Neighborhood Affordability and Housing Market Resilience

Kyungsoon Wang

Dan Immergluck

Follow this and additional works at: https://scholarworks.gsu.edu/urban_studies_institute

Part of the Urban Studies and Planning Commons

Recommended Citation
https://scholarworks.gsu.edu/urban_studies_institute/40

This Article is brought to you for free and open access by the Urban Studies Institute at ScholarWorks @ Georgia State University. It has been accepted for inclusion in USI Publications by an authorized administrator of ScholarWorks @ Georgia State University. For more information, please contact scholarworks@gsu.edu.
Neighborhood Affordability and Housing Market Resilience

Kyungsoon Wang & Dan Immergluck

To cite this article: Kyungsoon Wang & Dan Immergluck (2019): Neighborhood Affordability and Housing Market Resilience, Journal of the American Planning Association, DOI: 10.1080/01944363.2019.1647793

To link to this article: https://doi.org/10.1080/01944363.2019.1647793
Neighborhood Affordability and Housing Market Resilience
Evidence From the U.S. National Foreclosure Recovery

Kyungsoon Wang  Dan Immergluck

ABSTRACT
Problem, research strategy, and findings: Although many researchers have examined factors associated with vulnerability to foreclosure, few have investigated the role neighborhood affordability plays in foreclosures in metropolitan areas. In this study, we examine the effects of location affordability (i.e., housing and transportation affordability combined) on resilience to foreclosure in more than 300 U.S. metropolitan areas during the U.S. housing recovery period. Using hierarchical linear regression with changes in zip code–level home foreclosure rates, our findings suggest the relationship between affordability and foreclosure resilience varies according to urban form (central/high-density city versus suburban low-density area) and types of metropolitan housing markets (boom–bust versus strong versus weak). In the national analysis, where location affordability was high, home foreclosure rates dropped substantially in central/high-density areas but not in suburban low-density areas. When we disaggregated the zip codes according to the market type, location affordability contributed to recovery in central cities in strong and weak metros and in the suburbs of boom–bust metros. There was no positive association in the suburbs of strong and weak metros. With improved data, future studies could measure an association between affordability and lower income renter households.

Takeaway for practice: Our study of the affordability crisis that followed the foreclosure crisis shows that planners can foster resilient and affordable housing markets by expanding and densifying affordable neighborhood locations and considering interactions between the costs of housing and transportation. Planners can improve neighborhood affordability with local and regional strategies based on the local residential density and the type of metropolitan housing market.

Keywords: foreclosure, housing affordability, location affordability, resilience, urban form

The housing boom and bust of the 2000s and the resulting foreclosure crisis had a serious negative impact on the U.S. economy and many metropolitan housing markets. After the Great Recession, the affordability crisis in the housing market persisted in many U.S. cities as housing cost burdens increased while incomes remained stagnant. Housing affordability, however, is not the only component of neighborhood affordability. The tradeoff between housing and transportation costs and the combination of these costs, referred to as location affordability, may have been important in determining neighborhood resilience and recovery during and after the housing crisis.

Researchers have not reached a consensus about the effects of location affordability on neighborhood resilience. Some have argued that accessibility to rail stations led to greater housing market resilience by sustaining home values through the recession and helping values recover quickly after the crisis. After all, proximity to stations encourages less dependence on cars, reducing the cost burdens on nearby households, which may have helped them meet expenses and avoid home foreclosure (Welch, Gehrke, & Farber, 2018). Conversely, some have found little association between location vis-à-vis transit stations and cost savings on housing and transportation (Smart & Klein, 2018).

In this study, our goal is to identify the relationship between location affordability and resilience to foreclosure by examining changes in zip code–level foreclosure rates in more than 300 metropolitan areas from 2011 to 2014 across different urban forms (central/high-density and suburban low-density zip codes) and across different types of metro housing markets (boom–bust, strong, and weak markets). We find the association between greater location affordability and more resilience varies according to urban...
form and market types. In the national analysis, where location affordability was high, foreclosure rates dropped substantially in central cities and higher density areas but not in lower density suburbs. In central cities, more low-cost public transit networks with dense urban amenities might have reduced auto dependency, resulting in more effective and accessible location affordability. After disaggregating the zip codes according to the market types, we find location affordability helped minimize foreclosure rates in central cities in strong and weak metros and in the suburbs of boom-bust metros. Because affordable suburban locations may have been attractive to homebuyers and investors, foreclosed homes were easily absorbed back into the market. However, we find no positive association between location affordability and resilience in suburbs in strong and weak metros, possibly resulting from data limitations in the U.S. Department of Housing and Urban Development (HUD) affordability index or a lack of sufficient transit or dense, walkable locations.

The important takeaway for planners is that densifying and expanding affordable locations is important in fostering resilient and affordable housing markets. We conclude by recommending that in central/high-density locations, creating incentives for supplying dense affordable housing near transit stations can increase location affordability, and that in low-density suburbs, modifying land use regulations to provide for denser housing (which may then enable more transit) can promote resilient housing and transportation infrastructures.

Understanding Neighborhood Affordability and Resilience

Housing and Location Affordability

Housing has been viewed as a “platform” for social and economic opportunities (Cunningham & MacDonald, 2012), and housing and neighborhood location represent a bundle of goods and services that proffer advantages to households. One key advantage of some locations is housing affordability, and another is access to affordable transportation. Studies on housing affordability have focused on the direct costs of housing and the incomes of households, but transportation costs can also be an important attribute indirectly influencing housing affordability (Fisher, Pollakowski, & Zabel, 2009; Linneman & Megbolugbe, 1992).

Recognizing the likely importance of the cost of transportation as a major component of the household budget, in 2006, the Center for Neighborhood Technology and the Center for Transit Oriented Development established the Housing + Transportation Affordability Index, which estimates the affordability of a location based on the combined costs of housing and transportation relative to income. This index is based on the concept of the location-efficient mortgage: Homebuyers could afford to pay expensive mortgages if they lived near public transit and saved transportation costs (Holtzclaw, Clear, Dittram, Goldstein, & Haas, 2002). Then, in 2013, HUD updated the index and created the Location Affordability Index, a standardized index of the measure of affordability for a location estimated from the household housing and transportation costs incurred by owners and renters of eight household types (HUD, 2017).

HUD provides separate housing, transportation, and location affordability indices. The “housing affordability index” is a measurement of the share of income spent on housing expenditures. The traditional measurement of housing affordability is that no more than 30% of household income should be spent on housing costs. The Location Affordability Index is the housing plus transportation share of total household expenditures. Location affordability refers to cases in which households spend no more than 45% of their income on housing and transportation combined in a given location (HUD, 2017, 2019). Thus, transportation expenditures that exceed 15% of income would create an excessive burden if a household were at the 30% of income threshold for their housing expenses.

The Center for Neighborhood Technology and other agencies estimate the Location Affordability Index using structural equation models that predict housing and transportation costs at the block group level. Housing costs represent the average expenditures on housing, including mortgage payments by homeowners and utilities. The index calculates transportation costs as the sum of the estimated costs of auto ownership, auto use, and transit use. In this equation, auto ownership serves as a proxy for the fixed costs of owning vehicles and is calculated by dividing the aggregate number of vehicles by the number of occupied housing units for each block group. Auto use represents the variable cost, such as gasoline price, which depends on vehicle miles traveled, and transit use reflects any alternative mode of transportation for commuting to work. Studies have found auto ownership is a strong, negative predictor of transit use, and that household density reduces auto ownership and increases transit use (Haas, Makarewicz, Benedict, & Bernstein, 2008; Haas, Newmark, & Morrison, 2016). These studies suggest dense land uses tend to reduce the cost of owning and operating a car and increase the likelihood of commuting by transit, which reduces overall transportation costs.
Although housing generally entails regular expenses, transportation entails a variety of irregular expenses. Thus, capturing all transportation costs and collecting comparable data across the United States presents a challenge. In addition, the data and measurements of the Location Affordability Index have raised concerns regarding the reliability of their variables and possible aggregation bias (Ganning & Tighe, 2017). Nonetheless, the widely used HUD Location Affordability Index is the best available data on location affordability. The comprehensive and uniform application of this index enabled us to conduct comparative analyses by measuring “relative” affordability of various types of markets across the United States.

**Location Affordability, Neighborhood Resilience, and Residential Density**

As households encounter tradeoffs between housing and transportation costs, combining these costs is a reasonable approach to studying affordability. Alonso (1964), Mills (1967), and Muth (1969) use the ratio of commuting cost to housing consumption to explain residential mobility in terms of location. They find residents who place more value on neighborhoods with more land tend to move to areas with lower housing costs but higher transportation costs (e.g., suburbs), whereas those who place more value on neighborhoods close to workplaces tend to move to cities with higher housing costs and lower transportation costs. Traditional models consider monocentric cities, but contemporary metro areas are more complicated; thus, the tradeoff between them may not be that simple. As a result, studies pertaining to the relationship between affordability and resilience have produced inconsistent findings.

Several studies find evidence that neighborhoods with higher location affordability (e.g., housing with proximity to rail transit locations) may promote neighborhood resilience in housing markets. For example, in Atlanta (GA), Baltimore (MD), and Portland (OR), homes near transit-oriented submarkets retained and recovered their home values more quickly during the housing recovery (Welch et al., 2018). Similarly, during and after the housing crisis in Atlanta, transit-oriented development areas with compact and mixed land use and pedestrian-friendly environments exhibited higher resilience in home values than did areas without such transit facilities (Zhang, Wang, Barchers, & Lee, 2018). In the Chicago (IL) metropolitan area, investors were more likely to purchase real estate–owned (REO) properties with more affordable transportation options after the foreclosure crisis (McMillan & Chakraborty, 2016).

Neighborhoods near transit stations tended to be more resilient to economic shock because they retained home values and rapidly absorbed foreclosed homes during and after the housing crisis.

Other studies, however, find that accessibility and lower transportation costs are not associated with housing and transportation savings. A national study by Smart and Klein (2018) finds those who moved from the suburbs to transit-rich neighborhoods in the United States before and after the foreclosure crisis from 2003 to 2013 saw no cost savings, possibly because higher income households migrated to central cities to pursue urban amenities rather than to save on transportation costs. Evidence also shows Atlanta has undergone gentrification, which has led to several changes, such as a decrease in the number of public transit users and an increase in the number of automobile users. Conversely, in the Atlanta suburbs, the number of transit users increased, whereas that of car users decreased, possibly the result of the suburbanization of poverty (Wang & Woo, 2017). Another national study finds lower income residents in U.S. neighborhoods with better location affordability did not experience lower mortgage defaults (Kaza, Riley, Quercia, & Tian, 2016).

Some comparative studies suggest the relationship between affordability and resilience may vary among cities and regions. A study finds residents in areas with greater walkability and multifamily housing have a lower risk of mortgage defaults than those in areas with high auto dependency (Pivo, 2014). Another study demonstrates that, compared with residents of low-density suburbs, residents of compact cities drive shorter distances and walk more (Khattak & Rodriguez, 2005). Similarly, people living near transit stations drive less in high-density areas (Chatman, 2013) and more in low-density areas (King, Smart, & Manville, 2019). These studies confirm that less auto dependency and shifts to non-auto transportation modes can reduce transportation costs and that in dense cities, where multimodal transportation options are greater, transportation costs are more affordable.

**Locations, Foreclosures, and Metropolitan Housing Market Resilience**

Studies that examine the association between central city or suburban locations and the foreclosure crisis have inconsistent results. During the 2007 crisis, some researchers find higher foreclosures in the suburbs (Mayer & Pence, 2008), some in the exurbs (Ong & Pfeiffer, 2008), and some in both cities and suburbs (Lehnert & Grover, 2008).
Some national studies find city–suburban locations were not dominant factors affecting the growth in foreclosures during the crisis, once controlling for other neighborhood characteristics and subprime lending levels (Immergluck, 2010a, 2011). During the 2006 to 2008 period, the central cities of the 75 largest metropolitan areas tended to accumulate more home foreclosures than the suburbs. After controlling for high-risk lending, however, central city and suburban locations had no influence on the increasing number of REO properties (Immergluck, 2010a). A follow-up study analyzes REOs in the entire United States and concludes high levels of foreclosed properties were located in both cities and suburbs (Immergluck, 2011).

One of us (Immergluck, 2010a, 2011) uses metropolitan typologies to examine the dynamics of housing markets and finds that neighborhoods in both the central cities of traditionally weak markets and the suburbs of boom–bust markets were hit hardest by the foreclosure crisis. In an earlier study, we (Wang & Immergluck, 2019) classify the 50 largest metropolitan areas into three types during the recovery from 2011 to 2014 and find that long-term vacant properties, which were mostly the products of home foreclosures, were highly concentrated in the deteriorated urban cores of weak-growth metropolitan areas, whereas they were only somewhat more concentrated in the outer boundaries of strong-growth metropolitan areas.

Because the literature suggests the association between locational factors and resilience to foreclosure differs across and within metropolitan housing markets, analyses of affordability and housing market resilience should account for residential density and housing market types that follow diverse paths of the housing boom–bust recovery.

Our Research Approach

We conducted a detailed comparative study of location affordability and resilience within and across U.S. metropolitan areas to answer the following questions:

- Was location affordability more strongly associated with neighborhood resilience in central/high-density cities than in more suburban, low-density areas?
- Did this association differ across metropolitan housing market types experiencing different boom–bust/recovery trajectories?

We hypothesized that location affordability contributes to the resilience of housing markets: In general, greater location affordability is likely associated with a higher level of resilience, which in this case is measured by a larger drop in the home foreclosure rate. The effects of location affordability, however, may vary according to central city–suburban location and metropolitan housing market type.

The Link Between Resilience and the Housing Market

A number of studies present a theoretical background related to geographic resilience, but only a few apply an empirical approach to examine resilience at the neighborhood level. Early studies on neighborhood revitalization and gentrification following an economic downturn (e.g., Galster & Peacock, 1986; Glaeser & Gottlieb, 2006; Hackworth, 2001) may be most closely related to neighborhood resilience, the study of which uses indicators of neighborhood change. Recently, studies on neighborhood resilience following the Great Recession also use indicators such as socioeconomic and physical dimensions and find that neighborhoods with a high quality of life were more resilient to the foreclosure crisis (Delmelle & Thill, 2014) and that lower income and minority neighborhoods were more vulnerable (William, Galster, & Verma, 2013b).

We define housing market resilience as “the ability of a neighborhood or a region to maintain or bounce back to its preexisting housing market system from external shocks through neighborhood changes in socioeconomic, mortgage and housing, physical, and political characteristics” (Wang, 2018). The home foreclosure rate is an appropriate indicator of neighborhood vulnerability (William, Galster, & Verma, 2013a), and a reduction in home foreclosures is one way to measure resilience in the face of a foreclosure crisis.

We use changes in foreclosure rates as one indicator of housing market resilience. High resilience can be determined by lower vulnerability (Holling, 1986). Thus, we equate greater reductions in foreclosures with more highly resilient neighborhoods (i.e., foreclosure resilience) during the housing recovery period. To assess foreclosure resilience during the relatively short term, we compare resilience by determining whether some neighborhoods are more (or less) resilient to shocks than others across types of housing markets.

We use hierarchical linear methods consistent with the panarchy model of resilience, which suggests the interconnection of neighborhood and regional resilience. Both types of resilience follow the same trajectory, which shows that events on a small scale occur relatively quickly, whereas those on a large scale proceed more slowly (Holling & Gunderson, 2002). A more detailed explanation of hierarchical linear methods is provided in the Technical Appendix.
To measure foreclosure resilience in the analyses, we identify a recovery phase as the last phase of the adaptive cycle, which consists of four phases of development: rapid growth (exploitation), stasis (conservation), shock (release), and renewal (reorganization; Holling, 1986). We examine the foreclosure trajectory shown in Figure 1 because fewer foreclosures is a measure of high resilience during the renewal (reorganization) phase (Holling, 1986).

The dotted line in Figure 1 represents the housing price index (HPI), which we normalize setting the index value for January 2000 at 100. In 2006, home prices, which had previously been increasing, began to decrease and fell to their lowest levels by 2011. Since mid-2011, home values have exhibited an upward trajectory. The solid line presents the foreclosure trajectory at the national level. Between August 1992 and August 2007, foreclosure rates were less than 1%, with the lowest level at 0.38% in 2005. After 2005, foreclosure rates began to increase, exceeding 1% in November 2007, 3% in June 2009, and reaching a peak of more than 4% in October 2011. Afterward, the rate decreased to less than 3% in June 2013 and 1.78% in August 2014. Thus, we consider August 2011 to August 2014 to be the foreclosure recovery (reorganization) phase.

Examining the Relationship Between Affordability and Resilience

Measuring Resilience in the Housing Market

We use hierarchical linear methods to estimate the effects of zip code–level and metropolitan-level observations simultaneously (see the Technical Appendix for details). Because we consider changes in foreclosure rates an indicator of resilience, and because the end of the study period was August 2014, when the housing market had not yet reached full recovery, we measure foreclosure resilience as follows: A decline in home foreclosures in zip codes indicates higher resilience. We obtained foreclosure data from Black Knight, the largest mortgage market database in the United States. It includes prime, near-prime, and subprime loans collected from the top 10 mortgage servicers and 18 firms that collect mortgage payments for investors and lenders, including Fannie Mae, Freddie Mac, Ginnie Mae, and privately securitized loans.

Selecting Variables for Examining Location Affordability and Resilience to Foreclosures

To predict changes in foreclosure rates, we selected a number of explanatory variables at the zip code and metropolitan levels. Table 1 presents descriptions and rationales for the selected variables.

We include location affordability as a key variable at the zip code level. If the initial conditions of zip codes were stable before the crisis, we expected housing markets would be more resilient with more rapidly falling foreclosure rates (Wang, 2019); thus, we hypothesized that greater location affordability (lower housing and transportation combined) in 2011 contributed to a greater reduction in foreclosure rates from 2011 to 2014. We used the HUD Location Affordability Index for median-income, owner-occupied households because it is more robust for estimating housing costs for homeowners (Ganning & Tighe, 2017), who are the ones subject to foreclosure.
### Table 1

**Description and rationale of selected variables.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Explanation/rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable (zip code level)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreclosure</td>
<td>Change in foreclosure rate of zip code from 2011 to 2014</td>
<td>Foreclosure is representative of neighborhood vulnerability, which is the opposite of resilience. Denominator used is mortgage loan in zip code.</td>
</tr>
<tr>
<td><strong>Affordability variables (zip code level)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing affordability index</td>
<td>The share of income spent on housing expenditures in zip code</td>
<td>Housing costs &lt;30% of income are considered affordable (HUD, 2019). Housing expenditures include monthly payments and utilities.</td>
</tr>
<tr>
<td>Transportation affordability index</td>
<td>The share of income spent on transportation expenditures in zip code</td>
<td>Transportation costs &lt;15% of income are considered affordable. Transportation expenditures are estimated costs of auto ownership, automobile use, and transit use (Haas et al., 2008, 2016).</td>
</tr>
<tr>
<td>Location Affordability Index</td>
<td>The share of income spent on housing plus transportation expenditures in zip code</td>
<td>Housing plus transportation costs &lt;45% of income are considered affordable (HUD, 2017). A lower index value indicates a more affordable location, and a higher index value indicates a higher cost burden.</td>
</tr>
<tr>
<td><strong>Socioeconomic variables (zip code level)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African Americans</td>
<td>Percentage of African Americans in zip code</td>
<td>Zip codes with a high share of African Americans were less resilient to the U.S. foreclosure crisis (Wang &amp; Immergluck, 2019) regardless of income level (Wang, 2019). Minority and lower income groups, who were targeted by subprime and predatory lenders, suffered a concentration of subprime lending and consequent foreclosures (Massey, Rugh, Steil, &amp; Albright, 2016; William et al., 2013b).</td>
</tr>
<tr>
<td>Hispanics</td>
<td>Percentage of Hispanics in zip code</td>
<td>Zip codes with a high share of Hispanics were resilient to the U.S. foreclosure crisis, particularly in the boom–bust market (Wang &amp; Immergluck, 2019), except for those in the lower income group, which was vulnerable to the crisis (Wang, 2019).</td>
</tr>
<tr>
<td>Asians</td>
<td>Percentage of Asians in zip code</td>
<td>Zip codes with a high share of Asians were more resilient in the aftermath of the U.S. foreclosure crisis (Wang &amp; Immergluck, 2019) regardless of income level (Wang, 2019).</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Explanation/rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immigrants</td>
<td>Percentage of immigrants (foreign born/total population) in zip code</td>
<td>Zip codes with a high share of immigrants were resilient to the U.S. crisis in the short term but not in the long term (Wang, 2019)</td>
</tr>
<tr>
<td>Poverty</td>
<td>Percentage of people below the poverty line in zip code</td>
<td>Zip codes with a high share of poverty households were less likely to be resilient to regional economic changes (Galster, Quercia, Cortes, &amp; Malega, 2003; Immergluck, 2010a)</td>
</tr>
<tr>
<td>Income</td>
<td>Median family income in zip code</td>
<td>Zip codes with a high share of lower income populations were less resilient to the U.S. foreclosure crisis (Wang, 2019)</td>
</tr>
</tbody>
</table>

**Mortgage market variables (zip code level)**

- Conventional loans: Percentage of conventional loans in zip code
  - Conventional loans were predictors of neighborhood resilience during the housing recovery (Wang, 2016, 2019)

- Low-cost loans: Percentage of low-cost loans in zip code
  - Though high-cost loans were major predictors of vulnerability to foreclosures in neighborhoods during the crisis (Bocian, Li, Reid, & Quercia, 2011; Immergluck, 2008, 2009), low-cost loans were factors of neighborhood resilience during the recovery (Wang, 2016, 2019)

**Neighborhood urban form variables**

- Housing age: Median built year in zip code
  - Zip codes with a high share of old housing stock appeared to be less resilient to the foreclosure crisis (Immergluck, 2010a)

- Foreclosure boom (2006–2011): Percentage point changes in foreclosure rates from 2006 to 2011 in zip code
  - Zip codes with higher increases in foreclosures experienced larger drops during the recovery (see Figure 3); we measured the decline in foreclosures while controlling for the pre-recovery increase

**Metropolitan economic variables**

  - We used a combination of housing price boom and bust variables to measure the economic resilience of a metropolitan area. The lower the value from economic resilience index, the more resilient the metropolitan area
At the zip code level, we control for mortgage variables, including conventional and low-cost loans; physical housing and urban form variables, including changes in foreclosure rates during the foreclosure boom (2006–2011) and the median year housing was built; and socioeconomic variables, including race and ethnicity and income level. At the metro level, we control for physical urban structure (metropolitan size and

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Explanation/rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median home value</td>
<td>Median home value in a metropolitan area</td>
<td>The high initial median home value in a metropolitan area contributed to high resilience, lowering the foreclosure level (Immergluck, 2010b)</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Percentage of unemployment in a metropolitan area</td>
<td>The high initial unemployment rate in a metropolitan area worsened the recent U.S. foreclosure crisis (Immergluck, 2010b).</td>
</tr>
<tr>
<td>Metropolitan policy variables</td>
<td>Pre-foreclosure days No. days from a foreclosure notification to a foreclosure sale/auction</td>
<td>A longer pre-foreclosure period was negatively associated with the accumulation of real estate–owned properties (Immergluck, 2010b). However, others argue that a short or long process of pre-foreclosure resulted in more foreclosures and that a reasonable number of pre-foreclosure days is about 120 (Cutts &amp; Merrill, 2008)</td>
</tr>
<tr>
<td>Post-foreclosure existence</td>
<td>Existence of a post-foreclosure period from auction to redemption (yes = 1)</td>
<td>A longer post-foreclosure period was positively associated with the growth of real estate–owned properties (Immergluck, 2010b)</td>
</tr>
<tr>
<td>Metropolitan size</td>
<td>Total population in a metropolitan area</td>
<td>Large metropolitan areas experienced increased foreclosure rates over the long term (Wang, 2019)</td>
</tr>
<tr>
<td>Metropolitan density</td>
<td>Population density in a metropolitan area</td>
<td>Dense metropolitan areas experienced increased foreclosure rates over the long term (Wang, 2019)</td>
</tr>
</tbody>
</table>

Notes:

a. HUD provided the affordability index calculated at the block group level, which was aggregated at various geographic levels (e.g., census tract, county, state, and metros) and downloadable through an online portal. For our study, we downloaded census tract–level index data and converted them to the zip code–level index using HUD–U.S. Postal Service zip code crosswalk file (HUD, 2018). To estimate the Location Affordability Index, data for housing costs, auto ownership, and transit use came from the American Community Survey 5-year estimates, 2008–2012 (Haas et al., 2016; HUD, 2017; U.S. Census Bureau, n.d.). Auto use was modeled using vehicle mileage travel data from the Chicago and St. Louis metropolitan areas (Hamidi, Jahan, & Moazzeni, 2018).

b. The purpose of such pre- and post-foreclosure policies is to give borrowers the time and the opportunity to pay off loans and other related fees during the pre-foreclosure and post-foreclosure periods. Most states have various pre-foreclosure periods ranging from 38 to 312 days, and 18 states have post-foreclosure periods ranging from 10 to 180 days (Immergluck, 2010b).
density); housing policy variables, including the number of pre- and post-foreclosure days, and metropolitan economic and housing market conditions, including changes in housing prices, metropolitan median home values, and unemployment.

**Central City–Suburban Form and Metropolitan Typology**

*The Geography of Home Foreclosures During and After the Crisis*

To assess resilience in comparative ways, we classified zip codes into central/high-density city and suburban low-density location and metropolitan housing market types. In this section, we map the geographical variations of foreclosure rates across the United States to more accurately explain the accumulation of and changes in foreclosure rates.

Figure 2 presents the spatial patterns of foreclosure rates during and after the foreclosure crisis. During the crisis from 2006 to 2008, California, Florida, and the Northeast experienced high rates of home value decline following an accumulation of home foreclosures (Immergluck, 2008). Such patterns remained in August 2009, as shown in the top panel. The county-level mean value of the foreclosure rate was 2.0% in 2009, which falls between the lowest foreclosure rate, slightly exceeding 1% in mid-2007, and the highest foreclosure rate of more than 4% in mid-2011. Most counties in Florida and some in California had the highest foreclosure rates of more than 5% in August 2009. In Florida, Miami-Dade and Osceola counties exceeded 16%. Some counties in Maine and southern Nevada exceeded 4%, and many counties in Ohio, Illinois, Indiana, and Wisconsin exceeded 3% in August 2009.

During the recovery from 2011 to 2014, shown in the bottom panel of Figure 2, most counties in Florida experienced reductions in foreclosure rates of more than 5 percentage points. Among them, Miami-Dade and Osceola counties peaked at more than 19% and 17%, respectively, in August 2011. Many western regions also saw a rapid reduction in their foreclosure rates. Changes in the foreclosure rates in these regions declined more than 2 percentage points between 2011 and 2014, and foreclosure rates were less than 1% in August 2014, showing that the housing markets in western regions rapidly returned to their prior stable status. Most counties in New York, however, experienced growth in their foreclosure rates during the national recovery. Overall, housing markets exhibited remarkable variation in their rates of recovery.

### Categorizing Central City–Suburban Form and Types of Markets

To estimate the relationship between location affordability and changes in foreclosure rates, we classified zip codes into central/high-density cities versus suburban low-density locations and categorized more than 300 metropolitan areas into three types of metropolitan housing markets.

We refer to dense and primary central city zip codes for each metropolitan area as *central/high-density* zip codes. The census has designated one or more large cities in each metropolitan area as principal cities. We selected the largest principal city as the primary central city in each metropolitan area. Because zip codes do not follow the legal boundaries of many cities, and because we were interested in identifying other zip codes that did not lie mostly in the primary central city but that had a relatively large population density as “central/high-density,” we classified zip codes as *central/high-density* zip codes if they fell under one of the following two criteria: 1) 50% or more of the area covered by the zip code fell within the primary central city boundary or 2) 50% or fewer of the areas covered by the zip codes fell within the primary central city boundary and the zip code had a population density greater than the overall population density of the corresponding metro areas. Other zip codes within metro areas were classified as *suburban low-density*. Zip codes within metro areas designated as central/high-density had an average population density of 4,053 residents per square mile, and those classified as suburban low-density had an average population density of 1,179 residents per square mile.

We then categorized metropolitan areas using cluster analysis. We used two clustering variables, including changes in metropolitan-level housing prices from 2000 to 2014 and the degrees of the shocks, which determine whether metropolitan areas were severely hit or not and represent the ratio calculated by dividing the peak metropolitan-level housing price index from 2005 to 2008 by the lowest housing price index from 2009 to 2013.

As shown in the top of Figure 3, the cluster analysis yielded three types of metropolitan areas: “boom–bust,” “strong,” and “weak.” The name of each type reflects the home value trajectory, shown in the middle panel. The bottom panel illustrates the foreclosure trajectories across the three market types, which represent the total number of home foreclosures divided by the total number of home loans by metropolitan type at the zip code level.

As the figure shows, boom–bust metropolitan areas experienced dramatic changes in home values with the
Figure 2. (Top) Geographical distribution of county-level home foreclosure rates in August 2009 and (bottom) changes in county-level home foreclosure rates between August 2011 and August 2014. Source: County-level foreclosure data from Black Knight (formerly LPS Applied Analytics).

Color version available at tandfonline.com/rjpa
Figure 3. Home value and foreclosure trajectories by metropolitan types during the U.S. housing boom–bust recovery. (Top) Types of metropolitan areas; (middle) home value trajectories by metropolitan types; (bottom) foreclosure trajectories by metropolitan types. Source: Metropolitan-level home value data (368 metropolitan areas) from CoreLogic HPI and zip code–level foreclosure data (n = 12,285 in 351 metropolitan areas) from Black Knight (formerly LPS Applied Analytics).

Color version available at tandfonline.com/rjpa
hardest shocks, with a mean value of the peak-to-bottom ratio greater than 2: Housing prices increased rapidly during the boom, fell dramatically during the bust, and quickly bounced back to their prior trajectory during the recovery. Home price appreciation over a decade was high at about 61%. This type included 14% of the metros, including California, Nevada, Arizona, and Florida. As shown in the bottom panel of Figure 3, these metros experienced higher rates of foreclosures during the bust and greater reduction in foreclosures during the recovery.

Strong metropolitan areas exhibited a steady growth trajectory with moderate shocks. A mean value of the boom-to-bust housing price index ratio was 1.27. Home values fell slightly or continuously grew during the bust and maintained steady growth during the recovery. Home price appreciation between 2000 and 2014 was at its highest at 65%. These strong metros, accounting for 42% of the metropolitan areas, were located in coastal regions of the Northwest, the Northeast, and the Southwest. Strong metros had high levels of foreclosures during the housing crisis but relatively lower levels than other metros.

Weak metropolitan areas had moderate or smaller shocks and exhibited the lowest home value trajectories before, during, and after the crisis. In 45% of the metropolitan areas, home price appreciation between 2000 and 2014 was less than 22%. This cluster included metros in the Rust Belt, the Midwest, and the Southeast, except for Florida. The foreclosure trajectories in weak metros indicate foreclosure rates were the highest before the crisis but lower than those in boom–bust metros during the crisis. Some of these metros were experiencing industrial and population decline before the crisis, which resulted in stagnant home values followed by an oversupply of housing.

The Relationship Between Neighborhood Affordability and Resilience

We present the results of descriptive statistics for our selected variables in Table 2.

The HUD Location Affordability Index in our samples shows that median-income owner-occupiers living in suburban low-density locations and boom–bust metropolitan areas had a higher combined housing and transportation cost burden (a higher Location Affordability Index) than those in central/high-density cities and in strong and weak metropolitan areas.

We examine the housing affordability index in Table 2, which represents the percentage of the income of median owner-occupied households spent on housing costs. The mean values of the estimated housing affordability index show that suburban locations and weak metros had more affordable housing than did those in central cities and other types of metros. The mean value was slightly higher in central city zip codes than in suburban zip codes (31.2% versus 30.7%). The mean value was highest in boom–bust metros (32.3%), followed by strong metros (31.1%) and weak metros (30.2%).

The mean value of the estimated Location Affordability Index, however, shows central cities and strong metros were more affordable than suburbs and other metros. Housing and transportation costs, combined, of median-income households in suburban low-density zip codes were about 2.6 percentage points higher than those of central/high-density zip codes (53% versus 50.4%). The Location Affordability Index in boom–bust metros was about 2.4 percentage points higher than that in strong metros (54.1% versus 51.7%) and about 1.4 percentage points higher than that in weak metros (54.1% versus 52.7%). These findings are likely because neighborhoods in central cities or strong metros are denser, and they have more walkable areas and amenities, including public transit, all of which can reduce auto dependence, leading to more affordable locations.

Therefore, it appears that minimizing transportation costs can determine location affordability during the peak of a foreclosure crisis period. As with the Location Affordability Index, transportation costs were more affordable in central cities and strong metros than in suburbs and other metros. In addition, affordable locations tended to have a higher rate of transit use: Transit trips occurred more in central cities (46.6 trips) than in the suburbs (22.5 trips) and more in strong metros (38.8 trips) than in weak (19.3 trips) and boom–bust (16.5 trips) metros.

The mean foreclosure rate in central cities was slightly higher than that in suburban locations, except in 2014. In 2000, the mean foreclosure rate, on average, was higher in central city zip codes than in suburban zip codes (0.53% versus 0.43%), grew more in central city zip codes by 2011 (4.0% versus 3.6%), and declined more rapidly in central city zip codes by 2014 (1.94% versus 1.98%). The mean foreclosure rate from 2011 to 2014 was higher in boom–bust metros than in other metros, beginning at 0.4% in 2000, increasing significantly to 7.3% in 2011, and then dropping to 2.4% in 2014. The initial foreclosure rate was the highest in weak metros at 0.48% in 2000, increasing to 3.3% in 2011 and then decreasing to 1.7% in 2014.

Affordability and Resilience by Central City–Suburban Locations

In our initial models, we examined the relationship between location affordability and foreclosure resilience.
Table 2

Mean values for selected variables in central city–suburbs and metropolitan types.

<table>
<thead>
<tr>
<th>Zip code–level dependent variables</th>
<th>Central high-density zip codes</th>
<th>Suburban low-density zip codes</th>
<th>Zip codes in boom–bust markets</th>
<th>Zip codes in strong markets</th>
<th>Zip codes in weak markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Foreclosure in 2014a (%)</td>
<td>1.9 2.2</td>
<td>2.0 2.1</td>
<td>2.4 2.3</td>
<td>2.1 2.5</td>
<td>1.7 1.5</td>
</tr>
<tr>
<td>Foreclosure in 2011 (%)</td>
<td>4.0 4.1</td>
<td>3.6 3.2</td>
<td>7.3 5.8</td>
<td>3.1 2.5</td>
<td>3.3 2.4</td>
</tr>
<tr>
<td>Foreclosure in 2000 (%)</td>
<td>0.5 0.7</td>
<td>0.4 0.9</td>
<td>0.4 0.6</td>
<td>0.4 0.9</td>
<td>0.5 0.9</td>
</tr>
</tbody>
</table>

Zip code–level independent variables

Affordability variables for median-income owner-occupiersb

| Housing affordability index                | 31.2 3.3                       | 30.7 2.8                       | 32.4 3.6                       | 31.1 3.1                    | 30.2 2.5                  |
| Transportation affordability indexc        | 19.3 3.6                       | 22.3 3.6                       | 21.7 2.8                       | 20.6 4.0                    | 22.5 3.6                  |
| Autos per household                       | 1.4 0.5                       | 1.6 0.7                       | 1.2 0.6                       | 1.6 0.6                    | 1.6 0.6                  |
| Household annual vehicle miles traveled (1,000) | 13.9 5.0                     | 18.0 7.5                       | 13.1 6.8                       | 17.4 6.9                    | 17.1 7.2                  |
| Household annual transit trips             | 46.6 68.0                      | 22.5 39.8                      | 16.5 20.7                      | 38.8 60.6                   | 19.3 35.2                 |
| Location Affordability Index               | 50.4 4.4                       | 53.0 3.3                       | 54.1 4.0                       | 51.7 3.8                    | 52.7 3.6                  |

Socioeconomic variablesd

| Black (%)                                  | 19.6 23.9                      | 7.1 13.3                       | 8.8 14.9                       | 9.3 16.2                    | 11.7 19.4                |
| Asian (%)                                  | 4.4 6.7                        | 2.7 5.6                       | 4.2 6.4                       | 4.0 7.2                    | 1.8 3.1                 |
| Hispanic (%)                               | 17.6 20.8                      | 9.8 15.4                       | 25.0 22.4                      | 12.1 17.7                   | 6.7 11.1                |
| Immigrant (%)                              | 5.1 5.3                       | 3.7 4.8                       | 7.6 6.3                       | 4.6 5.3                    | 2.2 2.8                 |

(Continued)
Table 2 (Continued).

<table>
<thead>
<tr>
<th>Central high-density zip codes</th>
<th>Suburban low-density zip codes</th>
<th>Zip codes in boom–bust markets</th>
<th>Zip codes in strong markets</th>
<th>Zip codes in weak markets</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>Poverty (%)</td>
<td>15.5</td>
<td>10.8</td>
<td>8.6</td>
<td>6.8</td>
</tr>
<tr>
<td>Median family income ($10,000)</td>
<td>6.2</td>
<td>2.9</td>
<td>7.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Mortgage market variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional loana (%)</td>
<td>74.2</td>
<td>14.3</td>
<td>77.0</td>
<td>12.8</td>
</tr>
<tr>
<td>Low-cost loana (%)</td>
<td>95.3</td>
<td>4.8</td>
<td>95.0</td>
<td>5.6</td>
</tr>
<tr>
<td>Neighborhood urban form variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median built yeardf</td>
<td>1967</td>
<td>17.7</td>
<td>1976</td>
<td>13.8</td>
</tr>
<tr>
<td>Foreclosure boom (2006–2011)a</td>
<td>12.0</td>
<td>21.8</td>
<td>11.4</td>
<td>20.5</td>
</tr>
<tr>
<td>Metro-level independent variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolitan economic variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic resilience indexf</td>
<td>31.5</td>
<td>238.9</td>
<td>19.1</td>
<td>173.9</td>
</tr>
<tr>
<td>Median home value ($1,000)d</td>
<td>188</td>
<td>9</td>
<td>2019</td>
<td>99</td>
</tr>
<tr>
<td>Unemployment (%)d</td>
<td>9.5</td>
<td>2.3</td>
<td>9.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Metropolitan policy variables9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-foreclosure days</td>
<td>119.4</td>
<td>77.9</td>
<td>134.9</td>
<td>84.5</td>
</tr>
<tr>
<td>Post-foreclosure existence</td>
<td>0.3</td>
<td>0.5</td>
<td>0.3</td>
<td>0.5</td>
</tr>
</tbody>
</table>

(Continued)
at the zip code level using a multilevel (zip code, metropolitan area) analysis. We initially did this for central city versus suburban zip codes but did not disaggregate zip codes according to the type of metropolitan area in which they are located. Later, we disaggregated the analysis across metropolitan area type and found somewhat different results.

When all metropolitan areas are included in the regressions, we find, in general, greater location affordability (a lower index) was associated with greater foreclosure resilience, but we find no association between housing affordability and resilience. It is possible that central/high-density cities with affordable transportation may have many more neighborhoods near transit systems or dense and walkable areas where residents spend less on transportation, and that home values remained stable during and after the housing crisis, as suggested by Welch et al. (2018). Regarding other central city zip codes in Model 2, the results also suggest that greater location affordability overall was associated with more resilience.

The results in suburban zip codes for all metropolitan areas combined are somewhat different from the central city results. For the suburban zip codes in Model 3, greater housing affordability (a lower housing share of total household income) is associated with more resilience. However, greater transportation affordability in suburbs is generally associated with reduced foreclosure resilience. Moreover, in suburban zip codes in Model 4, the results show no significant association between location affordability and foreclosure resilience. This finding appears consistent with recent work by Smart and Klein (2018), who suggest positive effects of

<table>
<thead>
<tr>
<th>Table 2 (Continued).</th>
<th>Central high-density zip codes</th>
<th>Suburban low-density zip codes</th>
<th>Zip codes in boom–bust markets</th>
<th>Zip codes in strong markets</th>
<th>Zip codes in weak markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan urban form variables</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Metropolitan size (1,000)</td>
<td>1,769</td>
<td>1,957</td>
<td>1,789</td>
<td>2,028</td>
<td>1,797</td>
</tr>
<tr>
<td>Metropolitan density</td>
<td>535.9</td>
<td>557.1</td>
<td>580.2</td>
<td>584.0</td>
<td>641.7</td>
</tr>
<tr>
<td>n (zip code)</td>
<td>3,049</td>
<td>9,233</td>
<td>1,628</td>
<td>5,806</td>
<td>4,851</td>
</tr>
<tr>
<td>N (Metropolitan area)</td>
<td>324</td>
<td>349</td>
<td>49</td>
<td>140</td>
<td>162</td>
</tr>
</tbody>
</table>

Notes:
a. Source: Black Knight.
b. Source: HUD Location Affordability Index.
c. The HUD index does not break down transportation costs between those incurred by automobile and those incurred by public transit. Thus, in the multilevel regression shown in Table A-2 in the Technical Appendix, we used autos per household and household annual transit trips as proxies for auto ownership costs and transit use costs.
f. Source: CoreLogic HPI.
g. Source: Immergluck (2010b).
transit-rich locations in locations with very strong transit service, which may explain the more intuitive finding in urban zip codes but not in suburban ones. However, as we show below, disaggregating metropolitan housing markets by boom–bust/recovery trajectory is important and makes a difference in this case.

Other control variables generally exhibited expected results. For example, high shares of conventional loans in neighborhoods contributed to a reduced number of foreclosed properties and greater resilience during the recovery. Zip codes experiencing a housing boom (2000–2006) and bust (2006–2011), which are described by the economic resilience index, underwent increased foreclosure rates and decreased resilience. A higher surge in foreclosures during the bust (2006–2011) saw larger drops in foreclosure rates during the recovery (2011–2014).

**Affordability and Resilience by Central City–Suburban Location and Metropolitan Types**

Because prior research suggests small-area factors play diverse roles in housing resilience across types of metropolitan areas, we disaggregated our analyses by both central/high-density and suburban low-density zip codes across three market types: boom–bust, strong, and weak metropolitan areas. We find an association between greater location affordability and resilience to foreclosure (i.e., a drop in the foreclosure rate) in central/high-density zip codes in strong and weak metropolitan areas, but the association is the strongest in suburban low-density zip codes in boom–bust metropolitan areas. We find no association, however, in suburban low-density zip codes in strong and weak metropolitan areas.

Table 3 summarizes the results for the key independent variables across central city and suburban zip codes and across the three metropolitan types. As in Table A-1 in the Technical Appendix, the housing affordability and transportation affordability indices were included simultaneously in the estimates, whereas the location affordability measure was included in a separate specification to avoid perfect multicollinearity.

The results in Table 3 show that the previous finding—greater transportation and location affordability are associated with more resilience—generally holds true. More specifically, affordable transportation costs strongly contributed to the fast recovery to lower foreclosure rates in central cities in all types of metropolitan areas, and greater locational affordability contributed to a large drop in foreclosure rates in central cities in strong and weak metropolitan areas. Denser zip codes were more likely to have greater location affordability as a result of residents driving less, which reduced their transportation costs. The effects of location affordability in central/high-density zip codes in strong metropolitan areas were moderate. This finding is partially consistent with the finding that compact developments reduced driving, but their impact is not substantial (Stevens, 2017).

The association between location affordability and resilience in suburbs was the strongest in the boom–bust metros. One possible explanation is that affordable suburban locations in these neighborhoods might have been more attractive to homebuyers and investors, and foreclosed homes may have been quickly absorbed into the housing market. Another possible explanation is that suburban transit-oriented developments positively influenced the home values of surrounding neighborhoods in these metros, such as in San Francisco (CA; Mathur & Ferrell, 2013). In addition, affluent households in suburbs that generally lacked a public transit system possessed stable financial assets that may have boosted their resilience to economic shock.

However, we find no positive association between location affordability and resilience to foreclosure in low-density suburbs in strong and weak metropolitan areas. Because many suburban metropolitan areas (65% of our zip code samples) may have few or ineffective public transit lines, we attempted to test the relationship between transit use and change in foreclosure rates. To do this, we disaggregated the transportation affordability index into auto ownership and transit use. The results show that zip codes with greater public transit use saw a larger drop in foreclosed homes in both central cities and suburbs, with a much larger drop in suburbs, particularly in strong and weak metros (see Appendix A-2). Our model, nonetheless, shows no significant association between location affordability and resilience to foreclosures; this could be because of limitations in the HUD data set, which does not capture the features of every metro area accurately, or because of insufficient transit and dense, walkable places in suburbs in strong and weak metros. In addition, geographies smaller than zip codes might generate more significant results.

**Conclusion and Policy Implications**

In this study we examine the association between location affordability and housing market resilience during the U.S. foreclosure recovery period from 2011 to 2014. We use the HUD Location Affordability Index, which estimates the share of a family’s income dedicated to combined housing and transportation costs in a given location.
location. We assess location affordability by comparing changes in the foreclosure rates in the central city versus suburbs and various types of housing markets (i.e., boom–bust, strong, and weak markets).

We find that foreclosure rates during and after the crisis were high in both the central city and suburban zip codes and the highest in boom–bust metros. Our findings suggest an association between location affordability and a drop in foreclosure rates, but the association varies based on the residential density and market type. We find strong associations in central cities, especially in strong and weak metros, and the strongest associations in suburbs in boom–bust metros. However, we find no association in the suburbs in strong and weak metros.

These findings suggest several policy implications for planners attempting to improve neighborhood affordability and ensure housing resilience. Planners should identify locations for constructing new affordable housing developments where residents can minimize transportation costs that determine high location affordability. As our finding confirms, affordable central/high-density locations, which are more likely to have dense developments or accessible transit with pedestrian-friendly design, may reduce driving, which leads to greater location affordability and a smaller number of home foreclosures. Thus, planners should implement planning for densifying land use for affordable locations. They might create incentives that increase the supply of dense affordable housing near public transit lines/stations, which will reduce the costs of housing and transportation to residents. By promoting the construction of affordable housing in areas near transit systems, planners could improve location affordability and foster housing market resilience in these areas.

Table 3

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimated coefficient</td>
<td>t-Value</td>
<td>Sig.</td>
</tr>
<tr>
<td>Boom–bust</td>
<td>Housing affordability index</td>
<td>−0.0175</td>
<td>−0.850</td>
</tr>
<tr>
<td></td>
<td>Transportation affordability index</td>
<td>0.0844</td>
<td>2.060</td>
</tr>
<tr>
<td></td>
<td>Location Affordability Index</td>
<td>0.0140</td>
<td>0.740</td>
</tr>
<tr>
<td>Strong</td>
<td>Housing affordability index</td>
<td>0.0072</td>
<td>0.370</td>
</tr>
<tr>
<td></td>
<td>Transportation affordability index</td>
<td>0.0742</td>
<td>2.070</td>
</tr>
<tr>
<td></td>
<td>Location Affordability Index</td>
<td>0.0309</td>
<td>1.640</td>
</tr>
<tr>
<td>Weak</td>
<td>Housing affordability index</td>
<td>0.0100</td>
<td>0.550</td>
</tr>
<tr>
<td></td>
<td>Transportation affordability index</td>
<td>0.0745</td>
<td>2.090</td>
</tr>
<tr>
<td></td>
<td>Location Affordability Index</td>
<td>0.0347</td>
<td>2.180</td>
</tr>
</tbody>
</table>

Notes: Hierarchical linear regression results. Does not show most independent variables (see Table A-1 in the Technical Appendix).

a. DV = dependent variable.

*p < .1. **p < .05. ***p < .01.

Color version available at tandfonline.com/rjpa
Another approach to promoting neighborhood affordability and housing resilience is to establish land use regulations for sustainable urban infrastructures at both local and regional levels. Because we find no positive association between location affordability and changes in the number of home foreclosures in the suburbs (except for boom–bust metros), planners at the local level need to expand the number of affordable housing and incorporate affordable housing and transportation into sustainable infrastructure planning. The evidence shows local smart growth initiatives in older suburban towns that accommodate compact development strategies promoted pedestrian-friendly environments, which encourage walking and biking, and could enhance housing stability by integrating transportation systems that contribute to sustaining home values (Wang & Immergluck, 2015) as well as minimizing the number of home foreclosures, all of which lead to greater resilient and affordable locations.

At the regional level, planners should modify land use regulations to encourage denser, compact development and mitigate sprawl to help their cities weather economic recessions and maintain resilient housing markets. Although there is no positive association between location affordability and a drop in foreclosures, our analyses show the existence of public transit in neighborhoods contributed to significantly minimizing foreclosures, particularly in suburbs in strong and weak metropolitan areas. Many suburbs in these metros are not very affordable in part because of insufficient regional public transit systems, resulting in higher auto dependency. Despite the growing demand for transit systems in a number of metros, public transit planning often is not included in the suburbs. If planners expand new and underused transit lines throughout their regions, transportation costs would likely decline, which would in turn foster neighborhood affordability and housing market resilience.

ABOUT THE AUTHORS
KYUNGSOON WANG (kwang42@gatech.edu) is a founder and research director of the Housing and Urban Research Institute. DAN IMMERGLUCK (dimmergluck@gsu.edu) is a professor in the Urban Studies Institute at Georgia State University.

ORCID
Kyungsoon Wang http://orcid.org/0000-0002-3954-0798

ACKNOWLEDGMENTS
We would like to thank former and current Editors and three anonymous reviewers for their constructive comments.

RESEARCH SUPPORT
This study is partially supported by the Community and Economic Development Department of the Federal Reserve Bank of Atlanta through its Co-op researcher program.

SUPPLEMENTAL MATERIAL
Supplemental data for this article can be found on the publisher's website.

NOTES
1. The eight household types in the Location Affordability Index are 1) median-income families, 2) very-low-income individuals, 3) working individuals, 4) single professionals, 5) retired couples, 6) single-parent families, 7) moderate-income families (80% median income for a region), and 8) dual-professional families (150% of median income for a region; HUD, 2017).

2. The structural equation model uses housing costs, auto ownership, and transit use for homeowners and renters as endogenous variables, which are similar to dependent variables because of their interrelationship; other exogenous variables that are similar to independent variables include various household (e.g., median income, household size, and household commuters) and geographic (e.g., regional earning, single family home share, density, rental unit share, and commute distance) characteristics (Haas et al., 2016).

3. We used boom–bust recovery periods based on Figure 1: The housing boom occurred from August 2000 to August 2006, the bust from August 2006 to August 2011, and the recovery from August 2011 to August 2014, the last year in which housing price index (HPI) data were available in this study. To measure the degree of shocks, we selected the peak HPI from the highest prices during the housing boom from August 2005 to August 2008 and the lowest HPI from the lowest prices during the housing recovery from August 2009 to August 2013 (Dong & Hansz, 2016; Wang, 2018). We used the HPI from CoreLogic, which includes value-weighted repeat sales and is normalized by setting the index value for January 2000.

4. For this study we did not assume a certain number of clusters but instead used a simple two-step cluster analysis. The results of the silhouette measure of cohesion and separation exceeded 0.5, which confirmed that three clusters were meaningful and distinctive (Norusis, 2011).

REFERENCES


