I have emphasized the distribution of long-term vacancy across neighborhoods because the stock of long-term vacant housing is much more evenly spread across metropolitan areas. In fact, roughly two thirds of metropolitan areas have at least one out of 10 tracts with a high long-term vacancy rate. Nevertheless, there are some metropolitan areas with an unusually large number of high long-term vacancy tracts. Figure 7 illustrates this distribution by showing a map of metropolitan areas in the United States, where darker areas reflect a larger share of tracts with a high long-term vacancy rate. Most of the metropolitan areas with an unusually large share of high-vacancy tracts are in the South or Midwest, indicating that they are in areas with low incomes and/or low house values, as well as in post-industrial areas.

The first column of Table 8 describes the distribution of long-term vacancy across metropolitan areas in more detail by reporting coefficients from regressing the fraction of high long-term vacancy tracts in each metropolitan area on a set of metropolitan area characteristics. For ease of interpretation, all characteristics are normalized to have a mean of zero and a standard deviation of one. Consistent with the map, metropolitan areas with large amounts of long-term vacancy tend to have a low median house value and a high poverty rate. They also had a relatively large inventory of Real Estate Owned by banks (REO) relative to the housing stock in 2013, which is not surprising since most REO is unoccupied and may have been unoccupied for much of the foreclosure process.[19] Metropolitan areas with a large fraction of high long-term vacancy tracts tend to have experienced a larger-than-average increase in unemployment during the recent recession, but have a lower-than-average fraction of loans in

[19] The REO data are estimated by CoreLogic. CoreLogic's estimates add up to about half of the national inventory of REO as measured from banks' balance sheets. It is difficult to know whether the undercount in the CoreLogic data is more severe for some locations than others.

negative equity. Thus, the abundance of REO in these locations seems more closely related to poor economic conditions than to a severe housing market contraction.[20]

The remaining columns of the Table 8 report regressions where the dependent variable is the fraction of each type of high long-term vacancy tract. The housing boom tracts are more likely to be found in metropolitan areas with a low median house value, low employment growth in the previous three years, and a large share of manufacturing employment in 1979, indicating that they tend to be in post-industrial areas. Thus, these tracts are more likely to be found in metropolitan areas with weak labor demand, rather than booming areas like Dallas, TX or Washington, DC. They also tend not to be in areas with a large share of mortgages in negative equity, indicating that they are not likely to be in metropolitan areas that experienced an extreme housing market cycle. In other words, these tracts are likely to be in areas where the housing boom was concentrated in the periphery of the metropolitan area, not in areas that experienced a widespread boom in housing demand.

The declining inner city tracts also tend to be in metropolitan areas with low house values, but they tend to be in metropolitan areas with a very old housing stock. The characteristics of these areas are not consistent with substantial labor market weakness, suggesting that tracts may be losing population to suburban or exurban locations in the same metropolitan area, rather than being located in metropolitan areas with widespread declines in housing demand.[21]

[20] Consistent with this interpretation, the fraction of high long-term vacancy tracts is not larger in areas with larger drops in house prices during the housing market contraction (measured various ways using CoreLogic and Zillow data). The house price data are not included in the main specification because they are only available for 80 percent of the metropolitan areas in this sample.

[21] Although the coefficient on the change in unemployment from 2007 to 2010 is significant at the 5 percent level, the magnitude is small—a 1 standard deviation larger increase in unemployment is correlated with a 0.15 standard deviation larger fraction of declining inner-city neighborhoods.

The poor-but-stable inner city neighborhoods tend to be in metropolitan areas with low house values and high poverty rates. However, none of the other characteristics are suggestive of pervasive economic problems. One interpretation of this result is that these neighborhoods tend to be in metropolitan areas that are poor but expanding, and hence long-term vacancy in these neighborhoods may be related to shifts in housing demand within the metropolitan area rather than economic problems that extend to the entire metropolitan area. Finally, the declining suburban tracts tend to be in metropolitan areas with similar characteristics as the overall set of high-vacancy tracts, which is not surprising because it is a residual category made up of tracts that did not fall in any of the other three categories.

In summary, long-term vacant housing is concentrated in a relatively small set of neighborhoods that have high long-term vacancy rates. Such neighborhoods can be found in a variety of different types of neighborhoods and metropolitan areas, suggesting that there are multiple causes of long-term vacancy. For example, in the housing boom neighborhoods vacancy is likely related to overbuilding during the housing market expansion coupled with weak labor demand in the general area. By contrast, long-term vacancy in inner-city neighborhoods appears to be related to long-term shifts in the demand to live in specific neighborhoods within the metropolitan area rather than broad-based economic weakness.

Conclusion

Long-term vacancy is a relatively uncommon feature of vacant housing in the United States and can account for only a small portion of the rise in aggregate nonseasonal vacancy since the early 2000s. Thus, in the aggregate, the elevated level of vacancy in recent years does not appear to reflect an unusually large imbalance between housing supply and demand.

However, the long-term vacant stock is concentrated in a small number of neighborhoods that have extremely elevated long-term vacancy rates. In these neighborhoods, roughly 1 in 8 housing units have been vacant for an unusually long period of time, suggesting a substantial imbalance between demand and supply in these locations.

Unsurprisingly, neighborhoods with a high long-term vacancy rate are more commonly found in metropolitan areas with low house values and high poverty rates. Yet most metropolitan areas have at least a few neighborhoods with a high long-term vacancy rate. Consequently, long-term vacancy is an issue in at least a small portion of most metropolitan areas. The types of neighborhoods with a large share of long-term vacant property are quite heterogeneous, suggesting that long-term vacancy results from a variety of causes. For example, some high long-term vacancy neighborhoods seem to have suffered from declining demand for decades. In other cases, vacancy appears to be related to overbuilding during the housing boom.

One of the main contributions of this paper has been to show how duration of vacancy can be used to identify neighborhoods with an excess supply of housing. House price data are inadequate for this purpose both because it is difficult to measure house price changes for small geographic areas and because frictions in the housing market prevent house prices from fully adjusting to a drop in demand. By contrast, vacancy data by Census tract are available at a high frequency and on a timely basis, making them a useful supplement to any analysis of local housing market conditions.

Policymakers in some cities are acutely aware of issues related to long-term vacancy and have devoted resources toward tracking and reducing the inventory of vacant housing units in their area. For example, the "Vacants to Value" program in the city of Baltimore was designed to identify areas with a high concentration of vacant properties and determine the most

appropriate policy to deal with these properties. In some cities, such as Detroit and Cleveland, land banks assemble, temporarily manage, and dispose of vacant property for the purpose of stabilizing neighborhoods and encouraging redevelopment. However, many other cities do not have a method of measuring or managing vacant property. Yet the analysis in this paper shows that concentrations of long-term vacancy can be found in many different types of cities and neighborhoods across the US. Further research on the causes and effects of long-term vacancy would help communities and local policy makers determine whether policies aimed at tracking and reducing the long-term vacant stock would be useful and, if so, what types of policies might be most effective.

References

Apgar, William C., Mark Duda and Rochelle Nawrocki Gorey. 2005. "The Municipal Cost of Foreclosures: A Chicago Case Study" *Housing Finance Policy Research Paper* 2005-1.

Anenberg, Elliot. 2013. "Information Frictions and Housing Market Dynamics." *Finance and Economics Discussion Papers* 2012-48.

Genesove, D. and Christopher Mayer 2001. "Loss Aversion and Seller Behavior: Evidence From the Housing Market." *Quarterly Journal of Economics* 116(4): 1233-60.

Glaeser, Edward L. and Joseph Gyourko. 2005. "Urban Decline and Durable Housing." *Journal of Political Economy* 113: 345-75.

Goodman, John L. and John B. Ittner. 1992 "The Accuracy of Home Owners' Estimates of House Value." *Journal of Housing Economics* 2: 339-57.

Griswold, Nigel G. and Patricia E. Norris. 2007. "Economic Impacts of REsidneial Property Abandonment and the Genesee County Land Bank in Flint, Michigan." *MSU Land Policy Institute Report* 2007-05.

Guasch, J. Luis and Robert C. Marshall. 1985. "An Analysis of Vacancy Patterns in the Rental Housing Market." *Journal of Urban Economics* 17: 208-29.

Guren, Adam. 2014. "The Causes and Consequences of House Price Momentum." Mimeo.

Hartley, Daniel. 2013 "The Effect of Foreclosures on Nearby Housing Prices: Supply or Disamenity?" *Federal Reserve Bank of Cleveland Working Paper* 10-11R.

Immergluck, Dan and Geoff Smith. 2006. "The Impact of Single-family Mortgage Foreclosures on Neighborhood Crime," *Housing Studies* 21(6): 851-866.

Mikelbank, Brian A. 2008 "Spatial Analysis of the Impact of Vacant, Abandoned and Foreclosed Properties." Stud conducted for the Office of Community Affairs, Federal Reserve Bank of Cleveland.

Rosen, Kenneth T. and Lawrence B. Smith. 1983. "The Price-Adjustment Process for Rental Housing and the Natural Vacancy Rate." *American Economic Review* 73: 779-86.

Silverman, Robert Mark, Li Yin and Kelly L. Patterson . 2013. "Dawn of the Dead City: An Exploratory Analysis of Vacant Addresses in Buffalo, NY 2008-2010" Journal of Urban Affairs 35(2): 131-52.

United States Government Accountability Office. 2011 "Vacant Properties: Growing Number Increases Communities' Costs and Challenges," GAO-12-34.

Wheaton, William C. 1990. "Vacancy, Search and Prices in a Housing Market Matching Model. *Journal of Political Economy* 98: 1270-92.

Whitaker, Stephan and Thomas J. Fitzpatrick IV. 2013. "Deconstructing Distressed-Property Spillovers: The Effects of Vacant, Tax-Delinquent, and Foreclosed Properties in Housing Submarkets." *Journal of Housing Economics* 22(2) 79-91.

Table 1
Type of Vacancy in the 2010 Census

	Percent of Vacant Stock
For rent	27.6
For sale	12.7
Rented, awaiting occupancy	1.4
Sold, awaiting occupancy	2.8
Seasonal, recreational or occasional use	31.0
Other	24.5

Note. Author's calculations based on the 2010 Census.

Table 2
Length of Vacancy in the American Housing Survey
1989 to 2003

	0 to 5 months	6 to 11 months	12 to 23 months	24 to 35 months	36 to 59 months	60+ months
For rent	78.9	8.7	5.7	2.5	1.2	3.0
For sale	53.8	17.8	13.9	4.7	2.4	7.4
"Other" vacant	30.5	11.1	14.2	9.2	8.1	27.0
Seasonal/occasionally occupied	62.6	11.8	4.6	5.9	2.5	12.8
Rented/sold awaiting occupancy	73.0	9.7	8.1	2.8	2.0	4.5

Note. Author's calculations based on the American Housing Survey. Units with unknown or imputed duration are excluded. Duration of vacancy for units that were never occupied is calculated from year built.

Table 3
Reasons for "Other" Vacancy in 2012

	Percent of Other Vacant Units
Consistent with excess supply	
Needs repairs, renovations, or cleaning	13.8
Foreclosure	11.7
Legal proceedings	5.9
Possibly abandoned/to be demolished/condemned	6.6
Intended for year-round occupancy but vacant for 6 months or more	5.8
Not necessarily consistent with excess supply	
Personal/family reasons	19.7
Being repaired	9.3
Preparing to rent/sell	6.6
Held for storage	7.4
Used by a specific group of people at one or various times	1.9
Other/don't know	11.2

Note. Author's calculations based on the 2012 Housing Vacancy Survey.

Table 4
Physical Characteristics by Length of Vacancy for "Other" Vacant Housing Units
1989-2003

	0 to 3 months	4 to 11 months	12 to 23 months	24 to 35 months	36 to 59 months	60+ months
Area of peeling paint larger than 8x11	9.0	14.4	18.8	24.3	24.0	35.4
Open cracks in floors, walls or ceilings wider than a dime	10.9	17.6	21.9	26.9	26.7	37.7
Windows boarded up	4.6	6.8	13.2	13.3	15.2	22.2
Windows broken	7.4	12.2	14.7	19.1	21.0	26.5
Holes, open cracks, or crumbling in the foundation	4.0	7.3	10.7	10.7	14.0	17.7
Holes in the roof	2.7	4.9	6.5	7.4	9.1	13.6
Roof missing shingles/other roofing materials	6.0	10.9	12.0	15.9	15.7	24.1
Roof sags or is uneven	4.3	8.9	12.2	14.5	13.9	20.0
Outside walls missing siding, bricks or other materials	6.5	10.8	15.7	16.7	18.7	24.8
Outside walls slope, lean, buckle or slant	2.8	5.9	7.9	8.5	8.1	12.5
Holes in floor big enough to catch someone's foot	3.5	8.4	10.4	15.5	14.8	20.8
No hot and cold running water	2.3	5.3	8.6	13.7	14.2	26.7
Incomplete kitchen facilities	24.4	36.0	48.6	57.4	61.6	71.3
Not every room has a working electrical plug	3.7	4.3	9.0	10.9	12.2	18.2
Incomplete plumbing facilities	4.2	9.6	11.2	16.4	18.5	30.1
No working refrigerator	20.9	31.0	43.1	52.5	57.3	67.5
No flush toilet	2.4	4.4	6.3	8.5	9.6	17.1
No bathtub or shower	2.4	4.9	9.1	14.1	16.2	25.7
No heating equipment	2.4	2.4	5.5	12.6	14.7	18.0
Fraction of units with:						
At least 1 of the above	34.6	52.7	58.4	65.9	76.4	79.1
At least 3 of the above	14.1	29.0	33.8	43.6	50.5	60.7
At least 5 of the above	6.9	17.7	22.2	30.4	31.0	45.9
Fraction of units	34.5	11.8	13.9	8.2	7.7	23.9

Note. The sample includes all single-family, multifamily and mobile home units in the American Housing Survey that do not have imputed values of duration and that can be observed in the data for at least two prior surveys. Sample size varies by characteristic because some characteristics are only reported for single-family units.

Table 5
Geographic Distribution of Long-Term Vacant Addresses

	2011		2013 (USPS)	
	AHS	USPS	Long-Term Vacant	Occupied
By Census Division:				
Northeast	15.6	11.9		
New England			2.7	5.0
Mid-Atlantic			9.8	13.2
Midwest	27.6	29.1		
East North Central			20.6	16.5
West North Central			8.0	6.8
South	44.6	45.2		
South Atlantic			22.0	19.0
East South Central			11.2	6.3
West South Central			12.2	10.6
West	12.2	13.8		
Mountain			5.7	6.3
West			7.9	16.2
By Metropolitan Status				
Metropolitan, central county			72.2	82.9
Metropolitan, outlying county			8.7	6.3
Micropolitan			12.0	7.4
Rural			7.1	3.4

Note. Author's calculations from AHS microdata and tract-level USPS data. Long-term vacancy in the AHS is defined as units for rent vacant for 6 months or more, units for sale vacant for 12 months or more, and "other" vacant units vacant for 5 years or more. Long-term vacancy in the USPS is defined as vacant for 1 year or more or "no-stat" for 3 years or more.

Table 6
Characteristics of High Long-Term Vacancy Rate Tracts in Metropolitan Areas in 2013

	High Long-Term Vacancy Rate Tracts				Other Metropolitan Tracts
	Housing Boom	Declining Inner-City	Poor-But-Stable Inner City	Declining Suburb (Residual)	
Distance from MSA center relative to MSA average	1.47	0.29	0.38	0.74	0.78
Housing units per sq. mi. rel. to MSA density 2008-2012	0.72	15.8	13.1	6.0	5.2
% built 2000 to 2009	14.0	1.5	7.8	3.2	6.8
% built before 1950	11.3	65.6	23.0	38.3	10.5
Median household income rel. to MSA median 2008-2012	1.03	0.59	0.51	0.54	1.03
Poverty rate 2008-2012	13.2	30.1	38.2	34.7	10.6
Unemployment rate 2008-2012	8.9	15.1	16.8	19.9	8.1
% less than a high school degree 2008-2012	14.4	19.2	31.6	28.5	10.1
% college degree or more 2008-2012	16.6	13.3	8.3	6.8	26.8
Median house value relative to MSA median 2008-2012	0.92	0.59	0.55	0.48	0.96
Non-seasonal vacancy rate in 1990	6.6	9.9	13.9	8.1	4.9
Δln(population) 1990 to 2010	0.19	-0.18	-0.01	-0.14	0.10
Number of tracts	2365	1651	1250	696	44730

Note. All statistics are medians across tracts. Groups of high vacancy tracts are created using principal component analysis of all of the characteristics in the table. A tract is assigned to a group based on its largest predicted value of four components. Tracts with a below-average predicted value of all four components are in the residual group. Tracts have a high long-term vacancy rate if the fraction of addresses that were vacant for more than 2 years is more than 1 standard deviation above the mean. The long-term vacancy rate is calculated from USPS data. Characteristics in the first 10 rows are from the American Community Survey. Characteristics in the bottom 3 rows are from the 1990 and 2010 Census using fixed tract boundaries as calculated by Geolytics.

Table 7
Characteristics of High Long-Term Vacancy Rate Tracts in Rural Areas in 2013

	High Long-Term Vacancy	Other Tracts
Housing units per sq. mi. 2008-2012	20.4	32.8
% built 2000 to 2009	7.7	9.0
% built before 1950	20.0	23.7
Median household income 2008-2012	36,661	40,278
Poverty rate 2008-2012	19.3	16.5
Unemployment rate 2008-2012	9.4	8.2
% less than a high school degree 2008-2012	19.9	16.1
% college degree or more 2008-2012	12.8	14.4
Median house value 2008-2012	81,400	95,000
Non-seasonal vacancy rate in 1990	9.1	7.5
Δln(population) 1990 to 2010	0.01	0.05
Number of tracts	712	1283

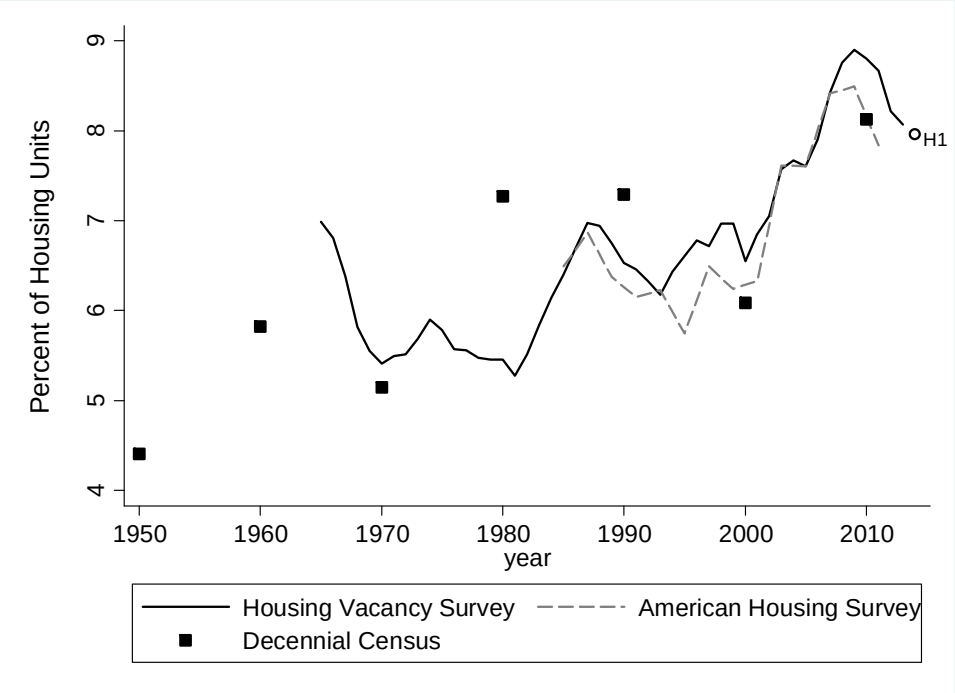
Note. All statistics are medians across tracts. Characteristics in the first 9 rows are from the American Community Survey. Characteristics in the bottom f3 rows are mostly from the 1990 and 2010 Census using fixed tract boundaries as calculated by Geolytics.

Table 8
MSA-Level Correlates of High Long-Term Vacancy in 2013

	% All High Long-Term Vacant Tracts	% Housing Boom	% Declining Inner-City	% Poor-But-Stable Inner-City	% Declining Suburb
Ln(median house value) 2012	-5.30**	-1.87**	-1.83**	-1.25**	-0.33
	(0.72)	(0.46)	(0.28)	(0.28)	(0.17)
Manufacturing emp. share 1979	0.74	1.23**	-0.44	-0.45	0.66**
	(0.71)	(0.45)	(0.24)	(0.28)	(0.17)
Δln(employment) 2009 to 2012	-0.87	-1.21**	-0.03	0.28	0.18
	(0.64)	(0.41)	(0.25)	(0.25)	(0.15)
Δ unemployment rate 2007 to 2010	1.83*	0.84	0.79*	-0.21	0.50*
	(0.83)	(0.53)	(0.32)	(0.22)	(0.20)
Poverty rate 2012	2.22**	0.19	0.01	1.25**	0.49**
	(0.75)	(0.48)	(0.29)	(0.29)	(0.18)
% Built pre-1950	-0.56	-2.39**	2.92**	-1.16**	0.01
	(0.72)	(0.46)	(0.28)	(0.28)	(0.17)
REO inventory / housing stock 2013	2.11**	1.10*	0.32	-0.41	0.71**
	(0.77)	(0.49)	(0.30)	(0.30)	(0.18)
% loans in negative equity 2013	-3.70**	-2.80**	-0.37	0.15	-0.53**
	(0.83)	(0.53)	(0.32)	(0.32)	(0.20)
Constant	16.2**	7.13**	3.50**	3.54**	1.55**
	(0.57)	(0.36)	(0.22)	(0.22)	(0.14)
Adjusted R^2	0.38	0.27	0.39	0.27	0.25
# Observations	349	349	349	349	349
Sd(dependent variable)	13.4	7.9	5.3	4.8	2.9

Note. The first column reports the results of regressing the fraction of high long-term vacancy tracts by metropolitan area on the MSA characteristics shown in the rows. The sample is restricted to MSAs with more than 10 tracts. The remaining columns report similar regressions where the dependent variable is the fraction of each type of long-term vacant tract. All independent variables are scaled to have a mean of zero and standard deviation of 1. The share of manufacturing employment is derived from County Business Patterns. The REO inventory and percent of loans in negative equity are calculated by CoreLogic. Employment growth is from the Bureau of Economic Analysis. The remaining variables are from the 2012 American Community Survey. All variables use the 2009 definitions of metropolitan areas. ** and * indicate significance at the 1% and 5% levels, respectively.

Figure 1
Aggregate Non-Seasonal Vacancy Rate



Note. Author's calculations from the Decennial Census, Housing Vacancy Survey (HVS) and American Housing Survey. Seasonal and occasionally-occupied housing units are excluded from the numerator and denominator. The hollow dot reports the average vacancy rate in the HVS in the first half of 2014.

Figure 2
Vacancy as Excess Supply in the Housing Market

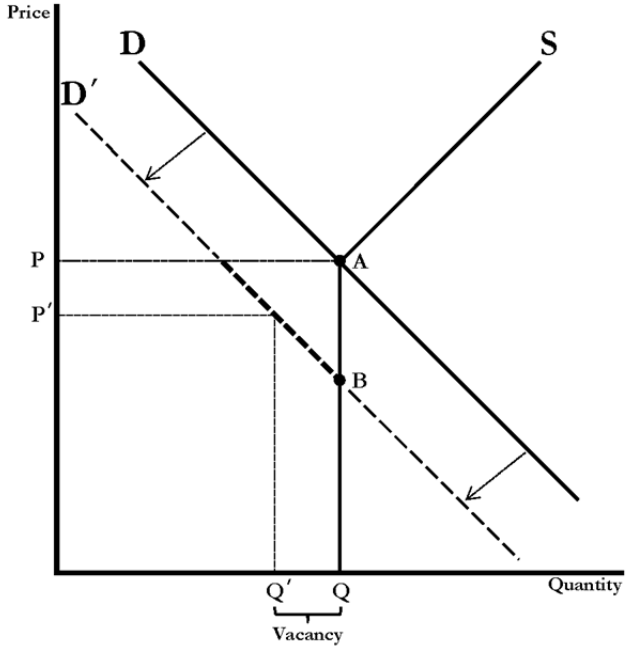
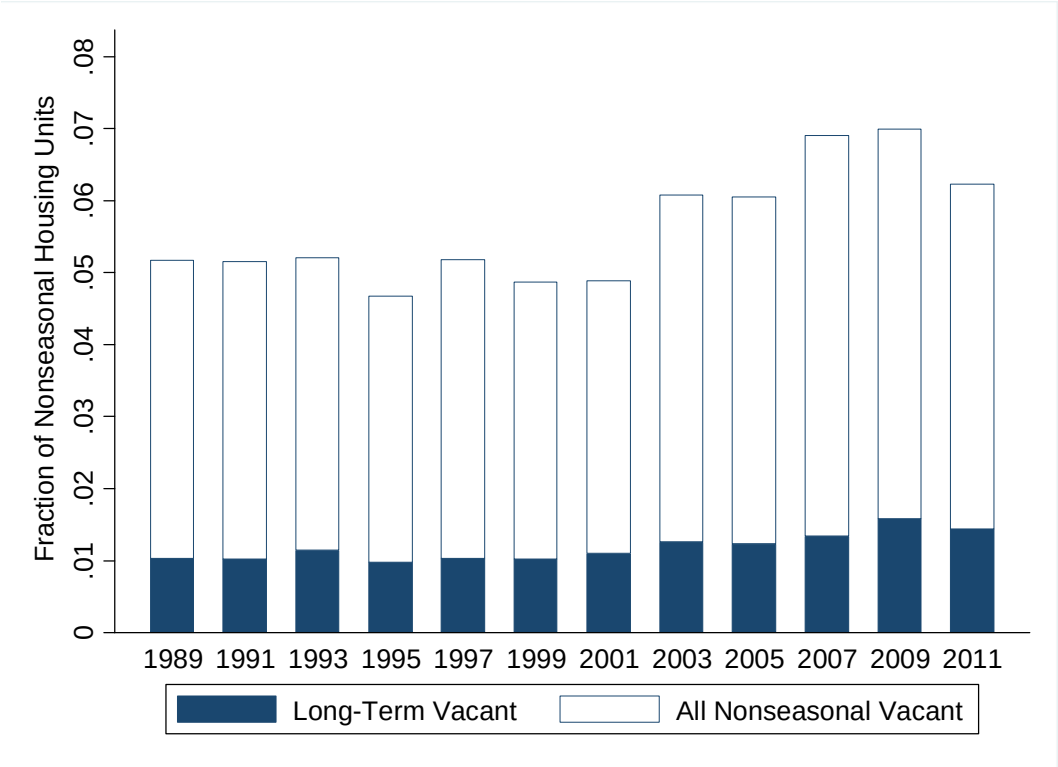
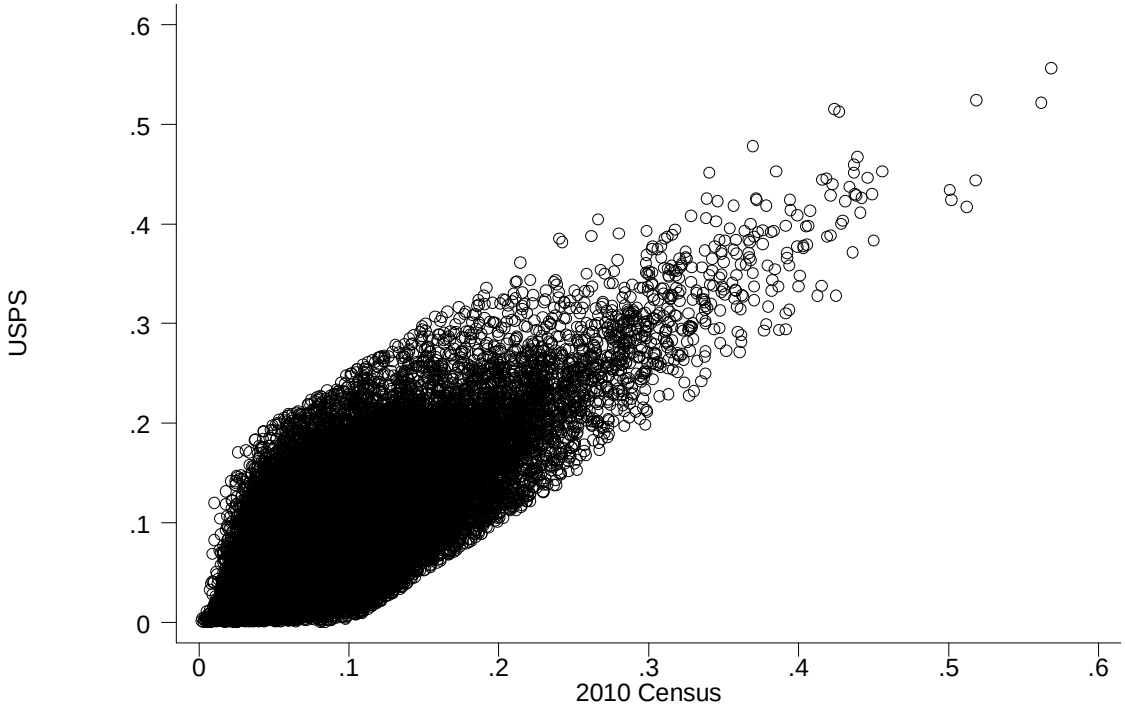


Figure 3
Long-Term Vacancy Over Time



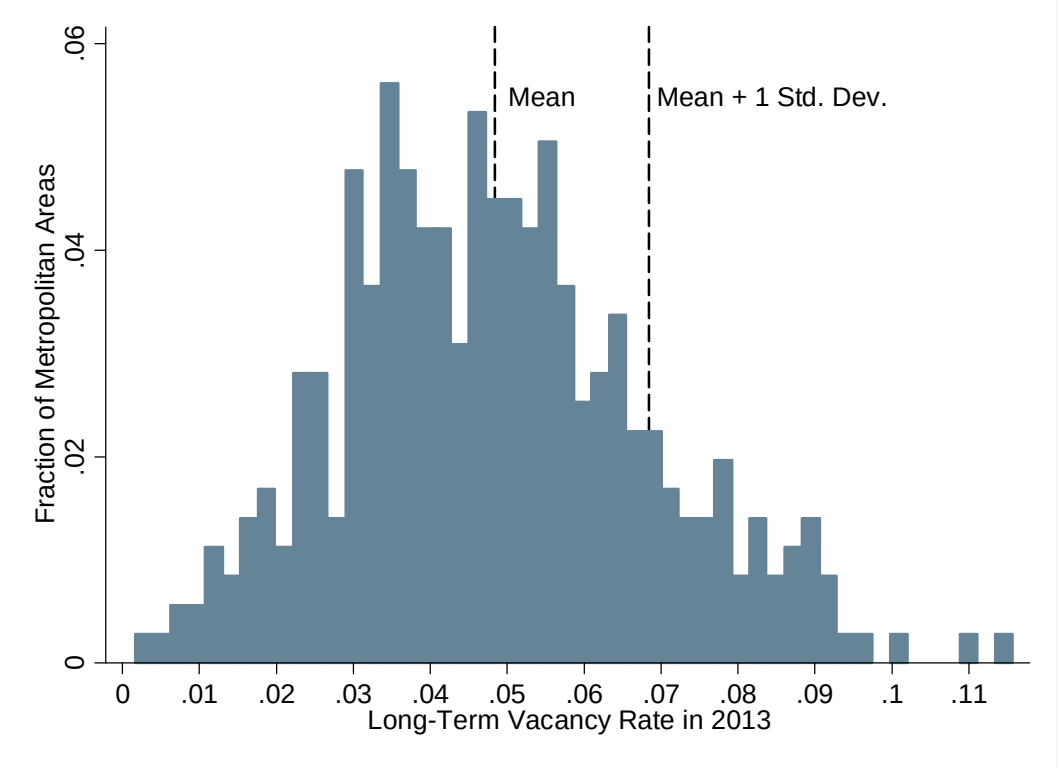
Note. Author's calculations from the American Housing Survey. Long-term vacancy is defined as units vacant for longer than 6 months in the for-rent category, vacant for longer than 12 months in the for-sale category, and vacant for longer than 5 years in the "other" category.

Figure 4
Vacancy by Tract in USPS and 2010 Census



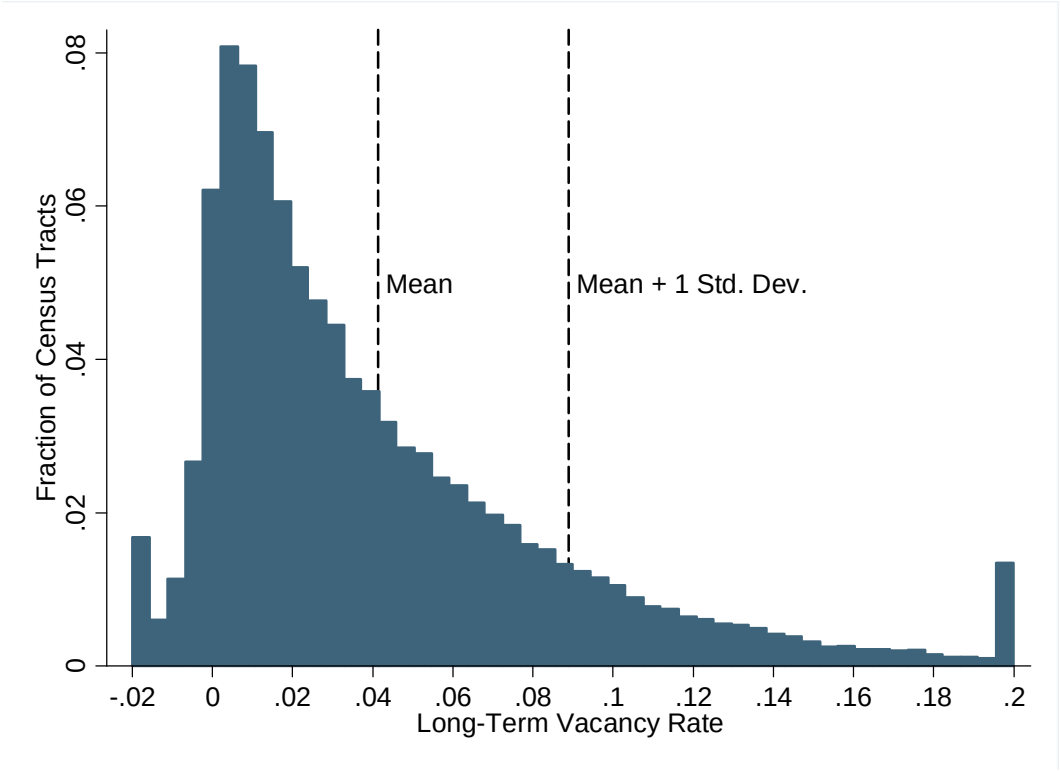
Note. Author's calculations based on tract-level data from the US Postal Service and 2010 Census. Sample is limited to tracts that satisfy the following five criteria: number of USPS addresses within 15 percent of the number of housing units in the 2010 Census, USPS vacancy rate not more than 10 percentage points less and not more than 15 percentage points more than the vacancy rate in the 2010 Census, share of seasonal housing units in the 2010 Census less than 10 percent, more than 500 USPS addresses, and growth in USPS addresses from 2009 to 2013 less than 50 percent.

Figure 5
Distribution of Long-Term Vacancy Rates Across Metropolitan Areas in 2013



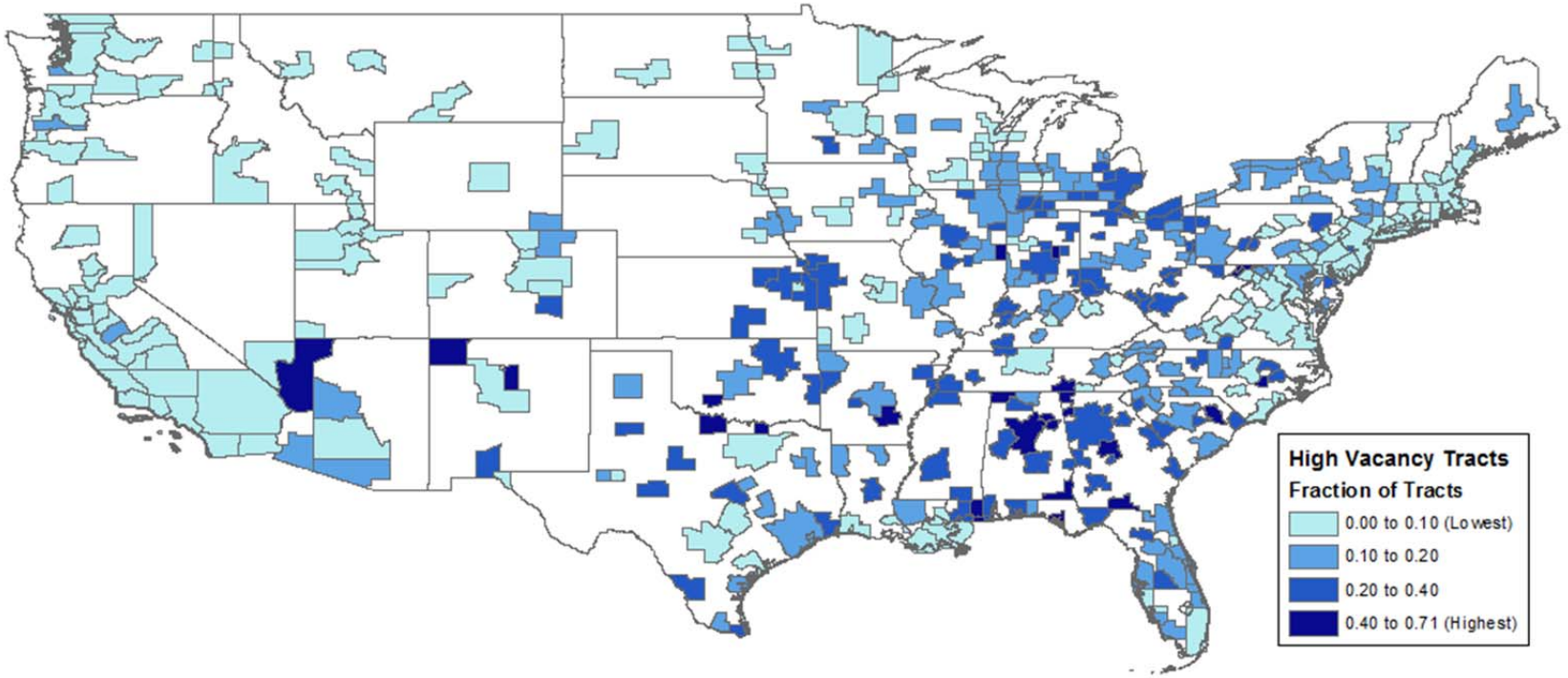
Note. Author's calculations based on tract-level data from the US Postal Service. Tracts with a high share of seasonal housing in the 2010 Census or a considerably different vacancy rate from the 2010 Census are excluded. See text for details.

Figure 6
Distribution of Long-Term Vacancy Rates Across Tracts in 2013



Note. Author's calculations based on tract-level data from the US Postal Service. Tracts with a high share of seasonal housing in the 2010 Census or a considerably different vacancy rate from the 2010 Census are excluded. See text for details. Locations with a negative vacancy rate are those that have more seasonal housing in the 2010 Census than long-term vacant addresses in the USPS data.

Figure 7
Fraction of Tracts with a High Long-Term Vacancy Rate in 2013



Note. Author's calculations based on USPS vacancy data. A tract has a high long-term vacancy rate if its long-term vacancy rate is more than 1 standard deviation above the mean in the distribution of Census tracts. Long-term vacancy is defined as vacant for 1 year or more or "no-stat" for 3 years or more.