Race and the production of extreme land abandonment in the American Rust Belt[1]

ABSTRACT:

Most theories of land abandonment privilege the economic dimensions and causes of the process. Land abandonment within most paradigms is principally driven by some combination of the following: housing obsolescence, municipal fiscal stress, or deindustrialization. When race is mentioned (and in most cases it is not), it is rarely situated in a meaningfully-causal way. This study explores the relative role of economic and racial factors on land abandonment in 151 Midwestern cities. It finds that percent Black is a far more significant correlate of extreme housing abandonment in the American Rust Belt than any of the aforementioned economic variables. I conclude from this, that past and present institutional (and interpersonal) discrimination best explains this association. Moreover, I suggest that existing theories of land abandonment be broadened to include group threat approaches to account for this relationship.

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Introduction:

Heidelberg Street in Detroit is fairly typical of the city's near east side. Virtually every home on the street has been abandoned and demolished since the early 1970s (Figure 1). Today, it's open spaces make it look more like a semi-rural town in central Michigan than the center of what was once the fourth largest city in the United States. Though extreme, Heidelberg Street is not unique—62 other census tracts in Detroit alone have also lost half or more of their housing since 1970. In total, there are 269 such Extreme Housing Loss Neighborhoods (EHLN) spread across 49 cities in the region.[2] Though they account for a small percentage of overall neighborhoods in the region these spaces are highly visible, and a frequent focus for scholars, practitioners, artists and the general public.[3] "Ruin porn" photographers and documentarians flock to such neighborhoods to record ostensibly representative images of Detroit and other cities (Kinney, 2016). Planners and city officials struggle to manage the costs associated with such places (Hackworth, 2015). Urban scholars seek to explain how they became so concentrated in some cities over others (Dewar and Weber, 2012). Conventional explanations of land abandonment emphasize some combination of housing lifecycle processes, deindustrialization, or municipal fiscal collapse. But when operationalized across the region, these drivers exhibit much weaker relationships with extreme abandonment than an additional factor that has only been partially developed in this context: race. I argue that race has an under-appreciated causal influence on the production of such extreme land abandonment, past and present. In particular, the construction of Blackness as a threat to white property, political power, and safety explains

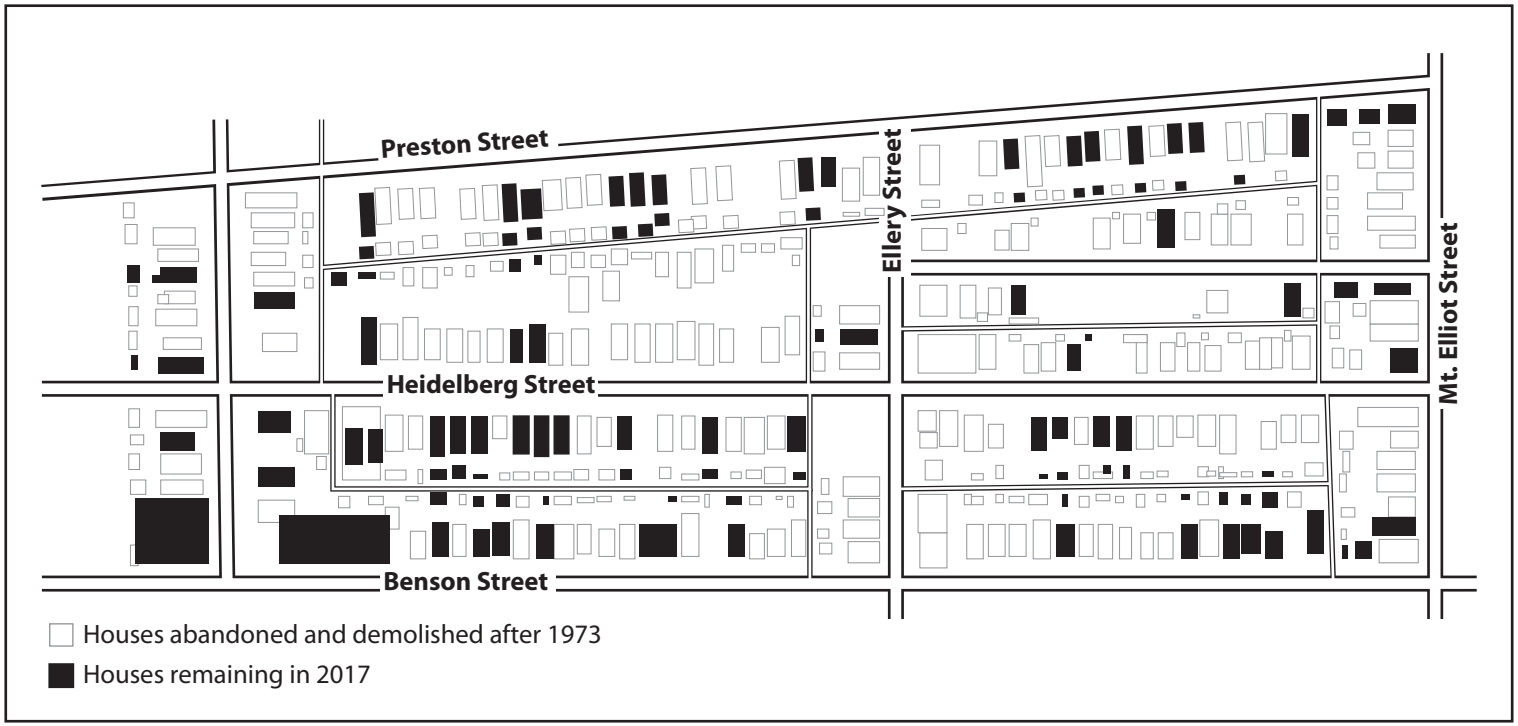

Figure 1: Post-1970 Extreme Land Abandonment on Heidelberg Street, Detroit (1973 building footprints traced from aerial photos via the Wayne State University Online Map Archive; 2017 footprints traced from Google Maps).

the presence of EHLN more than any other factor derived from conventional theory. This article draws out the empirical, historical, and theoretical basis for that conclusion.

Explanations of Land Abandonment:

Housing generally gets abandoned (by an owner) when the costs of maintaining or owning it exceed (usually to a significant, sustained degree) the potential value of selling or renting it. The costs of maintaining or owning can rise for a variety of reasons including tax liabilities, commercial liens, age of structure, and damage from arson or weather. The value of property generally drops when potential available consumers for that housing evaporates. But while the basic cost-benefit calculation for "underwater" property owners is fairly straightforward, the geographical concentration of this occurrence is less obvious. Why, in particular, are there such heavy concentrations of property owners who find the value of debts exceeding the value of sale in some locations more than others? There are three developed schools of thought on this matter, and the conceptual fragments for a fourth (the construction of Blackness) that will be drawn out in this section.

1. Housing lifecycle

Housing and neighborhood lifecycle theories associate blight and land abandonment with the physical deterioration and social obsolescence of inner core properties (Hoover and Vernon, 1959; Breger, 1967; Downs, 1973). Though more durable than most commodities, housing physically deteriorates, and when it does needs to be repaired. The physical condition of a building serves as a signal to neighbors and potential buyers of current and future neighborhood conditions. In cities like Detroit, with heavy concentrations of impoverished homeowners and

predatory investors who put little money into the built environment, the concentration "blight" can create a spiraling challenge that investors and cities struggle to manage. Existing homeowners see nearby deterioration as a reason not to renovate their own properties as it will be unlikely that they will ever recoup those expenses in the sale of that property. Return-oriented investors purchase (often with cash) and milk such properties, which further accelerates their deterioration. Physical upkeep becomes even more expensive, and unlikely. Eventually, property owners walk away from their commitment because of cost and the inability to sell. Left for even a few months without an occupant, such properties are often stripped of wiring, or damaged because of arson or weather.[4]

Social obsolescence can also occur when other, newer (larger, more modern) housing units are introduced in the region. Suburban jurisdictions approve thousands of building permits per year, exacerbating the problem (Breger, 1967). A "housing disassembly line" emerges as this seemingly never-ending production of housing units gets introduced to the region, making smaller, less modern, more expensive (to maintain) housing in the inner core less plausible to sell (Galster, 2013; Bentley *et al.*, 2016). The latter sit empty as owners await buyers and are sometimes vandalized, burned, or scrapped. If they are purchased at all, they are often bought by investors with little interest other than a cash flow. Such investors, based on the probably-correct assumption that their efforts will not be compensated, often refuse to make even basic repairs to the property, and frequently do not even pay their property taxes (Akers, 2013; Hackworth and Nowakowski, 2015). All else equal, such housing becomes less desirable and more expensive to maintain and finance. In many cases, banks and government insurers redline the area ostensibly on this basis alone—that is, house values are expected to decline so they refuse to lend in such

areas.[5] With time, cash-only sales, tax delinquency, and physical blight become the norm. Land abandonment is rife in this context.

2. Tax-service nexus

Urban fringe growth is not only a problem because it undermines the demand for inner core housing units. The particularly fragmented nature of metropolitan growth in the U.S. also poses fiscal and management problems that directly affect residential demand. Each city within a metropolitan area has separate taxing boundaries and responsibilities associated with their infrastructure age and demographic make-up. Despite more than a century of calls by urbanists, business officials, and inner core politicians to regionalize some social services (Gordon, 2009), state legislatures have generally allowed suburban municipalities to develop on the fringe of established cities and resist the annexation attempts of the older inner core city (Teaford, 1979; Thomas, 2013). This has cultivated a "defensive localism" (Weir, 1995), wherein city managers actively avoid the responsibilities of less fortunate adjacent cities. This has enormous consequences for the demand for housing. Tiebout (1956) famously argued that the most powerful sorting mechanism for households within a region is the mix between taxes-owed and services-provided. In older core cities with aging infrastructure and impoverished residents, the service burdens are great, but the tax bases are often not. In many cases, inner core cities resort to over-assessment—essentially charging more in taxes (per dollar of property value) than their suburban neighborhoods (White, 1986; DeBoer *et al.*, 1992; Skidmore *et al.*, 2012). Families who can move to a lower-taxed, better-serviced city generally do. Like the housing market challenges, these forces multiply and worsen over time. In extreme cases, school systems become untenably broken, and basic municipal functions get completed by city residents rather

than government (Kinder, 2014; Kinder, 2016). The accumulated impact on housing demand is deep. In jurisdictionally-fragmented regions with deep-seated divisions between municipalities, the problems can become intractable and house values collapse. Unable to sell their properties, vast numbers of households simply walk away from their holdings, or they go unclaimed after the owner dies.

3. Deindustrialization

The most basic and popular explanation for *generalized* issues of urban decline in the Rust Belt is deindustrialization (Bluestone and Harrison, 1982; Friedrichs, 1993; Teaford, 1994; High, 2003). This can be applied to the more specific problem of land abandonment. Cities in the Midwest were generally small agriculturally-oriented outposts in the mid-nineteenth century, but as industrialization swept the continent, the urban form of such places changed dramatically. Unlike their eastern seaboard counterparts, the factories and mills that developed in Midwestern cities were oriented around more land intensive uses (Hackworth, 2016b). Automobile assembly plants and steel mills took up much more space and had a more visible impact on the landscape than the textile mills of the Northeast. Midwestern industries also grew more quickly and were propelled by the manufacturing needs to two world wars—millions of workers moved to such places in a very short period of time. Combined with new assembly-line house construction methods devised in the 1930s (Checkoway, 1980), this translated into whole cities being composed of quickly-built worker housing—Detroit being only the largest and most iconic (Ryan, 2012). These landscape preconditions were particularly important when the manufacturing boom of the twentieth century gave way to the economic malaise of the 1970s (Friedrichs, 1993). Firms moved their operations to other parts of the United States, to Canada,

and eventually to cheaper labor locations elsewhere in the world aided by reduction in trade barriers by the federal government. Some places were decimated virtually overnight when mills closed (e.g. Youngstown), while others took several decades to disintegrate (e.g. Detroit), but the impacts were similar. Cities were left with large scale abandoned factories that served as a visual reminder of past prosperity and current travails (Mah, 2012). Most cities initially did desperate things to offset a fleeing manufacturing base—an instinct that was often unrealistic or even counterproductive (Mayer and Greenberg, 2001; Leo and Anderson, 2006).[6]

Though the impacts on residential land abandonment are not always drawn out in the deindustrialization literature, the links are not difficult to infer. First, the overall erosion of the job base undermines the ability of workers to buy or renovate housing. When this happens *en masse*, some owners and investors simply walk away from their holdings because they are unable to sell them through mainstream markets. Many of these properties revert to public ownership through the tax foreclosure process. In places like Detroit, where much of this housing was poorly built to begin with, the physical erosion of such units happens quickly, and has an accelerative effect on abandonment. Second, the physical and environmental relics to an industrial past are ugly and difficult to overcome for future developers, residents and investors. The Packard Plant in Detroit, for example, was closed more than a half century ago but is still standing. It is surrounded by a particularly-vacated swath of residential neighborhoods in the near east side of Detroit. Though it is a favorite site for ruin pornographers, it is a visual sore spot for current residents and deterrent for future investors. Deindustrialization, in short, has undermined the demand for housing by shifting jobs and prosperity elsewhere *en masse*, but it has also created unique development obstacles that make an economic reinvention more difficult. Conditions for residential land abandonment flourish in this context.

Race and land abandonment

Though many explanations of land abandonment draw upon a multitude of forces, most emphasize one of the three aforementioned paradigms. Race, by contrast, is generally not present or, if it is, remains as a background or parallel factor in this literature. Most often this occurs through simple elision—land abandonment is simply an economic process, while other factors, like race, are outside of the parameters of consideration. In other cases, race is mentioned but as either implicitly or explicitly spurious. Here, land abandonment and urban decline is *primarily* an economic process. Racism may be happening in parallel to this, and is perhaps an exacerbating force, but not a causal one driving it. Within such narratives, blacks in northern cities were disproportionately affected by processes of land abandonment primarily because they were the most disadvantaged group when the economic conditions reached their nadir. Finally, and most dubious, is the politically-conservative notion that black politicians and people actually engineered the movement of whites to the suburbs for political advantage. Race is involved, but only to the extent that "militant" black mayors came to power and drove white people to the suburbs (Glaeser, 2011). In the most extreme version of this thesis, Glaeser and Shleifer (2005: 2) write about Detroit's first black Mayor, Coleman Young:

> In his 24 years as mayor, Detroit's Coleman Young drove white residents and businesses out of the city, [similar to how] Zimbabwe's President Robert Mugabe abused white farmers after his country's independence, openly encouraging their emigration even at a huge cost to the economy.

Land abandonment, within this narrative, is just simply a logical response (of white people) to being pushed from the city (by black people).

Such views neglect over 100 years of evidence suggesting that white racism against black people has been a far more impactful force in the abandonment process. Whites have constructed black people as a threat to property, safety, and political power in a variety of different contexts, and through a variety of different means. Though it has yet to be applied to this specific context, group threat theory (GTT) offers a robust, trans-historical, multi-scalar framework for understanding how race has influenced the production of extreme land abandonment. GTT was introduced by sociologist Herbert Blumer (1958) as an alternative to the individual-focused understandings of racial prejudice. Blumer argued that racism was a group construct more than an offshoot of say one's educational or family background. To him, and others who developed this idea (among many others: Blalock, 1967; Bobo, 1983; Quillian, 1996), racism was a social calculation made on the basis of perceived group self-interest. The dominant "in-group" perceives that their interests are being threatened by the "out-group" and begins to exert overt-legal, and more furtive measures to limit that threat (Blalock, 1967). Racialization, within this frame, is fluid and not all out-groups are constructed as threats in the same way or at the same level (Esposito and Murphy, 1999).[7] The proportion of African Americans in a city, country, or region has been used within this logic to explain a number of defensive reactions by whites including opposition to busing (Bobo, 1983), intensified policing (Kane, 2003; Eitle and Taylor, 2008; Kane *et al.*, 2013), welfare generosity (Brown, 2013; Weaver and Gais, 2002), and residential segregation (Iceland and Sharp, 2013).

The mechanics for how group threat was codified and applied to inner city black neighborhoods has been drawn out in intricate historical and contemporary detail by the broader literature on racial discrimination. Several elements are of particular importance to the issue of land abandonment. During and after the Great Migration (particularly the second wave that

included more African Americans), an array of measures including restrictive covenants, federally-sanctioned mortgage discrimination, and zoning were devised to limit where blacks could live, and under what terms they could access capital to buy (or repair) a home (Bradford, 1979; Rothstein, 2014; Sadler and Lafreniere, 2017). The most common form of mortgage capital available were high interest, insecure, contract mortgages (Satter, 2009; Coates, 2014; Badger, 2016). Interpersonally, whites went to extraordinary, and often violent ends, to avoid living near or being schooled with black people (Hirsch, 1998; Sugrue, 2005; Shabazz, 2015). Racist neighborhood groups harassed the few black families who dared to move outside of their circumscribed neighborhoods with everything from taunts to firebombs. Racist realtors exploited the fears of white residents through blockbusting—buying the homes of white people at sub-market costs based on the fear that black people were moving in, and then selling the same house at above-market rates to a black family on the promise that they were getting to move to a white or integrated neighborhood (Gordon, 2009; Highsmith, 2015). Planners and city officials responded to these problems by compounding them, namely by demolishing the black ghetto to make way for expressways that wiped out neighborhoods, and development that would never materialize (Thomas, 2013). These events and others sparked the Civil Rights Movement, which in turn led to important legislation that outlawed many of the discriminatory measures in place. The 1968 Fair Housing Act outlawed rental and mortgage discrimination on the basis of race. The 1974 Home Mortgage Disclosure Act (HMDA) provided activist-researchers with an extensive database on which to test whether mortgage discrimination was still happening. And the 1977 Community Reinvestment Act (CRA) mandated that banks provide loans to underserved communities. By the late 1970s thus, de jure redlining and spatial segregation had been outlawed.

The juridical context since then thus poses a paradox for researchers interested in racial prejudice. On the one hand, it is true that the legal context has changed, and broader public sentiment has shifted about race relations since the mid-twentieth century. Most white survey respondents now believe, for example, that interracial marriage is acceptable and in the abstract principle of racial equality, when very low percentages did in the 1950s (e.g. Newport, 2013). Yet, on the other hand, there has been as much continuity as change when it comes to residential choice. Through audits, activists continue to find that black people are more routinely rejected on rental applications than equally qualified white people (Massey and Denton, 1998). Through HMDA data, researchers find that black families are denied mortgages more frequently, and forced to pay higher interest rates than similarly-resourced white families (Wyly *et al.*, 2006).[8] Regional segregation numbers throughout the United States have eased slightly but mostly because of integration in the inner suburbs (Massey and Denton, 1998). The average percentage of African Americans living in EHLNs actually *increased* from 76.7% in 1970 to 88.3% in 2010 (Hackworth, 2016a). Many whites still construct Blackness as a threat to their safety and property values. According to the Survey of Detroit Area Residents, large majorities of black people would prefer to live in evenly-mixed (black and white) neighborhoods. By contrast, most whites revealed as recently as the 1990s, that they would not feel comfortable *visiting* such a neighborhood, much less residing there (Massey and Denton, 1998: 93; Thomas, 2013: 207-8). A 2016 study, moreover, revealed that the mere association of black people to a space reduced its value and increased its danger to respondents (Bonam, Bergsieker, and Eberhardt, 2016). In a controlled experiment, respondents were given images of housing and urban spaces. The backgrounds were common but some images included a white family, while others included a black family. The latter were judged as significantly more impoverished, crime-ridden, and dirty,

significantly more often than the former even though the background images were the same. Other studies reveal group threat through qualitative methods. Desmond's (2016) award winning book *Evicted* for example revealed, in granular detail, how black people and spaces are constructed as threats by whites in Milwaukee. In one memorable passage when he reveals to one of his white subjects (Larraine)—who incidentally was living in an incredibly-impoverished, crime-ridden all-white trailer park in South Milwaukee—that he was moving to the city's almost-all-black north side (where all of the city's EHLNs are located), she and others became immediately concerned for his safety.

> If moving to the North Side initially confused Woo, it deeply disturbed my neighbors in the trailer park. When I told Larraine, she nearly cried. 'No, Matt. You don't know how dangerous it is.' Beaker chimed in: 'They don't cotton to white folks over there'. (Desmond, 2016: 322)

Elsewhere in the book, Desmond details the lengths to which even the most economically- and socially-marginalized white people would go to avoid living on Milwaukee's North Side themselves. To his in-group white subjects, nothing was considered lower than living with out-group poor black people, so all frantically avoided this fate if they could. This pattern extends to middle class white people as well. Hwang and Sampson (2014), for example, recently found that gentrification in Chicago's inner city was significantly less likely if the resident population was over 40% African American or Latino, even after controlling for income, location, and a variety of other factors that drive the process. In short, while there has been juridical and broad public opinion change since the Civil Rights Movement, the more subtle construction of Blackness as a threat persists.

How do these disparate forms of group threat relate to contemporary land abandonment? First, they have translated into a sustained suppression of demand for housing in the most African-American neighborhoods. Whites, the putative in-group, are the majority population in every state and region in the Rust Belt. If even a sizable percentage of white people construct Blackness in this way, it would decimate demand for housing in very poor, very black neighborhoods. Extreme housing loss neighborhoods are almost entirely African American and most have been for more than 40 years. More than this, they are often the most symbolically black spaces in each city—the location of the original black ghetto; the locale of the most intense violence during the 1967 disorders; and the location of important black churches and institutions. Whites, the majority population, have been avoiding residence in such heavily black neighborhoods since at least the Great Migration, and recent data do not detect any meaningful shift in this trend. Facing the accumulated challenges and opportunity costs of remaining, the black middle class has increasingly followed suit by moving to the suburbs too further undermining potential demand (Darden and Thomas, 2013). Second, and related, group threat has driven a sustained restriction of capital to such neighborhoods for more than 100 years. Historically-open redlining of entire neighborhoods gave way to more furtive and indirect (e.g. subprime lending) measures when the laws changed in the 1970s. Without affordable mainstream mortgages to sell homes to prospective residents, or home-equity loans to repair houses, such neighborhoods deteriorate quickly. Cash-sale slumlords are generally the most active buyers of such housing, but they too accelerate the processes of deterioration by refusing maintenance as part of their dubious business model. The sustained suppression of demand and capital has devastated the poorest out-group spaces the most.

These forces operate independently to produce land abandonment but also as an accelerant for other drivers. White flight, for example, has intensified fiscal problems, which have in turn fueled further abandonment. The racially-based restriction of capital has exacerbated housing lifecycle processes by accelerating the deterioration of older units and making them more difficult to sell. Even the wider process of deindustrialization has interacted in complicated ways with group threat. The history of cities in this region, for example, suggests that the only group willing *en masse* to buy housing in black neighborhoods are other African-American people. When industrial employment was abundant, millions of southern blacks made their way to places like Saint Louis, Cleveland, and Detroit. Even into the 1970s, there were still small inward flows African Americans to the region making housing somewhat easier to sell. But as industrial employment took a more severe hit in the 1970s and 1980s, all housing in industrial cities became more difficult to sell. Housing in black neighborhoods was even more severely hit than other markets as there was no net positive in-migration of new African-American households. Group threat operates in complicated, multi-scalar ways to produce extreme land abandonment. A careful multi-city examination of how much of an influence it plays has yet to be completed. This study was designed around that objective.

Study design

The aforementioned theoretical literatures are rooted in empirical observation, but there is no universally-used measure, sample size, or study-design used to study land abandonment. These studies differ in scale, stage in the abandonment process, and sample size, among other factors. Each conventional approach has its own limitations that will be briefly described, as a justification for the methodology constructed for this study.

Stages of land abandonment

One conceptual issue is pinpointing the stage in the abandonment process for measurement. When a housing unit is vacant, it has, by definition, been abandoned by its user, so some researchers use vacancy rates as a proxy for land abandonment (e.g. Bentley et al, 2016).[9] It is indeed true that places like Heidelberg Street have high vacancy rates (Hackworth, 2016a), but that does not make it a necessarily reliable metric of complete abandonment. First, such numbers give no indication of how permanent the user-vacancy will be. The housing unit may simply be in-between renters, or permanently vacated and irreparably damaged by scrappers (i.e. *very* different situations). Second, vacancy rates do not indicate whether the *owner* of the property has abandoned the housing unit. Investors buy and sell inner core real estate for a variety of reasons in places like Detroit (MacDonald and Wilkinson, 2011). That a housing unit is without an occupant when the U.S. Census gathers its statistics tells us very little. Third, and related, a vacant housing unit tells us very little about the potential for future use. Vacancy could be an indication of something more serious or it could be that the investor is warehousing the property for future investment. The property could still have meaningful exchange value based on its future potential use, or it could be virtually devoid of it.

For these reasons, other scholars use tax foreclosure as a proxy of land abandonment (Akers, 2013; Hackworth and Nowakowski, 2015). Tax foreclosure refers to the process in which public authorities aim to reclaim debts owed by a property owner by auctioning their property (or a lien certificate that has been placed against it). In "healthy" markets these auctions typically attract investors who often bid well above the minimum (which is usually the value of taxes owed) because there is potential value for them to then "flip" or rent the unit. But in

distressed markets, investors often refuse to bid on such units, and owners often do nothing to retain their holding because the tax debt is so much in excess of the current or future value of their property that it does not make any economic sense to bid on it. Such properties often then move to a second "discounted" auction where they are available for as little as $500.[10] Many *still* go unclaimed and the property eventually becomes a holding of the state. Thus tax foreclosure is sometimes used in case studies to denote the formal abandonment of a property by its owner.[11] But while tax foreclosure is arguably the most reliable and sensitive metric for gauging property abandonment, it is also very difficult (and expensive) to assemble datasets of it in more than one locale. Such data is gathered by county-level tax assessors, and the process of tax foreclosure differs significantly between states so it is difficult to pinpoint the stage when an owner has formally relinquished (or it likely to) her/ his holdings.

Thus rather than use housing vacancies or tax foreclosure data, this study uses tract-level housing unit losses between 1970 and 2010 to measure the owner-abandonment of property. Housing units can be "lost" for several reasons that do not denote land abandonment per se.[12] In particular, housing can be cleared by redevelopment to expand a hospital, university or commercial facility. To account for this, I eliminated all census tracts where 80% or more of the lost housing (between 1970 and 2010) occurred in a single decade.[13] Measuring land abandonment in this way thus provides a relatively consistent metric of owner-abandoned, demolished housing units. It denotes the end of the abandonment process, typically after tax reversion is complete, and a public authority has demolished the structure. It is highly unlikely that investors will find meaningful exchange value in the vacant lot for reasons drawn out elsewhere (Hackworth, 2016e).

Levels of land abandonment

Though there is no consensus, quantitative studies on land abandonment tend to use a continuous metric of housing vacancy or housing unit loss as a measurement (Bentley *et al.*, 2016). That is, in such studies a census tract value can range from 0% to 100% (loss of housing units). The main conceptual problem with such an approach is that it is difficult to compare marginal instances of abandonment with more severe and concentrated ones. Neighborhoods with say 50% housing unit losses do not just have 10 times the (relative) losses of a neighborhood with 5%. The former are, in many senses, *qualitatively* different from the latter. Markets and house values in extremely abandoned places, for example, have collapsed so completely that currently popular measures like demolishing vacant housing units would not yield a net benefit (Griswold *et al.*, 2014). Other popular measures, like side-lot programs (which work very well in marginally abandoned neighborhoods) do not work in EHLNs because there are not enough adjacent owner-occupiers to absorb them (Ganning and Tighe, 2015). Larger "right-sizing" plans for very distressed cities position EHLNs differently than other types of neighborhoods. EHLNs in cities that have right-sizing plans[14] are slated for simple removal—in some cases, all new development is prohibited, while other, more marginally distressed neighborhoods are dealt with through a variety of measures (Hackworth, 2015). Extreme housing loss neighborhoods like Heidelberg Street, are in short qualitatively different because of the quantitative concentration of housing abandonment there. There is, of course, no magical threshold in which land abandonment becomes "extreme", but 50% suggests that demolition of housing stock has been more active than any other development force in that neighborhood. It may exclude some fairly serious cases of abandoned neighborhoods, but it certainly includes the most severely abandoned.

Thus rather than measure housing unit losses from 0 to 100% within each census tract, I have chosen to first select extreme housing loss tracts then assess the association of various land abandonment drivers. For the city-level correlation analysis, the continuous variable is the percentage of land area consumed by EHLNs. For the neighborhood-level analysis averages for all EHLNs are compared to all non-EHL tracts in the region. In total, this produced a sample 151 cities, 49 of which contained at least one extreme housing loss neighborhood (EHLN) where more than 50% of the housing had been removed since 1970 (see Table 1; Figure 2).[15] For 102 cities in the sample without an EHLN, the figure was recorded as 0%. For the 49 cities with an EHLN, the range in extent was considerable, from 0.6% of Springfield, IL, to 82.4% of Chester, PA (Figure 3).

Generalizability

Much of the existing literature on land abandonment is based on single city case studies. There are important reasons for this, namely that all studies point to at least some causes that are local in origin or contingent in nature. Local planning decisions, conflicts between neighborhood groups, and decisions by business elites have driven the process in some locations in ways that are not reproducible elsewhere. By the same token, the case study approach has been used to derive larger principles about how, why and where abandonment occurs in a more general sense. Galster's (2012) housing disassembly line, for example, is derived from the careful study of the Detroit region, yet it is used as a reason by others to explain the abandonment process in a more general sense. Similarly single-city histories of Saint Louis (Gordon, 2009) and Flint (Highsmith, 2015) have been used to highlight the general importance of racist housing laws and practices at setting the conditions for contemporary land abandonment. The case study approach is certainly

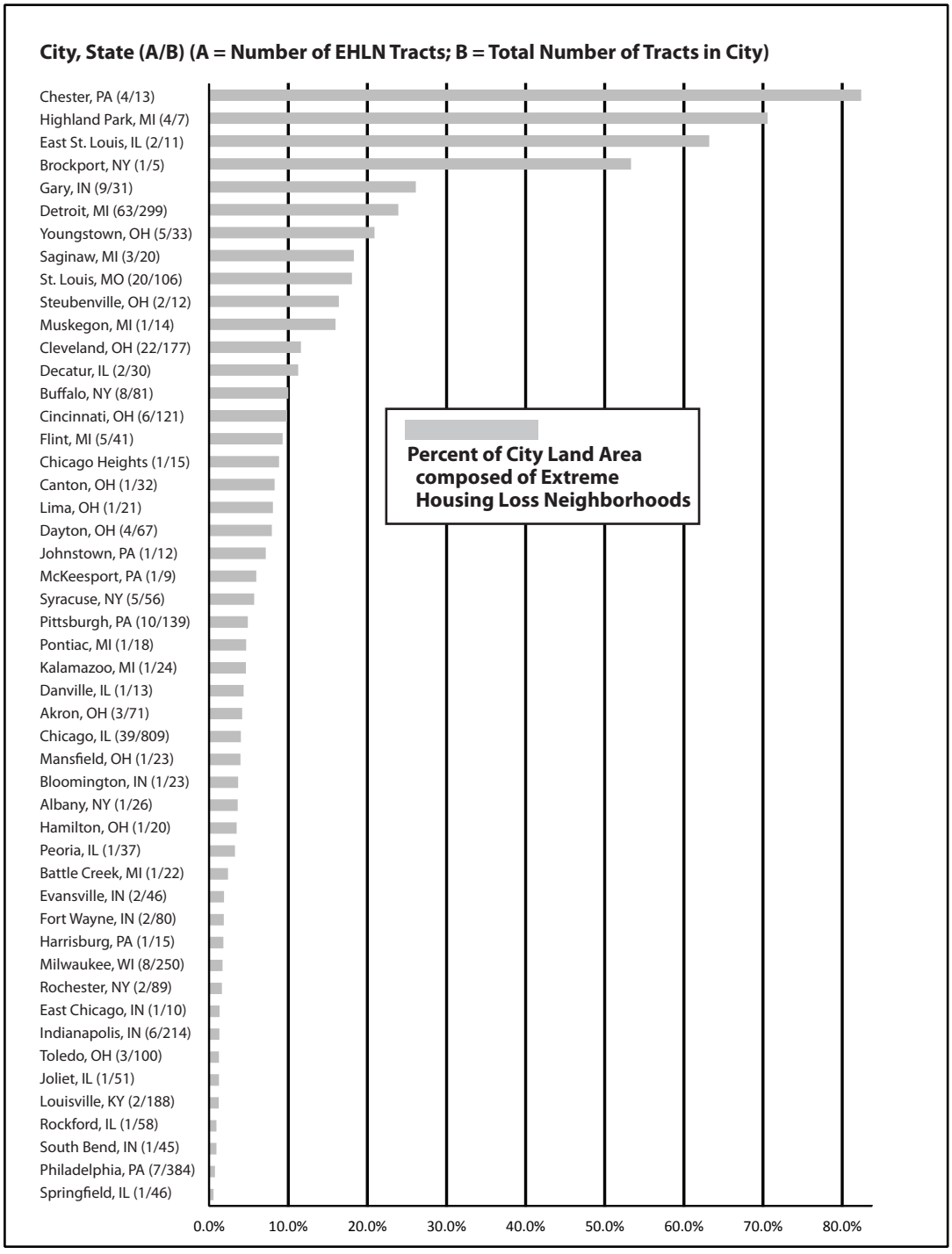

Figure 3: Extent of abandonment in cities with at least one extreme housing loss neighborhood.

Table 1: Cities included in study of extreme housing loss.[a]

State	EHLN Cities[b] (n = 49)	Non-EHLN Cities (n = 102)
Illinois	Chicago, Chicago Heights, Danville, Decatur, E. St. Louis, Joliet, Peoria, Rockford, Springfield	Alton, Aurora, Belleville, Berwyn, Bloomington, Champaign, Cicero, Elgin, Evanston, Granite City, Kankakee, Maywood Village, Moline, Oak Park, Rock Island, Waukegan
Indiana	Bloomington, E. Chicago, Evansville, Ft. Wayne, Gary, Indianapolis, So. Bend	Anderson, Elkhart, Hammond, Kokomo, Lafayette, Michigan City, Mishawaka, Muncie, New Albany, Terre Haute
Kentucky	Louisville	-
Michigan	Battle Creek, Detroit, Flint, Highland Park, Kalamazoo, Muskegon, Pontiac, Saginaw	Ann Arbor, Bay City, Dearborn, Ferndale, Grand Rapids, Hamtramck, Jackson, Lansing, Lincoln Park, Port Huron, Royal Oak, Wyandotte
Missouri	St. Louis	-
New York	Albany, Brockport, Buffalo, Rochester, Syracuse	Binghampton, Elmira, Ithaca, Kingston, Lackawanna, Lockport, Niagara Falls, Rome, Schenectady, Troy, Utica, Watertown
Ohio	Akron, Canton, Cincinnati, Cleveland, Dayton, Hamilton, Lima, Mansfield, Steubenville, Toledo, Youngstown	Alliance, Barberton, Cleveland Heights, Columbus, Cuyahoga Falls, E. Cleveland, Elyria, Euclid, Lakewood, Lorain, Massillon, Middletown, Newark, Norwood, Parma, Shaker Heights, Springfield, Warren
Pennsylvania	Chester, Harrisburg, Johnstown, McKeesport, Philadelphia, Pittsburgh	Aliquippa, Allentown, Altoona, Bethlehem, Easton, Erie, Hazleton, Lancaster, Lebanon, New Kensington, Norristown Borough, Reading, Scranton, Sharon, Washington, Wilkes-Barre, Wilkinsburg, Williamsport, York
Wisconsin	Milwaukee	Appleton, Beloit, Eau Claire, Fond Du Lac, Green Bay, Kenosha, La Crosse, Madison, Oshkosh, Racine, Sheboygan, Superior, Wausau, Wauwatosa, W. Allis

NOTES

[a] Includes all cities whose 1950 population exceeded 25,000 people in New York, Pennyslvania, Ohio, Michigan, Indiana, Illinois and Wisconsin. New York City was subtracted, and St. Louis and Louisville were added.

[b] Cities that include at least one extreme housing loss neighborhood (EHLN). EHLNs are census tracts that lost more than 50% of their housing between 1970 and 2010 (not including tracts that contained fewer than 500 housing units in 1970, or those that lost more than 80% of their housing in a single decade).

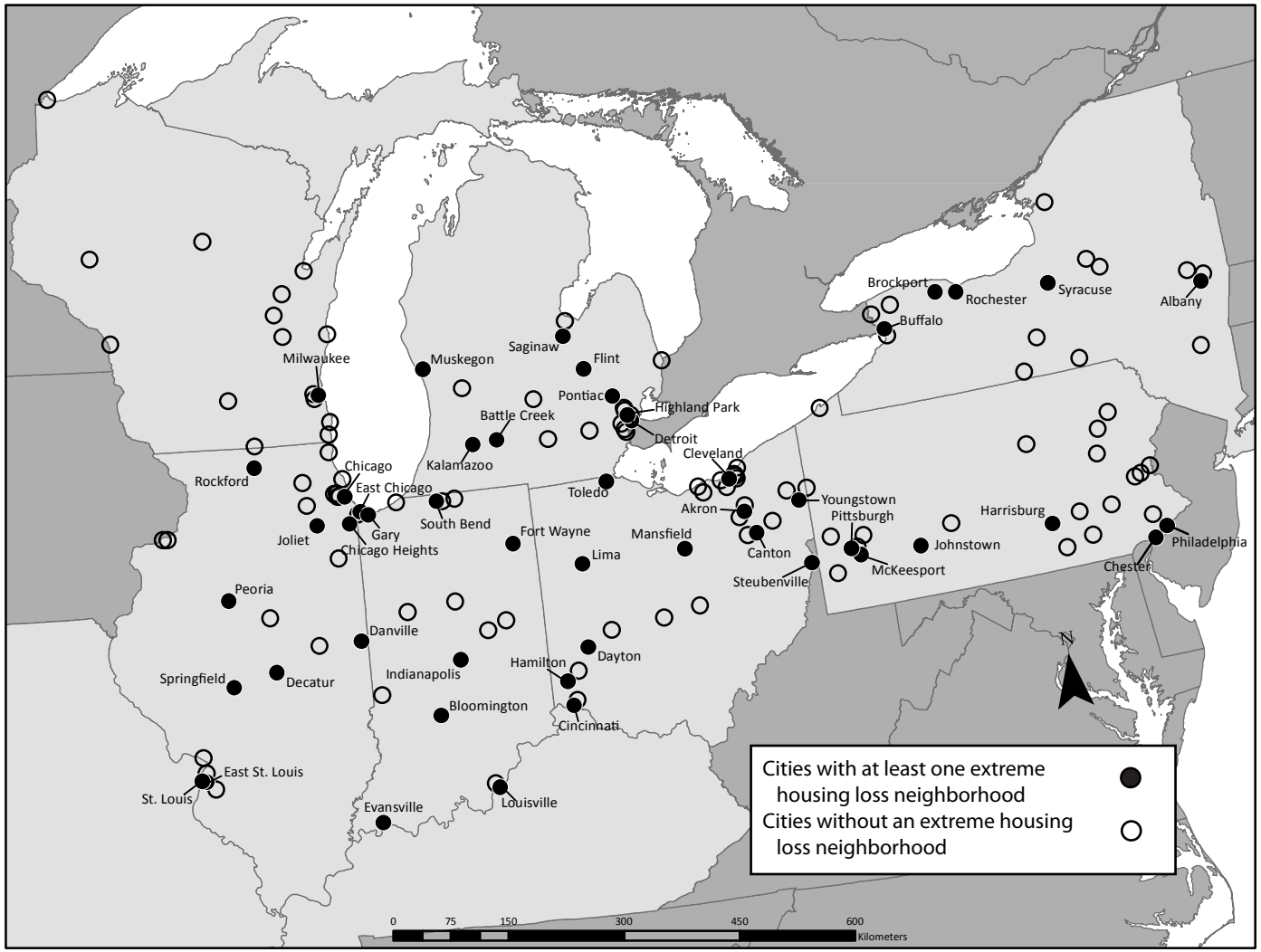

Figure 2: Cities with, and without, extreme housing loss neighborhoods in the American Rust Belt.

valuable but it raises obvious questions about generalizability. If fringe growth is framed as a cause of inner city land abandonment on the basis of a careful study in Detroit, presumably we should find less relative abandonment in slower suburban fringe growth places like Fort Wayne. If race is a reason for major abandonment in Flint or Saint Louis, presumably there would be less abandonment in a whiter cities like Allentown. Case studies cannot address questions of this sort. Only a wider sample of cities can answer these questions.

For this study, I focus on larger older cities the Rust Belt to partially control for industrial histories and housing stocks that are different elsewhere in the country. Specifically, I limit the focus to cities which had a built-up core before 1970 (to eliminate as many new suburbs as possible), so the exercise began by considering all cities in the region that contained at least 25,000 people in 1950. For this study, all cities that met this threshold (over 25,000 in 1950) in Pennsylvania, Ohio, Michigan, Indiana, Illinois, and Wisconsin were considered, as were cities in New York State, except for New York City and its suburbs (because of its dissimilarity with cities in the Midwest). Louisville and Saint Louis were added to the sample because their similarities to other cities in the region, and because their metropolitan statistical areas (MSA) spill into the study zone.

City-level analysis:

To assess the impact of forces operating at the city level, this study relied on a dataset of variables that align with the theoretical principles expressed in each school of thought. The source definitions are contained in Appendix 1. As the table indicates, all variables were obtained from the U.S. Censuses of Population, Government, Economy and Manufacturers for the period 1970 to 2012. To assess the impact of neighborhood lifecycle, housing age, and pace

of suburban fringe construction were computed. Specifically, the percentage of housing units that were older and newer than 20 years was calculated for each city to assess the impact of housing age on the extent of EHLN in each city. The percent growth of fringe housing units—those that were built outside of the principle city in the region—was calculated to assess the degree of fringe growth.[16] Operationalizing the tax-service nexus across the region involved data from the Censuses of Governments in 1972 and 2012. Three areas were chosen: property taxes per person, all local revenue per person, and expenditures per person in 1972 and 2012. Change over time metrics for each dimension were also calculated. This study eliminates resources such as transfer payments from higher levels of government because the intent is to assess the relationship between *local* fiscal conditions and extreme housing loss. To operationalize deindustrialization, this study employed a simple ratio of the number of manufacturing jobs in 1972 (from the 1972 Census of Manufacturers) to 2012 (from the 2012 Economic Census). This calculation was performed at both the city and MSA levels.[17] The 151 cities in this study lie within 82 MSAs, so some of the latter calculations were the same. Finally, at the city level, this study measured percentages (and change over time between 1970 and 2010) of black, white, and neither in each city in 1970 and 2010. Measuring race in this way is, of course, somewhat limiting. It fails to capture, for example, the complexity of the social construction (Esposito and Murphy, 1999; Brown, 2013). I fully acknowledge this limitation. That said, percent of the out-group is a commonly used metric in group threat studies (e.g. Quillian, 1996; Kane, 2003), and while the sheer volume of the out-group is not the *only* dimension of that social construction, it is an important component of it (Dixon, 2006).

Two tests were then performed with these metrics. First, a simple t-test comparing the averages of each variable in EHLN cities (N=49) and those without an EHLN (N=102) was

performed (Table 2). Second, all of the variable were correlated against the percent of each city that is characterized as an extreme housing loss neighborhood (Table 3). Correlation tests were performed using both the entire sample of cities (N=151) and just those cities with an EHLN (N=49) separately. The goal is *not* to assemble a multivariate model, but rather to parse the various influences and compare their relative weights.[18]

Neighborhood-level analysis:

To assess these patterns at the neighborhood level, data from the Geolytics Neighborhood Change Database (NCDB) was used. The NCDB normalizes census tract boundaries over time to allow for change-over-time analysis back to 1970. The census tract database was used here to divide the 49 affected cities into two categories: extreme housing loss neighborhoods (N=269), and all other tracts in the same cities (N=3,714). The neighborhood types were then compared to see on which dimensions EHLNs vary from others the most. The NCDB is derived from the U.S. Census—which measures some of the aforementioned concepts differently than other sources such as the Census of Manufacturers—so some adjustments were made. Housing age was calculated in a manner identical to the city-level analysis (see Appendix 2 for neighborhood-level variable definitions). The impact of suburbanization and fringe growth on individual tracts is difficult to isolate conceptually (and empirically), so it was not calculated for this scale. Tax-service nexus measures were not measured at this scale because the Tiebout argument (and on-the-ground reality) is that cities (and some counties) determine tax and service levels, not neighborhoods. Deindustrialization was measured using the Census of Population data on occupations of residents. The U.S. Population Census measures industrial sector jobs differently than the Census of Manufacturers and Economic Census in two ways that are worthy of mention.

Table 2: City level t-test differences.

	Extreme Housing Loss Neighborhoods			
	Cities with (N=49)	**Cities without (N=102)**	**Difference**	**T-Value**
Housing Lifecycle				
Percentage of newer housing	25.9%	30.3%	-4.4	-1.81
Percentage of older housing	74.1%	69.7%	4.4	1.81
Suburban fringe housing growth, 1970-2010	88.7%	76.3%	12.4	0.98
Tax-Service Nexus				
Property tax revenue per person, 1972	$70.80	$76.10	-$5.30	-0.57
Property tax revenue per person, 2012	$361.70	$399.10	-$37.40	-0.79
All local revenue per person, 1972	$206.30	$171.60	$34.70	2.06*
All local revenue per person, 2012	$1,683.40	$1,213.00	$826.50	3.60*
Total expenditures per person, 1972	$282.00	$239.40	$42.60	1.71
Total expenditures per person, 2012	$2,430.20	$1,603.70	$826.50	3.98***
Change in property tax revenue per person, 1972-2012	416.1%	542.5%	126.4	-2.23*
Change in all local revenue per person, 1972-2012	763.2%	685.9%	77.3	1.48
Change in expenditures per person, 1972-2012	787.7%	710.8%	76.9	1.42
Deindustrialization				
Ratio of 1972 to 2012 manuf. jobs in the city	5.8	4.9	0.9	0.96
Ratio of 1972 to 2012 manuf. jobs in the region	2.5	2.3	0.2	1.70
Racialization				
Black population, 1970	21.5%	6.1%	15.4	6.96***
Black population, 2010	35.5%	14.8%	20.7	6.02***
Change in Black population 1970-2010	14.7	7.9	6.8	4.03***
White population, 1970	77.9%	93.5%	-15.6	-6.96***
White population, 2010	54.1%	73.3%	-19.2	-5.41***
Change in White population, 1970-2010	-24.3	-19.6	-4.7	-2.39**
Other population, 1970	0.61%	0.41%	0.20	2.12**
Other population, 2010	10.1%	11.9%	-1.8	-1.56
Change in Other population, 1970-2010	9.6	11.7	-2.1	-1.77

*** <0.001
** <0.01
* <0.05

Table 3: Spearman's correlation coefficients with percentage of land area that is EHLN.

	All Cities		Only EHLN Cities	
Housing Lifecycle	Coeff.	N	Coeff.	N
Percentage of newer housing	-0.158	103	-0.339*	42
Percentage of older housing	0.158	103	0.339*	42
Suburban fringe housing growth, 1970-2010	-0.061	146	-0.167	48
Tax-Service Nexus				
Property tax revenue per person, 1972	-0.007	151	-0.136	49
Property tax revenue per person, 2012	-0.151	151	-0.229	49
All local revenue per person, 1972	0.161*	151	-0.146	49
All local revenue per person, 2012	0.287***	151	-0.134	49
Total expenditures per person, 1972	0.173*	151	-0.088	49
Total expenditures per person, 2012	0.299***	151	-0.020	49
Change in property tax revenue per person, 1972-2012	-0.174*	151	-0.230	49
Change in all local revenue per person, 1972-2012	0.285	151	-0.110	49
Change in expenditures per person, 1972-2012	0.135	151	0.149	49
Deindustrialization				
Ratio of 1972 to 2012 manufacturing jobs with city	0.271**	128	0.442**	43
Ratio of 1972 to 2012 manufacturing jobs with region	0.125	147	0.431**	46
Racialization				
Black population, 1970	0.657***	143	0.458**	48
Black population, 2010	0.567***	151	0.445**	49
Change in Black population 1970-2010	0.431***	143	0.490***	48
White population, 1970	-0.658***	143	-0.449**	48
White population, 2010	-0.458***	150	-0.338*	48
Change in White population, 1970-2010	-0.248**	146	-0.272	47
Other population, 1970	0.246**	143	0.077	48
Other population, 2010	-0.770	150	-0.491***	45
Change in Other population, 1970-2010	-0.107	142	-0.475**	47

*** <0.001

** <0.01

* <0.05

First, the U.S. Population Census gathers data on the residential location of workers, not the location of their job. Second, the Population Census definition of "industrial worker" is different than the Economic Census (and earlier Census of Manufacturers). At the tract level in 1970, the Population Census tabulated the number of people "employed as operators, assemblers, transportation, material moving, nonfarm laborers, and service workers". At the tract level in 2010, some of this data was parsed into different categories. To make the measures comparable, they were combined into a category that included all of the 1970 occupational areas. These numbers were then divided by the total employed residents for a given census tract for both 1970 and 2010. A simple change-over-time calculation was also added. Because this excludes individuals who are unemployed, a measure of unemployment (1970, 2010, and change over time) was also added. Finally, neighborhood-level race statistics were considered: percentages of black, white, and neither for 1970, 2010, and change between those two years. Once collected, the difference in averages for EHLNs and all other tracts was calculated and a t-test of significance. The results are presented in Table 4.

Findings

The findings for this study are presented in Tables 2, 3, and 4. In general, the percentage of African-American people is a stronger correlate, at the city level with the extent of extreme housing loss than any of the other factors derived from land abandonment theory. At the neighborhood level, extreme housing loss neighborhoods are significantly different than other neighborhoods in the same cities, but in no area is the difference as great as race.

<u>1. Lifecycle influences:</u>

Table 4: T-test comparisons between extreme housing loss neighborhoods and other residential areas in the same cities.

	Extreme HL Neighborhoods	All Other Neighborhoods	Difference	T-Value
Housing Lifecycle				
Percentage of Newer Housing	11.99%	32.56%	-20.57	18.82***
Percentage of Older Housing	88.01%	67.44%	20.57	-18.82***
Deindustrialization				
Manufacturing employment, 1970	59.31%	38.71%	20.60	-30.32***
Manufacturing employment, 2010	39.54%	29.90%	9.64	-11.47***
Change in manufacturing employment, 1970-2010	-19.76	-8.8	10.96	11.27***
Percent unemployed, 1970	8.88%	4.48%	4.40	-24.34***
Percent unemployed, 2010	24.26%	13.96%	10.30	-13.14***
Change in Unemployment, 1970-2010	15.38	9.35	6.03	-7.72***
Racialization				
Black Population, 1970	63.08%	17.74%	45.34	-20.72***
Black Population, 2010	75.85%	38.74%	37.11	-21.53***
White Population, 1970	34.56%	79.75%	-45.19	21.44***
White Population, 2010	18.80%	50.70%	31.90	21.86***
Other Population, 1970	2.36%	2.51%	-0.15	0.48
Other Population, 2010	5.56%	10.56%	5.00	7.91***
Change in Black Population, 1970-2010	-16.06	21.04	37.10	23.06***
Change in White Population, 1970-2010	12.77	-29.08	41.85	-25.65***
Point Change in Other Population, 1970-2010	3.29	7.01	3.72	9.94***

*** <0.001

** <0.01

* <0.05

There was considerable difference in the 1970 housing stock age within the samples (EHLN cities versus non-EHLN cities) but not between. For cities without an EHLN, the percentage of older housing ranged from 26.1% in Parma Ohio to 93.2% in Wilkes-Barre Pennsylvania. For cities with EHLNs, older housing ranged from 53.1% in Indianapolis to 92.6% in Buffalo. There was not however, a statistically significant difference between the two types of cities at this scale (Table 2). Similarly, new housing built outside of the urban core for non-EHLN cities ranged from 9.6% growth for Muncie, Indiana to 158.4% for Appleton, Wisconsin. For those with an EHLN, fringe housing growth ranged from 14.1% (Battle Creek, MI) to 158.4% (Appleton, WI). Again however, there was not a significant difference between the two samples on this score. The impact of accelerated suburbanization was also not a consistent predictor. High rates of suburban fringe housing growth were more widespread than the presence of EHLN in the region.[19] Correlations between these variables also reveal little impact for higher-than-normal suburban growth. As Table 3 indicates, a higher percentage of older housing was lightly (but significantly) associated with greater extent of EHLN within just those 49 cities, but was not a statistically significant predictor in the larger sample of cities. At the neighborhood level (Table 4), EHLNs did contain housing stocks that were marginally older, but the overwhelming majority of housing in all neighborhoods was over 20 years in both samples. Greater was the difference in *new* housing: 32.56% of non-EHLNs, while only 11.99% of EHLNs were new housing in 1970.

2. Tax-service influences:

Overall, the tax-service nexus was not a strong predictor of extreme housing loss at the city level. Property tax per person (in current dollars) was higher for non-EHLN than EHLN cities in both 1972 and 2012, but the differences were not statistically significant (Table 2).

Fiscally-challenged cities evidently compensated for this shortfall through user fees and other taxes as the average revenue (all local sources) was actually higher for EHLN cities in both years. Expenditures per person were higher in EHLN cities by small, but statistically significant, margins. Changes in each variable were considerable in both categories, but only changes in property tax revenue, with non-EHLN cities averaging 542.5% (versus 416.1% for EHLN cities) was significant. As Table 3 illustrates, correlations were also light across the board at both scales of analysis. All local revenue per person in 2012 was positively associated with the presence of EHLN. This is counterintuitive and difficult to align with theories of fiscal crisis which would posit a negative relationship. Total expenditures per person in 2012 was also positively associated (.299) which aligns better with the principle here, but the level of correlation was still low. Change over time variable associations were not strong or significant. Within EHLN cities alone, all variables were very lightly (and negatively) associated, and none significantly. Census of Government data does not exist at the tract level to do a t-test so it was not included for this level of analysis. In general, however, there appears to be little isolated link between fiscal stress and extreme housing loss.

3. Deindustrialization influences:

For non-EHLN cities, the ratio of manufacturing job change ranged from 0.6 in Lafayette, Indiana (i.e. the city actually *gained* jobs) to East Cleveland, Ohio which had 45.6 times more manufacturing jobs in 1972 than they did in 2012. EHLN cities also had enormous variation on this measure ranging from 1.3 in Battle Creek, Michigan to 24.5 in Highland Park, Michigan. Though the average level of deindustrialization was higher in EHLN than non-EHLN cities, the ratios were not statistically different when a t-test was performed (Table 2). The same pattern held when those measures were applied to the regional level.

The relationship strengthened when it was expressed in the form of correlations (Table 3). There is a small, but statistically significant, correlation between manufacturing job loss and the extent of EHLN in the city (0.271). This relationship is much stronger when considering the range within the EHLN cities alone (0.442). Regional deindustrialization did not have a statistically significant relationship with the extent of EHLN at the city level (0.125) but did within the EHLN-only sample (0.431). Table 4 illustrates some aspects of this pattern at the neighborhood level. Above all, it illustrates the dependence on manufacturing employment in the 49 EHLN cities (in both kinds of neighborhoods) with rates of employment well above the national averages. Manufacturing employment accounted for a larger portion of EHLN occupations than other areas of the city, but it should be noted that all areas of these cities were substantially oriented around manufacturing employment, and remain so in relative (to the rest of the U.S.) terms. Between 1970 and 2010, the downturn in manufacturing employment, and uptick in unemployment hit EHLNs more severely than other areas of the same cities, but again, even "healthy areas" of such cities were in evident distress. In all cases, there was a statistically significant difference between the employment (and unemployment) composition of EHLN versus non-EHLN neighborhoods, but the most significant neighborhood level differences were in the average percent of manufacturing employment in 1970 (20.6 points higher in EHLNs), and the relative drop in such employment between 1970 and 2010 (10.9 points higher in EHLN). In short, there appears to be a moderate, but mixed signals of a relationship between deindustrialization and the production of extreme housing loss.

4. Race influences:

Race is the most consistent and strongest correlate of extreme housing loss neighborhoods and the dimension on which they differ the most with growing and less extreme

cases of abandonment. A few descriptive matters are worth highlighting before delving into this association. First, the cities of the Midwest were in 1970 and remain (compared to the rest of the United States), heavily dominated by white and black. People who identify as neither or mixed race accounted for less than 1% of the population in 1970, and around 10% in 2010 (10.1% for EHLN cities; 11.9% for non-EHLN cities) (see Table 2). Second, there is considerable variation in the distribution of white and black populations between cities in the region. In 1970, EHLN cities ranged from 2.6% (Bloomington, Indiana) to 68.9% black (East Saint Louis, Illinois), with an average of 21.5%. In 2010, the EHLN cities ranged from 2.8% (Brockport, New York), to 97.0% black (East St. Louis), but the overall average had increased to 35.5%. There was also considerable variation within non-EHLN cities. In 1970, percent black ranged from a 13-way tie with 0.0%, to 58.6% in East Cleveland. In 2010, populations ranged from 1.1% black in Eau Claire Wisconsin, to 93.2% black in East Cleveland. But while ranges were significant, so were the differences between categories. Sizeable and statistically significant t-test differences were found between EHLN and non-EHLN cities on: percent black 1970, percent black 2010, change in percent black 1970-2010, percent white 1970, percent white 2010, and change in percent white 1970-2010 (Table 2). Differences on percent other were more ambiguous.

When expressed as correlations, the relationship is similarly strong. Percent black is the strongest and most significant correlate with extreme housing loss within the larger sample or just those that have one EHLN. The positive relationship holds whether one considers the percent black in 1970, 2010, or the change between these points (Table 3). Table 4 illustrates the neighborhood-level pattern of this relationship. EHLNs were 45.3 percentage points more African-American than all other neighborhoods in those cities in 1970. By 2010, the rate had shrunk somewhat to 37.1 points but only because non-EHL neighborhoods became more

integrated. EHLN areas actually became even more concentrated black. Race, in short, is the most significant correlate of EHLN extent at the city level, and the most substantial neighborhood difference from non-EHL neighborhoods.

Conclusion

Land abandonment is arguably the most visible form of urban decline. It vexes city planners, troubles residents, and discourages productive owner-occupation. It also serves as a challenge for urban theorists struggling to comprehend why some places have more extreme versions of it than others. Conventional theory tends to emphasize "natural" housing lifecycles, fiscal collapse, or deindustrialization (or unemployment). Yet, none of these factors is as strongly associated with extreme land abandonment as race. EHLNs are significantly more African American than non-EHLN neighborhoods. Cities and neighborhoods with high percentages of African American people, are more likely than others to experience extreme land abandonment. Of course, this is not the *only* reason for land abandonment. Much remains local, unexplained, or unmeasurable about patterns of extreme abandonment. This study does not change that, but it does underscore the relative importance of race compared to other putative reasons in the literature on urban decline and land abandonment.

The most theoretical compelling explanation to account for the multi-scalar trans-historical production of these spaces is group threat theory. Blackness itself has been constructed as a threat to white property, safety and political power. The in-group reaction to this constructed out-group threat has, of course, changed over time. Racial discrimination in lending and renting are now illegal, and white attitudes about broad, abstract matters of racial equality have indeed become more tolerant. But residential segregation patterns have budged only slightly and even

then at the regional level. EHLNs have become *more* racially isolated than they were even under the period de jure racial segregation. Social psychologists, survey researchers, and ethnographers continue to find evidence that many whites construct black people as a threat. GTT offers the most compelling theoretical explanation for this pattern. Rather than fixating on what is now legal or not in the realm of housing discrimination, it focuses on the symbolic construction of the underlying "threat". In this context, the construction of Blackness as a threat has taken different forms over the years, but produced the same two conditions that have facilitated the production of extreme housing loss. It has manifest as a sustained suppression of demand from the numerical majority (white people) and has constricted the availability of mainstream capital to the most African American spaces. This underlying condition has, in turn, amplified other abandonment-producing processes like the suburbanization of housing and jobs. Thus in conclusion, rather than exclusively framing the process as an outcome of natural economic evolution, conventional theory should be supplemented with a consideration of race. It is not just a demographic oddity or causally-irrelevant that extreme abandonment and the location of poor African Americans are associated with one another. The former is deeply and directly influenced by the construction of the latter as a threat.

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ENDNOTES

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[2] Extreme Housing Loss Neighborhoods are census tracts that lost more than half of their housing between 1970 and 2010. The more detailed definition and justification for this threshold is contained in the study design section.

[3] In the 49 cities with extreme housing loss, 6.8% of tracts were EHLNs, 47.3% of tracts had lost 0-49.9% of their housing, and 45.9% of tracts saw an increase in their housing units since 1970.

[4] The physical idiosyncrasies of a particular city can exacerbate these problems. Ryan (2012), for example, points out how Detroit's overwhelmingly wood-frame housing stock deteriorated more rapidly than Philadelphia's brick-framed (multi-family) housing and thus contributed to the difference in abandonment between the two cities.

[5] In some cases government insurers actually identify at risk areas, and this designation becomes a self-fulfilling prophesy as investors avoid the neighborhood on this basis (Metzger, 2000).

[6] Famous examples of such counterproductive activities include using public financing to build large commercial redevelopment projects that are themselves eventually abandoned (e.g. Flint's Autoworld), or using eminent domain to allow for factory expansions and other redevelopment that fails to deliver on its promises (e.g. Poletown in Detroit/ Hamtramck).

[7] Researchers have found, for example, that racist white attitudes toward Latinos are more easily dissolved through basic interaction than hostile attitudes toward African Americans are with the same exposure (Dixon, 2006).

[8] Legally, such practices still occur because all of the legislation involved was highly compromised to begin with (Massey and Denton, 1998). The Fair Housing Act explicitly places the burden on those who were discriminated against, to prove it—an incredibly complicated and often expensive process. HMDA provides a great deal of data, but it also omits other factors the banks use to determine credit-worthiness and create profiles of borrowers. The CRA relies on federal enforcement—which was generally non-existent under Reagan and (GHW) Bush—and only mandates that banks serve certain communities. It does not require them to provide mainstream interest rates or serve the most underserved communities (e.g. EHLNs), and they generally do not.

[9] More general studies of urban decline often use population loss as a metric. One prominent limitation to using this approach here is that household sizes have shrunk by about a third since 1950. That is, a third of population loss in cities with roughly the same housing stock is due to household restructuring, not the abandonment of the housing unit per se. Such units are still occupied but by fewer people.

[10] The actual rate varies by state. $500 is the minimum bid for secondary auctions in Detroit.

[11] It is important to note that tax foreclosure is different from mortgage foreclosure. Though mortgage foreclosure has drawn the attention of many researchers in recent years, if a property goes unclaimed at an auction to recover mortgage losses, the holding reverts to the bank holding the loan, not the government. Banks are reluctant to take less than the mortgage debt owed on the property so many have, since 2008, opened REO (real estate owned) offices where they sell foreclosed units directly. Units that go unclaimed at *tax* auction almost never have a mortgage on them, and the values are typically much lower. It is typical in Detroit for example, for properties to go unclaimed for $12,000 in tax debt. It is rare that a Sherriff's auction occurs for a house with a $12,000 mortgage. Thus in short, tax foreclosure is often a sign of much more actual and sustained abandonment than mortgage foreclosure.

[12] In some cases, housing units can also be lost through the conversion of a multi-family housing unit into a single family house—a characteristic of gentrification not land abandonment. It is difficult to fully eliminate the possibility for the latter, but a more careful demographic comparison of incomes, rents, and house values in EHLN (Hackworth, 2016b) indicates that, if such a pattern exists, it is marginal in size. EHLNs have not exhibited characteristics of gentrification since 1970.

[13] I arrived at this figure by "ground-truthing" (with Google Earth) all census tracts with more than 50% housing loss, and highlighting those that were the result of an adjacent institutional or commercial redevelopment. The 80% threshold eliminated all such tracts and thus was applied to the larger sample to be consistent.

[14] The following cities have a formal plan for right-sizing: Cleveland, Detroit, Flint, Saginaw, and Rochester. Please see Hackworth (2015) for more detail.

[15] Tracts that had fewer than 500 housing units 1970 (and were thus likely not residential areas) or where 80% or more of the housing was lost in a single decade (which likely denotes demolition associated with some form of economic development) were eliminated.

[16] In other studies, the housing disassembly line is measured by assessing the difference between the household growth (or decline) and housing unit growth (or decline) at the MSA level. This approach was not adopted here for

two reasons: 1) Such a measure creates deceptively high numbers for some extreme housing loss cities, *not* because there was extraordinary fringe growth but because there was extraordinary inner core land abandonment. The reason that places like Detroit or St. Louis would, for example, measure high on such measures is not because they had higher than normal fringe growth per se (compared to other Midwestern cities). It is because they had higher than normal housing unit abandonment in the core; and 2) It is difficult to separate cause and effect from such metrics. That is, did extra fringe growth cause the abandonment of the core, or did it simply absorb the outflow of households who were going to leave anyway?

[17] To assure consistent measurement and account for changes within a region that might not always be accounted for via the regular updates to the MSA boundaries, this study utilized recent county-level boundaries for each MSA and gathered data within this catchment (whether or not it was formally considered part of the MSA in the 1970s) (United States Executive Office of the President, 2013).

[18] The approach here is to separate and evaluate the different influence of these forces, but a longer working paper version of this project does fuse them into a multi-variate regression if the reader is interested in this detail (see Hackworth, 2016c).

[19] This aligns with other studies that have questioned the relationship between suburbanization and decline (e.g. Downs, 1999).

Appendix 1: Measures used for city-level analysis of land abandonment.

Variable	Code	Calculation and Source
Housing Lifecycle		
Percentage of newer housing	A	The total number of housing units in the city built after 1949 divided by the total housing units in 1969. Data are derived from the 1970 U.S. Census of Population and Housing, and retrieved through the Social Explorer (2016) Dataset.
Percentage of older housing	B	The total number of housing units in the city built before 1949 divided by the total housing units in 1969. Sources: same as A.
Suburban fringe housing growth, 1970-2010	C	Percent growth in the number of housing units built between 1970 and 2010 outside of the principal city in the metropolitan statistical area (MSA). MSAs were defined using fixed contemporary definitions (United States Executive Office of the President, 2013). Housing unit data for 1970 and 2010 were derived from the U.S. Census of Population and Housing for both years respectively. The data were retrieved through the Social Explorer (2016) dataset.
Tax-Service Nexus		
Property tax revenue per person, 1972	D	Current property tax revenues in 1972 (current dollars) divided by the 1970 city population. Sources: the U.S. Census of Governments, 1972, and the Census of Population and Housing, 1970.
Property tax revenue per person, 2012	E	Current property tax revenues in 2012 (current dollars) divided by the 2010 city population. Sources: U.S. Census of Governments (2012) and Census of Population and Housing, 2010.
All local revenue per person, 1972	F	All local revenue in 1972 (current dollars)—includes property taxes, other taxes, and user fees collected within the border of the city in question—divided by the 1970 city population. Sources: same as D.
All local revenue per person, 2012	G	All local revenue in 2012 (current dollars), divided by the 2010 city population. Sources: same as E.
Total expenditures per person, 1972	H	Total expenditures in 1972 (current dollars)—which includes all operating and debt service expenses—divided by the 1970 city population. Sources: same as D.
Total expenditures per person, 2012	I	Total expenditures in 2012 (current dollars) divided by the 2010 city population. Sources: same as E.
Change in property tax per person, 1972-2012	J	Percent change between D and E.
Change in all local revenue per person, 1972-2012	K	Percent change between F and F.
Change in total expenditures per person, 1972-2012	L	Percent change between H and I.

Appendix 1 cont.

Deindustrialization		
Ratio of 1972 to 2012 manufacturing jobs within city	M	Number of manufacturing establishment employees in 1972 divided by the number of manufacturing jobs in 2012 within the same city (regardless of boundary changes). Both refer to the location of the job (not the residential location of the worker). Sources: 1972 Census of Manufacturers via the University of Virginia City and County Data Book Archive (2016), and the 2012 U.S. Economic Census, total employees for NAICS codes 31-33 via American Factfinder (U.S. Census, 2016).
Ratio of 1972 to 2012 manufacturing jobs within MSA	N	Number of manufacturing jobs in the MSA in 1972 divided by the number of manufacturing jobs in 2012 (using constant 2013 MSA boundaries). Sources: same as M.
Racialization		
Black population, 1970	O	Percent of a city that self-identified as Black in 1970. Source: 1970 Census of Population and Housing via the Social Explorer Database.
Black population, 2010	P	Percent of a city that self-identified as Black in 2010. Source: 2010 Census of Population and Housing via the Social Explorer Database.
Change in Black population, 1970-2010	Q	P minus O.
White population, 1970	R	Percent of a city that self-identified as White in 1970. Source: same as O.
White population, 2010	S	Percent of a city that self-identified as White in 2010. Source: same as P.
Change in White population, 1970-2010	T	S minus R.
Other population, 1970	U	Percent of a city that self-identified as neither Black nor White in 1970. Source: same as O.
Other population, 2010	V	Percent of a city that self-identified as neither Black nor White in 2010. Source: same as P.
Change in Other population, 1970-2010	W	V minus U.

Appendix 2: Measures used for neighborhood-level analysis of land abandonment.

Variable	Code	Calculation and Source
Housing Lifecycle		
Percentage of newer housing	A	The number of housing units in the census tract built after 1949 divided by the total housing units in 1969. Source: 1970 U.S. Census of Population and Housing, via the Geolytics Neighborhood Change Database (NCDB) (2016).
Percentage of older housing	B	The number of housing units in the census tract built before 1949 divided by the total housing units in 1969. Source: same as A.
Deindustrialization		
Manufacturing employment, 1970	C	Percentage of 16+ aged people (not including unemployed) "employed as operators, assemblers, transportation, material moving, nonfarm laborers, and service workers" within the tract in 1970. Source: U.S. Census of Population and Housing, 1970 via the NCDB (2016).
Manufacturing employment, 2010	D	Combined percentage of 16+ aged people (not including unemployed) employed as: A. "operators, assemblers, transportation, and material moving workers", B. "nonfarm workers", and C. "service workers". Source: same as C.
Change in manufacturing employment, 1970-2010	E	D minus C.
Percent unemployed, 1970	F	Percentage of people, 16-64, in the census tract who were unemployed in 1970. Source: same as C.
Percent unemployed, 2010	G	Percentage of people, 16-64, in the census tract who were unemployed in 2010. Source: same as D.
Change in unemployment, 1970-2010	H	G minus F.
Racialization		
Black population, 1970	I	Percentage of the census tract that self-identified as Black in 1970. Source: 1970 Census of Population and Housing via the NCDB.
Black population, 2010	J	Percentage of the census tract that self-identified as Black in 2010. Source: 2010 Census of Population and Housing via the NCDB.
White population, 1970	K	Percentage of the census tract that self-identified as White in 1970. Source: same as I.
White population, 2010	L	Percentage of the census tract that self-identified as White in 2010. Source: same as J.

Appendix 2 Cont.

Other population, 1970	M	Percentage of the census tract that self-identifies as neither White or Black in 1970. Source: same as I.
Other population, 2010	N	Percentage of the census tract that self-identifies as neither White or Black in 2010. Source: same as J.
Change in Black population, 1970-2010	O	J minus I.
Change in White population, 1970-2010	P	L minus K.
Point Change in Other population, 1970-2010	Q	N minus M.