Gentrification, Displacement, and the Effects of Urban Context

By

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Abstract

Why has the quantitative research so consistently found that gentrification does not lead to increased displacement? This dissertation shows through a series of empirical studies that the persistence of these counterintuitive findings is rooted in a variety of empirical and conceptual issues that mask underlying household and neighborhood change processes.

The first chapter examines the different ways of understanding gentrification – through cultural, demographic, and political economic lenses. I argue that gentrification is an example of what I call a "bundled concept," whereby multiple distinct dimensions of theory and empirical analysis come together under one conceptual framework. Through the case of gentrification, I show that unbundling such a concept, can help us understand it better in two important ways: by elaborating typologies and by showing how one dimension might drive another in particular stages of gentrification.

In the second chapter, I identify three primary methods of operationalizing displacement. The most common approaches, in addition to mis-identifying hotspots of displacement, also mask a variety of important displacement dynamics: that some people are displaced from their home but not their neighborhood, that neighborhoods both send and receive displaced people, and that the movers and the displaced exhibit fundamentally different mobility patterns.

Chapter three examines how gentrification and displacement patterns vary across dif-

ferent types of cities. After replicating a prominent study, I find heterogeneity in the effect of gentrification on displacement. In highly segregated cities gentrification does increase the probability of displacement, yet in low-segregation cities displacement is more likely in a poor neighborhood than a gentrifying one.

Chapter four looks at how the ecology of the city shapes mobility and displacement patterns. By aggregating household mobility trajectories to their origin and destination neighborhoods, an urban mobility network emerges that connects neighborhoods with one another. I argue that it is not simply the number of people moving into a neighborhood that leads to increased displacement, but the position of that neighborhood as a funneling point within the broader urban mobility network.

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I dedicate this dissertation to Erik's memory and to Claire.

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Preface

This dissertation began with an empirical puzzle: Why has the quantitative research so consistently found that gentrification does not lead to increased displacement? Having lived as a renter in New York City, this seemed strange to me. I watched as historically black and Latinx neighborhoods became whiter and rents skyrocketed. In some parts of the city, every other block was a construction site for a new apartment building. Rumors became news reports that landlords would evict, pressure, or buy-out renters in rent-stabilized apartments in order to convert them into substantially more profitable market-rate units. I was there at the height of the artisanal cupcake boom and there was one on every corner to match the new coffee shops. I myself moved when I couldn't stomach another rent increase.

So why was this body of research reaching conclusions that diverged so strongly from my own experience as well as anyone you talk to in the city? While some critical urbanists penned screeds against these scholars and their findings as gentrification apologists and neoliberal schills, I took their research at their word. Assuming these scholars didn't forge their numbers, what explains their findings? This led me into a line of questioning of how the data we use and types of analysis we pursue may mask what's happening on the ground – or simply that what we're looking at may not exactly be the thing we say we're studying. In particular, there were four questions that seemed unclear from the prior gentrification research and that were potentially muddying the results. Those questions were: What is gentrification? What is displacement? How is gentrification and displacement different across places? And how does people moving into a neighborhood shape the likelihood of people moving out of it via displacement. These questions form the four main chapters of this dissertation.

As someone living and doing community organizing in Harlem, gentrification was on everyone's mind. But who was the "gentrifier"? "It's all the affluent white people coming in," some would say. "No," others would reply, "it's the landlords and developers who raise the rents." Others would say the main issue is that "the neighborhood just doesn't feel like ours anymore, now that all the coffee shops and bars replaced all of the community businesses." When I started reading the academic research on gentrification, I found out that these same debates were going on among gentrification scholars. The "supply" versus "demand" sides debated whether developers or the cultural tastes of in-movers were the primary drivers of gentrification. Meanwhile, whenever someone wanted to quantitatively identify a gentrifying neighborhood, they relied on measures capturing the traits of the people moving in through Census data, regardless of what might actually be happening on the ground with respect to culture or real estate patterns.

These issues form the basis for my first chapter on the ways that we understand gentrification as a concept. In it, I argue that gentrification has multiple dimensions regarding the culture, demography, and political economy that changes in gentrifying neighborhoods. These dimensions are distinct and draw upon their own respective social science traditions, yet somehow they hold together as something that we understand as "gentrification." As such, I argue that gentrification is an example of what I call a "bundled concept," where multiple distinct dimensions of theory and empirical analysis come together under one conceptual framework. By unbundling such a concept, in the case of gentrification we can understand it better in two important ways. One, we can hunt for examples where not all dimensions are substantially present, such that these missing dimensions can point to different varieties of gentrification. Secondly, by examining the components separately, we can see how one component may drive another in some cases or in particular stages of gentrification.

Displacement was also something open to competing definitions. I heard countless stories of people moving from their homes when they did not want to, either due to direct pressure from their landlords or because they could not endure another rent increase. On the other hand, also knew many people who moved because they wanted to get their own place, move to a different part of town, or be closer to a new job. Moreover, people often do not have only one reason for moving. I myself moved in with my girlfriend (now wife) in part because my landlord was also raising my rent at the time. While this was a voluntary move in one respect, it was combined with an involuntary pressure that perhaps made me move slightly earlier than I would have under other circumstances. Given the importance and complexity of people's mobility decisions, it was surprising that most of the scholarly research was mostly not trying to directly measure involuntary mobility. They either were measuring population changes or people moving regardless of the reason why.

These questions informed the second chapter on measuring displacement. Through a thorough scan of the literature, I concluded that in general people measure displacement in three ways: a *population approach* that measures the changing composition of a neighborhood between two time periods, an *individual approach* that measures actual individual-level mobility, and a *motivational approach* that takes the individual approach and adds to it a stated reason why someone moved to discern whether that move was involuntary. I understood these all as proxy measures for the underlying complex process of displacement. But were they equally good proxies, or might they be a source of discrepancies among research findings? In this chapter I use data from New York City to show that these do not measure the same thing and identify different hotspots of displacement. Moreover, these other approaches mask important displacement dynamics: that some people are displaced from their home but not their neighborhoods, that neighborhoods both send and receive displaced people, and that movers and the displaced exhibit fundamentally different mobility patterns.

While my understanding of gentrification and displacement – like most gentrification scholars – is heavily shaped by how it plays out in New York City, I have lived in and spent time in other cities that are very different from one of the most iconic cities in the world. Places where I have spent substantial time like Omaha, Minneapolis, Madison, and Buffalo are worlds away from New York, or other major metropolitan areas like Los Angeles, Chicago, San Francisco, or Boston. These other cities are less dense and more affordable. They have different cultural amenities and are not the center of finance or corporate capital to the extent that these other cities are. Homeownership rates are higher, and their class and racial compositions are very different. So I wondered if gentrification scholars were guilty, like me, of sometimes applying a model from one exceptional city to all cities in the country.

In response to this question, my third chapter examines how gentrification and displacement patterns vary across places. In it, I examine how the urban context in which gentrification takes place may lead to divergent effects on displacement rates. Indeed, I find that gentrification in highly segregated cities leads to increased displacement, while gentrification in low-segregation cities does not. This chapter has an added goal of replicating one of the most prominent studies that established that gentrification does not increase the risk of displacement, Lance Freeman's "Displacement or Succession." At the outset of this project, Freeman's study had not been replicated since it was published in 2005, despite a variety of changes in the US housing market, including the Great Recession.[1] I thus find that in not accounting for differences between cities, Freeman's study masked that gentrification indeed can increase the risk of displacement, though not in all cases.

Returning to New York City, I noticed some patterns in the ways that my friends moved. Many would first move to the more affordable neighborhoods closest to downtown

[1]In 2018, Isaac Martin and William Beck published a replication of the study. The study updated the data to more recent years, yet made a substantial change in adding all neighborhoods, including rural ones. This made sense in the context of their main question, which was on the effects of property taxation on displacement, but is a substantial difference from Freeman's original study, which I argue still made my replication worthwhile.

Manhattan – Astoria, Harlem, Washington Heights, Williamsburg. Then some of those neighborhoods became too costly and they moved to nearby neighborhoods, usually deeper into Brooklyn, Queens, and the Bronx. This suggested to me that there were both stages of gentrification, but also that people move or are displaced in a stepwise fashion. They did not jump and move from Manhattan all the way out to Coney Island, but rather stayed in more central neighborhoods at first, even if it meant that their rent would be increased, and they may have to move later. The consistency with which I heard of these patterns suggested to me that there was some regularity in the pathways that people use to move between neighborhoods in the city.

This formed the basis of my final empirical chapter, which is on the urban displacement network. In it, I document how people move from one community to another, connecting the city in an urban mobility network with neighborhoods as its nodes. I find evidence of what I call a "funneling process" in the network, in which some neighborhoods are sites of convergence as people move from other parts of the city. Given that in New York City, boroughs are geographies with extreme social salience, these neighborhoods of convergence act as bridging points between boroughs, as well as other clusters of neighborhoods. People thus funnel into such a neighborhood, before moving on more deeply into a borough. These neighborhoods are also places with some of the highest displacement rates. Thus, I argue, that displacement is not just a result of people moving in, but people funneling in.

In the research process for the forthcoming chapters, more questions were raised than answered. These provide opportunities for future research. In the meanwhile, I hope these chapters will serve as a basis to have a more grounded discussion of the causes and consequences of gentrification and displacement, as well as how they might vary over time and place.

Chapter 1

Gentrification: The Case of a Bundled Concept

Gentrification is like obscenity: you know it when you see it. It has been called a "chaotic concept," since it describes multiple phenomena (Warde 1991: 223), and there are numerous definitions for it (Brown-Saracino 2017). These qualities have mired gentrification studies in a series of debates. In the 1990s it was the "supply" versus "demand" debates, often represented by Neil Smith and David Ley, respectively. The supply side argued that what was most important for gentrification was the real estate interests that created a supply of gentrified housing in their pursuit of profits, while the demand side focused on the cultural tastes of gentrifiers which drove the demand for gentrification. After a great deal of ink was spilled, people seemed to conclude that both were important. In the 2000s, the primary debate was whether gentrification led to displacement, perhaps best captured in debates between Lance Freeman and Tom Slater. Freeman's research showed little to no increase in the likelihood of displacement in gentrifying neighborhoods (Freeman 2005; Freeman and Braconi 2004). Slater penned a number of screeds against Freeman and other mostly quantitative scholars for their "eviction of critical perspectives from gentrification research"

(Slater 2006). The two camps have largely drifted apart since then with the debate mostly empirically unresolved.

In both cases, people often talked past each other as they had different conceptualizations of what gentrification was. Scholars may focus on these different aspects of gentrification, to which Hamnett (1991) evokes the metaphor of blind men feeling different parts of an elephant – that people are all talking about the same thing, just focusing on different parts of it. This assumes that in all cases researchers are feeling the same elephant, and that all elephants are generally the same. To extend the metaphor and illuminate some issues around conceptualization, there are a number of questions that do not usually get asked, which are relevant for the understanding of elephants. 1) *Do all elephants have tusks?* (No, all male and female African elephants have tusks, but only some male Asian elephants have them. Baby elephants also do not have tusks *yet.*) 2) *Are all things that have tusks elephants?* (No, rhinoceroses, hippopotamuses, and warthogs have them). 3) *If we wanted to estimate the population of one particular species of elephant, how would we make sure we were not counting other species of elephant – or counting other tusk-bearing animals?* (If we just counted all elephants in Africa, we would miss the differences between the African Bush Elephant and the African Forest Elephant, which were recently determined to be distinct species.) Thus, to answer these types of questions, we would need to specify the dimensions of elephant-ness in a way that both allows us to account for variation across elephants, while still distinguishing elephants from other types of animals. These are questions of conceptualization, which parallel issues in the study of gentrification and displacement. Does gentrification look the same and have the same dimensions in all contexts? Should we call it gentrification if it just has some of those attributes? If we only measure one of the attributes, should we assume that the others are present? How do we operationalize gentrification or displacement in a way that accounts for underlying variation?

I argue that gentrification research tends to focus either on *cultural* aspects of changing neighborhoods, *demographic* changes in the composition of neighborhoods, and *political economic* changes in the investment patterns and practices of various real estate interests. These three perspectives denote distinct processes and mechanisms, yet all fall under the umbrella of "gentrification". This yields what I call a "bundled concept," where a theoretical concept invokes multiple dimensions that often – but not always – co-occur empirically. As I will argue below, in both cases the above-mentioned debates people were talking about different facets of the bundled concepts, without disentangling them. In particular, that cultural changes and political economic changes can coexist, and that demographic changes may not align with political economic ones.

In this chapter, I will first outline important considerations when fashioning a concept to be well-suited for theoretical and empirical analysis. Next, I will specify the main dimensions of gentrification as a bundled concept. Finally, I will describe some of the ways that this framework can help elucidate varieties of gentrification, as well as the different possible sequences and stages of how the process actually works.

1.1 Conceptualizing a concept

One of the core tasks for a social scientist is to figure out what exactly it is that they want to study and how to study it. From conceptualization of a social phenomenon to operationalizing for study, research is filled with innumerable choices. This is additionally complicated because research needs to speak to other research. Good theory requires a level of abstraction in concepts in order to draw broader conclusions beyond the case (Healy 2017), and operationalization often requires choices among imperfect options for data and analysis. Clarity and explicitness can support the incremental building of knowledge, while ambiguity and unspecified assumptions can lead to scholars talking past each other as the terms of a debate are not agreed upon.

Conceptual clarity and alignment on meaning are important for theory building. Ermakoff (2017) argues that "sound theorizing is predicated on both empirical grounding and analytic specificity." Conceptual ambiguity can lead to both research that talks past one another, as well as claims that elude counter explanations and falsification. Scholars talk past each other when they believe they are addressing the same thing, but are actually discussing different phenomena, which can lead to entrenched and unproductive debates (Redfern 1997). On the other hand, conceptual fuzziness can sometimes lead to claims that can be true or false depending on the data they use or their choices for analyzing it.

There are a number of sources of conceptual ambiguity. One of the ways that scholars talk past each other is from the semantic differences in the terms they use. Abend (2008) shows how one term, in his case "theory," may be used to describe numerous distinct concepts. When a reviewer asks "what are the theoretical contributions of this study?" they may mean: "How does this explain the relationship between two variables?", "How does this respond to classic disciplinary thinkers?", or "How does your study fit into established paradigms?" among others. Abend argues that these are different semantic questions, and the ambiguity around them can lead to people talking past one another. While Abend argues that there is no inherently "right" meaning, there should be clarity that our terms may have different intended meanings. As we will discuss below, these semantic issues similarly arise with the case of gentrification.

Another common source of ambiguity is the ways that some cases collapse multiple dimensions under one concept, what I call "bundled concepts." One could thus analyze the component dimensions within or independently from the bundled concept. Bundled concepts appear in a number of places in sociology. For example, Putnam defines "social capital" as "connections among individuals —- social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam 2000: 19). This merges two distinct aspects: ties and norms.[1] Similarly, the debates on "class" have in different cases taken on income, educational status, relationship to the means of production, occupation, cultural tastes and others (see Wright 2005). These imply very different understandings of what class is and its importance. "Capitalism" is also a bundle of state structures, modes of production, subjectivities, and cultural factors among others that vary across countries and contexts (Hall and Soskice 2001). "Democracy" also bundles governmental institutions, values of whose voices are heard, decision-making structures, and uncertainty of the outcome of a potential decision.

The bundling of concepts is not a bad thing – in fact it can be quite useful. Bundling groups together a field of study and orients it towards a set of questions. Simultaneously holding a bundle together while understanding its component parts allows for questions of how the dimensions relate to one another in a couple of important ways. One way is by showing how on factor may drive another, such as in the case of class, how occupational status may or may not drive cultural tastes. Another way examines how the relative strength of each dimension can reveal distinct varieties of the bundled concept. In the case of democracy, one particular decision-making structure, representative voting, occurs in numerous countries that have very different relations to how the voices of the people are actually heard by governmental institutions. Examining the component parts of a bundled concept thus provides opportunities for interesting empirical and theoretical questions.

1.2 Conceptualizing gentrification

Next, I examine conceptual ambiguity through the case of gentrification. There has been a great deal of scholarly debate about what exactly gentrification is, and how to divide its camps. Some have talked about gentrification's "supply" and "demand" perspectives (Lees

[1] Thanks to Ivan Ermakoff for this point.

2000; Redfern 1997). Supply side accounts are concerned with flows of capital and the disruption of economic and housing markets through investments that alter the supply of affordable housing and retail (Slater 2006; Smith 1996). The demand side is more concerned with the economic and tastes of "gentrifiers" as they relate to the tastes of the preexisting residents, as a way to explain the demand for upgraded housing and amenities (Ley 1994; Zukin 2010). Brown-Saracino (2017) argues that the divisions are rooted in empirical questions between a camp that sees gentrification as consequential and expanding versus a group that sees gentrification as having minimal impacts on disadvantaged people and communities.

I define gentrification as *the process by which low-status neighborhoods transition to higher-status neighborhoods*. This definition is intentionally sparse in order to capture the breadth of ways that scholars use the term, but also to not privilege the cultural, demographic, or political economic aspects that I will describe below. It references *neighborhoods*, since it is a place-based phenomenon, and not describing general changes in a city or a country. It is about *transition*, since it examines the changing of neighborhoods, not their stasis. I use the word *status*, since some scholars focus on income, class, occupation, or race – or a combination of those.[2] The point is that it refers to a specific neighborhood status transition: from "low" to "higher". These are vague modifiers, but the intention is to capture the idea that we would not call it gentrification if a rich neighborhood becomes super-rich.[3]

Under this overarching definition, I identify three broad categories of conceptualizations of gentrification that appear in the research – *cultural*, *demographic*, and *political economic* – which often have a degree of overlap. Cultural approaches refer to the *aesthetics* of a neighborhood, and the *tastes* of its residents, which change under gentrification (Brown-Saracino 2009; Ley 1994; Zukin 2010). New businesses, architectural designs, and artistic projects

[2]This ultimately relies on some understandings and assumptions of how status reflects underlying social hierarchies and systems of domination and exclusion within a given place.

[3]Some scholars have identified what they call "super-gentrification," which examines the further increasing affluence once a neighborhood has gentrified (Lees 2003). My position is that there distinct mechanisms at play in gentrification versus super-gentrification, that warrant them to be considered different concepts.

change the character of a neighborhood from what it was before. Demographic approaches focus on changes in the *composition* of the residents of a neighborhood, with respect to income, race, age, profession, and other factors (Ellen and O'Regan 2011; McKinnish, Walsh, and White 2010). In gentrification, these changes are due to in-migration, rather than by any changes of the preexisting residents. In the political economic approach, the focus is on how land and housing are used as *investment* opportunities (LeGates and Hartman 1981; Sims 2014; Slater 2009; Smith and DeFilippis 1999). This includes the increased influence of speculative capital, real estate development, and how landlords may be emboldened to harass or evict lower-income residents in hope of replacing them with more lucrative tenants.

I will describe below in more detail the three general approaches to discussing gentrification, as well as some of the specific contributions and strengths of each perspective. Yet a typology like this is made difficult for a few reasons. One is the difficulty in categorizing the research along these lines. While it is often the case that one of these approaches is primary in a particular study, scholars often implicitly or explicitly include aspects of the other approach, either as central parts of their analysis or as background. A second difficulty is the challenge of disentangling these factors in the real world. This is both because they often mutually reinforce one another, but also because most things are suffused or inflected at some level by culture, demography, and political economy. I will elaborate more on these challenges later. A final difficulty is that this focuses on what gentrification *is*, rather than the *secondary effects* of it. Many have noted that gentrification can rupture social networks (Betancur 2011), affect local employment patterns (Meltzer and Ghorbani 2017), and decrease incumbents' political voice (Hyra 2015). While these factors can be endogenous and intensifying forces, the goal is to extricate gentrification from its effects. Given these analytical difficulties, the purpose of the discussion of the three approaches is not to create rigid boxes, but rather laying out distinct dimensions of analysis, based on what previous scholars have focused on. To say one study prioritizes one approach is not to say that it ignores the other approaches, only that one receives more attention than the others. It is also the case that some studies may give equal weight to two or all three perspectives.

1.2.1 Cultural approaches

Cultural approaches to gentrification examine how the aesthetics of a neighborhood change, or how the tastes of various neighborhood constituencies are reflected in the community as it changes. In this perspective, aesthetics and tastes are invoked in two ways: 1) accounts of cultural *change* within a community, such as how gentrification may reshape a neighborhood's cultural artifacts in the image of its higher status residents (Hyra 2015; Sullivan and Shaw 2011), or 2) culture as a *magnet* for gentrification trends, such as how it may be led by "gentrifiers" who seek out "gritty" and "authentic" communities (Zukin 2010). In many cases, these cultural elements are important not just for describing changes in tastes themselves, but also because they reflect underlying power dynamics of who gets to shape a community. As Zukin (2010) notes, "...Power over space is not just financial. Even more important, it's *cultural* power" (p. 4).

A neighborhood's changing cultural assets are important indicators and processes of gentrification in their own right. Changing retail stores can alienate incumbent residents who feel like their culture and material needs are not supported by the new businesses (Sullivan and Shaw 2011). Ley (2003) describes how art and artists, reflecting high cultural capital but low economic capital, serve to facilitate the transition to high economic capital neighborhoods. Many of these changes are related to Richard Florida's book on the "creative class," as well as his advocacy around it (Peck 2005), which argued that cities should actively foster a variety of cultural amenities in order to attract and keep creative knowledge workers (Florida 2002).

The cultural approach contributes a number of insights to the understanding of gentrification. It focuses on arguably the most visible signals that a community is gentrifying.

Regardless of whatever else is happening, residents, newcomers, and real estate interests usually perceive cultural gentrification first. New businesses and architectural styles are easily visible from the street, while neighborhood composition and property relations are veiled. These changes often evoke feelings and meaning for people about who the neighborhood is *for*. Even if someone is not physically displaced from their home in a gentrifying neighborhood, they may nonetheless feel culturally and politically displaced (Hyra 2015).

1.2.2 Demographic approaches

A demographic approach describes gentrification as the changing composition of a neighborhood with respect to the traits of its residents. In this case, gentrification is a question of *who* lives in a neighborhood. It looks at who lives in a place now, compared to who lived there before, and thus examines change over time. Methodologically, this is a common way to identify numerous gentrifying neighborhoods with Census data.

The specific way that a neighborhood's composition may change under gentrification varies widely. Most commonly, researchers look at either the class composition of a neighborhood or its racial composition. While examining changing class composition of a gentrifying neighborhood is more common, there is a number of ways that "class" is operationalized. Sometimes this is with rising incomes of residents (Ellen and O'Regan 2011; McKinnish et al. 2010). Others treat rising educational attainment – usually number of bachelor's degrees – as a proxy for a neighborhood's class transition (Freeman 2005). In some cases, scholars look directly at occupational categories to discern growth in various types of professional workers in a neighborhood (Atkinson 2000). Other research emphasizes racial transition as a core aspect of gentrification, specifically when a community of color has a growth in white residents. Despite the focus on racial change in popular discussions, few scholars use race as the sole indicator of gentrification. Instead, it is often used in combination with other factors (Bostic and Martin 2003).

Demographic approaches address the notion that between the cultural and political economic approaches, there is an assumed correspondence with a change in who lives in a place. They also are fairly easily scalable to allow analysis and comparison across numerous communities – the entire geography of the U.S. is subdivided into Census tracts, which can be classified for large-scale analysis. These are also "objective" measures, in the sense that an outsider can consistently identify a "gentrifying" neighborhood based on a set of criteria. The remaining questions, however, are both what those criteria should be, and even with "good" criteria, whether on-the-ground it would correspond to something that could reasonably be considered gentrification in all cases. Common methodologies often diverge from what media accounts may identify as a gentrifying neighborhood (Barton 2016). Drew (2018) documents the differences between common measures of gentrification, finding wide divergence in which neighborhoods the measures identify and "gentrifying." Drew used three common measures of gentrification to identify neighborhoods in the 93 largest cities in the US. Out of 14,152 total tracts, only 152 were consistently identified as gentrifying by all three approaches, while 3,160 tracts were classified as gentrifying by only one of the three approaches.

1.2.2.1 Defining neighborhoods

Demographic approaches are made additionally difficult because they also require us to ask and define: What is a neighborhood? While researchers most commonly use the Census tract as an approximation of a neighborhood, gentrification has been shown to bleed over tract boundaries (Hammel and Wyly 1996). The Census tract is not a socially meaningful boundary – nobody can tell you what tract they live in or where the edges of that tract are. When people ask questions about neighborhoods and the types of effects they have on individuals and families, they generally rely on two conceptions of neighborhoods: an *egocentric* model that views the neighborhood as the geography closest to an individual, and a *fixed-boundaries* model that relies on consistent geographic boundaries, which may be socially meaningful boundaries or not.

In the egocentric model, your neighborhood is the area around you, most often understood as a radius around where you live. The notion reflects Tobler's first law of geography: "Everything is related to everything else, but near things are more related than distant things." (Tobler 1970: 236). Egocentric approaches have been shown to be improvements over other fixed-boundary methods in cases like how close children are to a tobacco retailer (Duncan et al. 2014) or the amount of segregation in a metropolitan area (Lee et al. 2008). While this method captures the intensity of one's *exposure* to things near them, the implication of this is that everybody has their own distinct neighborhood. While people's neighborhoods may overlap, nobody lives in exactly the same neighborhood, since as you move down the street the radius for your neighbor shifts.

This is contrasted with the fixed-boundaries idea of a neighborhood. In this case, the boundaries of a neighborhood are set, and everyone who resides within them lives in the same neighborhood. In this case the metaphor of "someone from the other side of the tracks" makes sense, since hard boundaries can create meaningful differences in people's life experience, even if their physical distance is small. Census tracts are the most commonly used fixed-boundary proxy of a neighborhood in social science, yet these boundaries are "meaningless" in two ways: they have no meaning to residents living in them and the boundaries confer no social, political, or economic meaning onto their territory. To the first point, research asking people to draw their neighborhood shows that residents' definitions of their neighborhood may not line up with how Census tracts define them (Basta, Richmond, and Wiebe 2010). To the second point, school districts are examples of boundaries that have political and economic significance, since they shape people's access to resources and housing patterns (Reardon, Yun, and Eitle 2000).

Both conceptions of a neighborhood must grapple with the questions of scale. For egocentric models, should the radius be .25-miles, .5-miles, or 1-mile? For fixed-boundaries, should one use block, block group, tracts, or something bigger? All of these issues make the question of understanding demographic gentrification complicated and subject to numerous choices by the researcher. Both approaches are potentially defensible, depending on whether the underlying gentrification process in question is one of *exposure* to things in near proximity, or to how fixed territories can contain *meaning* for people living in them.

1.2.3 Political economic approaches

Political economic approaches to gentrification draw attention to the ways that land and housing are used as investment vehicles to maximize profit. Gentrification creates new conditions that allow real estate interests to flourish. Landlords, investors, and developers capture rising rents and property values, and may seek to accelerate their growth by finding ways to push out the existing residents in favor of those with higher incomes. Moreover, the state and political actors are implicated in this approach, either from the ways that real estate figures enter and influence politics (Logan and Molotch 1987), or when cities depend on the rising property tax revenue that gentrification creates (Frug and Barron 2008).

This approach attributes gentrification to the structural influences of capitalism, as well as the deliberate actions of those acting in their class interests. Neil Smith (1979) describes it as a "back to the city movement by capital, not people," as investors look for neighborhoods where the "rent gap" – the gap between current value and the value of the land at its highest potential value – is the largest. Smith describes the "revanchist city," in which the middle- and ruling-classes seek a kind of revenge on the working-class urban denizens who they see as having ruined the city (Smith 1996).

It is from this perspective that the strongest indictments of gentrification as a materially harmful process come. The question of gentrification's relationship to residential displacement primarily lies in this approach. While cultural and demographic shifts could technically be a result of cycles of residential turnover and succession, residential displacement occurs when landlords evict, harass, and raise rents on tenants. Slater (2006, 2009) has tried to re-center gentrification research around these questions, which he argues have been sidelined in favor of cultural and economistic accounts.

1.3 Examining dimensions of gentrification

Unbundling these three dimensions reveals distinct sets of processes that shape gentrification in neighborhoods. Yet the ideal type of gentrification has all of these things occurring in simultaneous and mutually reinforcing ways. So what benefit is there to this additional specificity? Apart from hopefully avoiding intractable debates by giving clarity to which part of the “elephant” someone is discussing, unbundling gentrification allows us to do two things: investigate the relationship between the component parts and identify potential varieties of gentrification. In some cases, one dimension may be *driving* the gentrification process more than the others, particularly if we think of gentrification unfolding in stages. In other cases, one of the component parts may be largely *absent* from the neighborhood’s gentrification process – whether permanently or for the time being – which can indicate gentrification of a different type. Below I will discuss some cases of each of these, though there will be a high degree of overlap between the examples.

1.3.1 Stage models

One advantage of this approach is that it helps to elucidate exactly how different factors may drive the gentrification process. A “stage model” sees gentrification passing through distinct stages of neighborhood transformation. This first came from Clay (1979), who described four stages of gentrification: 1) “pioneers” with a high tolerance for risk move into a disinvested neighborhood and renovate properties for their own use, 2) more people move in and begin to attract preliminary speculative investment, 3) major media attention for the neighborhood brings in developers and others who see housing as primarily an investment vehicle, and 4) professional and other middle class residents move in in large numbers, consolidating the gentrification of the neighborhood. While stage models like this loom in the background of the gentrification literature, there are actually few studies that directly examine the stages of gentrification through empirical work.

Thus we can examine how cultural, demographic, or political economic factors may drive other parts of the gentrification process through different stages. Artists are often early pioneers who also reshape the cultural milieu of the neighborhood, typically reflecting "high" cultural capital (Ley 2003; Lloyd 2006). Early cultural shifts can make way for subsequent capital interests (Ley 2003; Zukin 2010). The composition of businesses in a neighborhood is shaped by where a neighborhood is on the trajectory of gentrification (Yoon and Currid-Halkett 2015). In some cases, the demographic trends may or may not drive cultural changes, such as how black gentrification has been shown to lead to less cultural transition than white gentrification (Somashekhar 2019).

1.3.2 Varieties of gentrification

Studies may foreground one or more of these approaches yet include secondary discussion of the others. They may treat cultural, demographic, or political economic aspects as different dimensions of the broader and more complex gentrification process. The assumption is that these three approaches to gentrification are focusing on distinct dimensions of a singular process – they may be feeling one part of the elephant, but the whole elephant is there. Indeed, this is likely the case in most instances of gentrification, particularly in large cities. But there may be instances where the three dimensions do not correlate, that can reveal important facets of the gentrification process. These may be different varieties of gentrification, or they may illuminate the stages of an unfolding gentrification process.

Table 1.1 describes theoretical cases based on the presence or absence of the different dimensions of gentrification, as well as some possible empirical examples. Given the challenges in disentangling these factors mentioned above, it may be that a given component is not completely absent from a particular case, it might just not be prominent or influential for the moment. The purpose is to engage with the possible ways that gentrification may play out differently across diverse places and spur possible future research.

Figure 1.1 explores in more detail some of the possible empirical examples. These varieties of gentrification are based on different configurations of the dimensions of gentrification (cultural, demographic, political economic). It elaborates some of the ways that gentrification may look different across diverse contexts and places. The research on gentrification focuses heavily on major cities (New York City, San Francisco, London, Vancouver, Toronto), but less on other geographies. As Brown-Saracino (2009) argues, in some cases gentrifiers may strive to preserve the social character and culture of their new communities, particularly in small towns and rural areas.

1.4 Conclusion

How would an understanding of gentrification as a bundled concept help the supply/demand and the gentrification/displacement debates mentioned above? The supply and demand sides were talking about two separate dimensions of gentrification, the cultural and the political economic ones. Both of these matter and reinforce one another in interesting ways. In the other debate, those who say that gentrification does not increase displacement were using a narrow demographic understanding of gentrification as changes in who lives in a neighborhood. Those who say gentrification does indeed lead to displacement were coming from a political economic perspective in which displacement becomes inextricable from the

Table 1.1: Coexistence of different dimensions of gentrification

Cultural	Demographic	Political Economic	Examples
X	X	X	Normal gentrification in big cities
X	X		Small town/rural gentrification
	X	X	Historic preservation, “authentic/gritty” gentrification, early-stagegentrification
X		X	Local/generational gentrification, failed gentrification projects
X			Macro-cultural shifts
	X		Rural, social preservationist gentrification (Brown-Saracino 2009), brownfield gentrification
		X	Speculation

experience of gentrification as it is used as a tool to clear out old residents to make way for the new. Given the volatility in attempts to consistently identify neighborhoods as gentrifying or not (Barton 2016; Drew 2018; Hammel and Wyly 1996), it seems likely that just because a neighborhood is going through a demographic shift does not necessarily mean that the same political economic mechanisms are in full force. We should thus be clear when we use a demographic approach whether it is being treated as a proxy for all the other dimensions of gentrification, or narrowly looking at neighborhood composition change. These issues are particularly salient as we push research on gentrification outside of the major metropolitan areas that have been the focus of most studies (Billingham 2015).

Deciding how to properly conceptualize an object of study and then operationalize it for research are difficult tasks to sort out for social scientists. Indeed, we should strive to do so to improve our knowledge about the social phenomena we study and support productive debate. By explicitly stating which aspect of a bundled concept is under study, we can specify which part of the elephant we are feeling, and situate our arguments as either constrained to that part of the elephant or how that part of the elephant relates to the whole.

Figure 1.1: Details of varieties of gentrification

- **Full gentrification**
  - *Normal gentrification in big cities*: This is the common form of gentrification we see in most instances, particularly in larger cities, where cultural, demographic, and political economic changes coincide.
- **Gentrification without strong profit-making opportunities**
  - *Small town/rural gentrification*: This is when the investment opportunities through gentrification are minimal (at the moment), yet cultural and demographic changes occur.
- **Gentrification without substantial cultural/aesthetic change**
  - *Historic preservation*: This is when historic neighborhoods seek to preserve their aesthetic and cultural character yet may see the influx of more affluent residents. Historic preservation can be converted to profitable real estate.
  - *Authentic/gritty gentrification*: Often an early stage of a longer gentrification process, this is when old industrial areas and lofts may see new residents moving in, searching for an "authentic" experience.
- **Gentrification without significant demographic change**
  - *Local/generational gentrification*: This is gentrification in smaller or mid-sized towns, where neighborhood composition may stay roughly the same, but cultural amenities change, reflecting the changing tastes of younger generations.
  - *Failed gentrification projects*: This is when developers may invest in the creation of a gentrification hub, but new residents do not materialize, and the project fails its intended goals (Billingham 2017).[a]
- **Cultural gentrification**
  - *Macro-cultural shifts*: This could be changes in the cultural assets of a community due to a combination of the normal success and failure of businesses, which are then replaced by new businesses that reflect generational cultural changes (For example, a video store replaced by a board game store).
- **Demographic gentrification**
  - *Rural social preservationist*: This could be "Back-to-the-land" in-movers to rural areas, who seek to preserve the social character of the place, without substantial investment activity.
  - *Brownfield development*: This is characteristic of many sprawling metropolitan regions that convert rural land into new residential areas.
- **Political economic gentrification**
  - *Speculation*: This would be pure investment speculation, perhaps in downtown business districts or industrial areas of smaller cities where few people live at the moment. This may be a pre-cursor to subsequent gentrification.

[a] Thanks to Gianpaolo Baiocchi for this suggestion.

Chapter 2

Measuring displacement: Assessing proxies for involuntary residential mobility

Residential displacement and housing insecurity are pernicious sources of inequality and poverty (Desmond 2018; Desmond, Gershenson, and Kiviat 2015). The causes and consequences of displacement are a growing area of research. One area of investigation is around the relationship between gentrification and displacement. As a neighborhood gentrifies and more affluent residents move into it, there is a concern that this leads to the displacement of preexisting residents – where they are pressured or forced to move involuntarily from their homes. While some scholars argue that gentrification leads to increased displacement (Newman and Wyly 2006), others claim that displacement is not more prevalent in gentrifying neighborhoods (Ellen and O'Regan 2011; Freeman 2005; Freeman and Braconi 2004; McKinnish et al. 2010; Vigdor 2002). These studies examine the relative likelihood of displacement between gentrifying and non-gentrifying neighborhoods.

Yet studying displacement is made empirically elusive due to the difficulty in measuring it. It has been described as "measuring the invisible," since by definition, displaced people are not where they were when the displacement occurred, making it difficult to know the conditions of their mobility (Atkinson 2000; Wyly et al. 2010). Often we do not know if a household moved at all, or the specific reason why they moved. This makes disentangling displacement from other types of benign household mobility difficult. These challenges in empirically measuring displacement leads to varying operationalizations of the concept. Many researchers thus rely on a variety of proxy measures of displacement based on available data. Proxy measures are common in social science research and necessary to understand complex social phenomena in a world of data limitations. The question is how well a given measure approximates the real-world social object it seeks to emulate.

This paper examines the use and efficacy of different quantitative measures of displacement in neighborhoods. First, starting from the baseline definition of displacement as "involuntary residential mobility," I describe three common types of proxy measures of displacement: a population approach that measures compositional changes in neighborhoods over time, an individual approach that measures individual housing mobility, and a motivational approach which traces both individual mobility as well as the reasons why a household moved in order to determine if that move was involuntary. Through a systematic review of gentrification and displacement studies, I show the relative prevalence of these three measures of displacement in the literature, using a sample of all available articles collected through a set of academic journal databases. I find that the approach that most closely approximates the underlying concept of displacement, the motivational approach, is the least commonly used methodology. Then, I use data from New York City to look at the three approaches in their ability to present comparable rank-orders of the amount of displacement across neighborhoods. I show that the different approaches do not consistently identify where displacement is most and least likely. Next, I show that part of the reason why these other measures misidentify concentrations of displacement is that they cannot account underlying processes of displacement, or they make untenable assumptions about mobility. In particular, the population approach masks people who stay in their neighborhood after leaving their housing unit, and do not account for the in-flow of displaced people from other neighborhoods. On the other hand, the individual approach does not account for the fundamentally different mobility patterns between those who move involuntarily and those who move willingly. Lastly, to further explore some of the possible implications of our measurement choices, I examine the relationship between gentrification and displacement, compared across the three measurement approaches. I find suggestive evidence that gentrification correlates with increased displacement for some measurement approaches, but not others. These findings suggest that in considering the relationship between gentrification and displacement, accurate measures of the dependent variable – displacement – should account for both individual mobility and the specific motivations for why people move.

2.1 Gentrification and Displacement

Gentrification has been referred to as a “chaotic concept,” since it describes multiple phenomena (Warde 1991: 223), and scholars employ a variety of definitions for it (Brown-Saracino 2017). The choices authors make in operationalizing gentrification can lead to different empirical results (Barton 2016). For a general working definition, gentrification describes, “the process by which central urban neighborhoods that have undergone disinvestments and economic decline experience a reversal, reinvestment, and the in-migration of a relatively well-off middle- and upper middle-class population” (Smith 1998: 198).

Displacement refers to the variety of ways that people involuntarily lose their prior ties to a particular place. The research on displacement generally addresses it in two broad ways, through *physical displacement* of people from their residences, and through *social displacement*, meaning the various ways that people lose their social connections in – and to – a place. In a common of definition of physical displacement, “Displacement occurs when any household is forced to move from its residence by conditions which affect the dwelling or immediate surroundings, and which: 1) are beyond the household's reasonable ability to control or prevent; 2) occur despite the household's having met all previously-imposed conditions of occupancy; and 3) make continued occupancy by that household impossible, hazardous or unaffordable" (Grier and Grier 1978: 8). Displacement thus implies that a person moved when they otherwise would have preferred to stay, and thus their mobility is to some degree involuntary. This contrasts with other types of residential mobility, where someone may move from a prior residence to take a job or buy a home. On the other hand, social displacement examines how people lose their sense of place and belonging in their community – an experience of "dis*place*ment" (Davidson and Lees 2010: 403). This can be cultural displacement or political displacement (Brown-Saracino 2009; Hyra 2015), or the rupturing of social networks that people depend on in a community (2011). The remainder of this article will refer only to physical displacement.

Many have suggested that displacement is a result of gentrification. Ding et al. (2016) use credit score data and find a small effect of gentrification on the likelihood of people moving, and that people with lower credit scores – used as a proxy for low-income status – living in gentrifying neighborhoods were more likely to subsequently move to low-income neighborhoods. Martin and Beck (2018) found that while homeowners were not more likely to be displaced in gentrifying neighborhoods, renters were. Newman and Wyly (2006) argue that displacement is more prevalent in gentrifying areas, and that one reason we may see lower displacement levels in a gentrified neighborhood is that all the people at risk of displacement have already left.

While some imply that gentrification and displacement are two sides of the same coin – that gentrification requires displacement – others have suggested that displacement is not a necessary condition for gentrification. Freeman (2005) ascribes the compositional changes in gentrifying neighborhoods to "succession." In succession, new groups *replace* rather than *displace* preexisting groups, as households leave a neighborhood voluntarily, and more affluent, whiter residents take their place. This is why Freeman argues that you do not see substantially greater displacement in "gentrifying" neighborhoods. Others say that incumbent residents might be more willing to absorb the increased housing costs in favor of greater amenities and neighborhood quality (Ellen and O'Regan 2011; Guerrieri, Hartley, and Hurst 2013; Vigdor 2002). Thus, changes in neighborhood composition might not indicate displacement per se.

The competing explanations for gentrification – displacement or succession – necessitates that the concepts be analytically distinct. Some make displacement a necessary condition in their definitions of gentrification, which would technically preclude any analysis that separates them.[1] Thus, I treat gentrification as a *neighborhood-level* phenomenon and displacement as a *housing-unit-level* process. Therefore under this framework, a single home cannot "gentrify," but rather it is once the aggregation of housing and investment patterns within a particular neighborhood passes a certain threshold do we say that a neighborhood has "gentrified." Similarly, a neighborhood in its entirety is not "displaced" at once, even though the process of its transformation over time may consist of many individual instances of displacement from housing units. Thus by analytically distinguishing the two concepts, we can elaborate how neighborhood-level processes relate to individual-level outcomes.

2.1.1 Measuring Displacement

At its core, displacement is generally referred to as an involuntary residential move by a household (Grier and Grier 1978; Vigdor 2002). This means that displacement has two components, 1) somebody moves, and 2) that move was involuntary, meaning that a house-

[1] Examples include: "Gentrification as a process whereby lower-class residents of degraded residential neighborhoods are displaced by higher income, white inhabitants, who invest in local infrastructure rehabilitation" (Essoka 2010: 299), and "...gentrification — that is, neighborhoods changed because higher income, usually white, households moved into low-income, minority neighborhoods and displaced the original (lower income) residents, spurring racial transition in the process" (Ellen and O'Regan 2011: 89).

hold otherwise would have preferred to stay. Capturing individual level mobility and the reasons for moving is difficult with most data, since both of these questions are not often directly asked on surveys. Researchers rely on a variety of proxy measures, which may or may not include these attributes. There are three broad approaches to measuring displacement quantitatively: what I call the *population approach*, the *individual level approach*, and the *motivational approach*. The population approach measures aggregate changes in the composition of a neighborhood, the individual approach uses individual-level data to identify any increase in mobility, and the motivational approach adds to the individual approach the specific reason why someone moved to determine whether that move was involuntary. These approaches are used to measure the breadth and scale of displacement – to answer the question of "how much" displacement is occurring.

One of the most readily available proxies for displacement is the *population approach*, which looks at compositional changes in a neighborhood through cross-sectional data. In this method, a given area is measured at time, t_1, for its demographic composition (usually by income or race) and again at time, t_2. The loss in population for a particular subgroup over the time period is then attributed to "displacement" (see Zuk et al. 2015 for a review of many of these studies). This is often based on changes in the counts of the low-income households in a neighborhood (Ong et al. 2017: 65).[2] This is a method that is commonly used by governments and policy researchers to track and predict where gentrification and displacement is likely to occur (Chapple and Zuk 2016). This is a useful approach in seeing how populations compositionally change over time in a particular area but does not trace actual mobility. Thus, we do not know if households actually left a given neighborhood, or instead the incomes of incumbents increased (Hochstenbach and van Gent 2015), or people moved within a neighborhood.

The *individual approach* thus seeks to improve on the population approach by relying on

[2]This would be formally represented as $DISPLACEMENT = LOWINC_{t_2} - LOWINC_{t_1}$.

individual-level data to see whether a household actually moves – for any reason. This often requires either longitudinal data, or other data that otherwise documents mobility. The New York City Housing and Vacancy Survey (NYCHVS) and the American Housing Survey (AHS) both have been used to trace individual mobility (Ellen and O'Regan 2011; Freeman and Braconi 2004; Vigdor 2002). These data sources are longitudinal by housing units, allowing researchers to see who replaces a previous resident in a given housing unit. Others have used longitudinal data, such as the Panel Study of Income Dynamics, to follow individuals as the move households (Freeman 2005; Martin and Beck 2018).[3] New research has used credit score data to track individual mobility patterns for low-income people (Ding et al. 2016). However, these studies do not distinguish between moves classified as displacement versus other types of residential moves that households make.

Both the population approach and the individual-level mobility approach do not identify the specific reasons that households move. The *motivational approach* is a proxy that adds to the individual approach the reasons for someone moving, in order to distinguish people who may move to take a better job or choose to move to a better home, from those who move for reasons that are not entirely of their own volition. Some surveys do ask respondents for the reason why they moved from their previous residence. Researchers have used this when analyzing the Panel Study of Income Dynamics (PSID) (Freeman 2005; Martin and Beck 2018) and the New York City Housing and Vacancy Survey (Freeman and Braconi 2004; Newman and Wyly 2006; Wyly et al. 2010). The specific reasons that are documented in a survey may not perfectly estimate every real-world reason for moving that would be considered "displacement," but they help separate out those who moved for jobs or other positive reasons. Its limitation is that the data is less available than Census data, and not all individual mobility studies ask for the motivations why someone moved.

All three of these approaches should be considered as proxy measures to the "true"

[3] Both Freeman (2005) and Martin and Beck (2018) use both the individual and motivational approaches.

process of displacement. Mobility behaviors are complex, as are the reasons behind them. Nonetheless, I argue that the motivational approach should be considered the proxy that most closely operationalizes of the underlying phenomenon of displacement, since it captures both that a household did indeed move, and that that move was involuntary. However, there are limitations with this approach. Relying on self-reporting makes a number of assumptions about people and their reasons for moving: that they honestly report their reasons, that they have a single reason, and that they are fully aware of their reasons. What counts as "involuntary mobility" is also heavily conditioned on people's alternative choice sets, which in turn are shaped by their access to resources, social networks, and other factors. In spite of these limitations, I will use the motivational approach as an approximate benchmark against which I can compare the other approaches.

2.1.2 Systematic review of proxies for displacement

In the next section, I conduct a systematic review (Petticrew and Roberts 2006) to show how prevalent each of these three approaches are in the literature. Indeed, the three approaches are used frequently to measure residential displacement. To determine this, I collected a sample of scholarly articles from a variety of methodologies that employed some quantitative measure of displacement somewhere in their study. Then I coded them for the specific approach(es) they used and used their frequencies to create rates of their usage. In deriving usage rates for the three approaches, given that the specific set of research questions focus on whether displacement is *more likely* in gentrifying neighborhoods, the target population is the *quantifiable* measurements of displacement – that authors not only identify that displacement may be occurring, but specifically *how much* displacement there is. I elaborate the methodology below.

First, I created a sample of relevant articles using the "SocINDEX", "EconLit", and "Urban Studies Abstracts" databases through EBSCOhost. I used the search terms "gentrification AND displacement" to select the articles. I restricted the search to "academic journals", which after removing duplicates resulted in a sample of 207 articles.[4] Next, I restricted the data to papers – quantitative, qualitative, or mixed-methods – which include quantitative measures of displacement. A quantitative measure of displacement is something that captures a magnitude of something that the author explicitly calls "displacement." This would still include primarily qualitative papers, which for example might include as background information descriptions of levels of "displacement" occurring near their field sites. Papers which only described instances of displacement, or neighborhoods where they asserted that displacement was occurring would not be included. After removing articles which did not have any discernible quantitative measure of displacement, I had a sample of 45 papers. It is notable that only 22% of the studies in my sample employed a quantitative measure of displacement.

I then searched for how the authors operationalized what they referred to as "displacement". I documented both the "conceptual" definitions and the "operational" definitions of displacement. A conceptual definition is how the author broadly defines displacement as a social phenomenon, while the operational definition is the specific way that they make it into a researchable object. The text of the definition was copied into a database and coded according to the typology. A displacement measure was coded as the "population approach" if it measured displacement as compositional changes in a neighborhood, often through Census data. If the measure used individual level data to track actual mobility, it was coded as the "individual approach". If an author's measure both tracked individual data, and included the reason why someone moved, then it was coded as the "motivational approach". There was a residual "Other" category that had a variety of approaches. The most common was when a public housing facility would be shut down, and the people would be removed from the building. While somewhat in line with the motivational approach, since it captures both

[4]This excludes the following document types: Journals, Conference Materials, Books, Reviews, Magazines, Working papers, Trade publications, Dissertations.

Table 2.1: Prevalence of displacement approaches in literature

Approach	Share in sample
Population Approach	0.51
Individual Approach	0.26
Motivational Approach	0.12
Other	0.14

mobility and whether moving was involuntary, I categorized it as a residual category, since it was restricted to specific housing projects and thus difficult for making cross-neighborhood comparisons about the likelihood of multiple forms of displacement.

I find that the population approach was the most common, with 51% of studies using this method.[5] Table 2.1 shows that the individual approach was the next common, with 26% of studies using it. The least common was the motivational approach, with 12% of studies employing this method. With a sense of the relative prevalence of these three approaches, I will next apply them to New York City.

2.2 Data

The New York City Housing and Vacancy Survey (NYCHVS) is a survey administered every three years by the US Census Bureau, under contract from the City of New York. The sample is based on the most recent decennial Census and is longitudinal between Census takings. The unit of analysis is the household within a specific housing unit. If a family moves out of that unit between waves of the survey, then the new household is surveyed, but the housing unit remains constant. The survey is administered by an in-home interviewer. The main focus for this paper is on the three sample years 2005, 2008, and 2011, for which

[5]Proportions do not add up to 1, due to rounding and because some studies used multiple approaches.

the total pooled sample size is n = 49,873.[6]

The two main aims of the survey relate to the demographic and economic characteristics of the respondent, as well as the physical condition and traits of the housing unit itself. The survey records the amount that the respondent pays in rent, utilities, mortgage, and other housing expense information. It includes their income, differentiated by a variety of sources, including wages, SSI, TANF, unemployment, financial receipts, and others. It also includes a number of physical descriptors of the building, such as peeling paint and leaky pipes, recorded by the interviewer. The history of maintenance issues is included, as well rent regulation status.

The geographical unit of analysis provided by the NYCHVS is the "sub-borough," which is nested within a "borough." The boroughs of New York City are five large subdivisions, which are equivalent to counties. The sub-boroughs are 55 Public Use Microdata Areas, as designated by the Census Bureau, which are geographically bigger than census tracts and zip codes, but smaller than boroughs. In New York City, sub-boroughs roughly correspond to "community districts," which are administrative subdivisions that each have their own Community Boards of appointed residents to make community-level decisions. Thus, while not the most granular geography, they are nonetheless intelligible as a kind of neighborhood in the city. Community districts vary widely in population, ranging from about 52,000 to about 247,000 people, with an average size of about 139,000, according to 2010 New York City Department of City Planning data. In this article, the words "sub-borough" and "neighborhood" will be used interchangeably.

To measure displacement, the NYCHVS is able to both answer the question of whether a person moved as well as their reason for moving. To determine mobility, the survey asks whether the respondent moved in the past three years. Then it asks for which neighborhood

[6]The 2014 and 2017 waves of the survey are not used for this article, since they are missing a question I require to make the methodology consistent across years.

Table 2.2: Reasons for moving, among the displaced

Reasons	Share of displaced movers
Wanted less expensive residence/difficulty paying rent or mortgage	0.59
Poor building condition/services	0.14
Displaced by private action (other than eviction)	0.13
Evicted	0.08
Harassment by landlord	0.05

they lived in for six months or more, as long as it was within New York City.[7] When paired with the respondent's current reported neighborhood, this allows me to create origin-destination patterns for household mobility.

Next, to determine the whether a move was involuntary, the survey asks for the reason why the household moved from their previous residence. The survey provides thirty-three possible options for the respondent, such as "job transfer," "needed larger house or apartment," "to attend school," and others. To help isolate people who moved due to displacement, the responses I am concerned with are: "Wanted less expensive residence/difficulty paying rent or mortgage," "Evicted," "Poor building condition/services," "Harassment by landlord," "Displaced by urban renewal, highway construction or other public activity," and "Displaced by private action (other than eviction)" (see Table 2.2 for a summary of reasons for moving, among displaced movers). Any of these responses were coded as "displaced," as they indicate an involuntary move. This is the same definition used by other researchers who used the NYCHVS to measure displacement (Freeman and Braconi 2004, Newman and Wyly 2006, Wyly et al. 2010). A similar definition of displacement is also used with the PSID (Freeman 2005, Martin and Beck 2018).

[7]This question about previous residence was not asked in 2002, 2014, or 2017, and thus these years are not included in this analysis.

The advantage of the NYCHVS is that it is solves some of the limitations of other datasets, which make it amenable to evaluating displacement methodologies. While Census data is available for every neighborhood at a variety of scales, it does not trace individual mobility or record the reason why someone moved. On the other hand, nationally representative data such as the AHS or the PSID, trace individual mobility, but typically do not have sample respondents in large enough numbers to say anything about how displacement concentrates in a particular neighborhood in a given city. The NYCHVS thus both captures individual mobility and the reasons why someone moved, and it has a large enough sample size to speak to how displacement concentrates in a neighborhood. I will use these advantages to test how well the varying displacement approaches consistently report the relative levels of displacement across neighborhoods.

2.3 Testing the methods of displacement

To test the comparability of the three different proxy approaches for measuring displacement, I examine whether they achieve similar rank-orders of neighborhoods for their magnitudes of displacement. If the three approaches achieve approximately similar relative results, then they should produce similar rank-orders of amount of displacement occurring across neighborhoods – the neighborhoods experiencing the most displacement and those experiencing the least displacement should be comparably ranked across the different approaches. While the motivational approach is the most closely aligned with the underlying concept of displacement, the other methods might be satisfactory if they perform comparably well, and the data is more readily available. To test whether this is the case, I compare the three approaches to measuring displacement with the NYCHVS and the Census during the same years for which I have data, 2005-2011.

2.3.1 Measures

For the population approach, I follow the work of the Urban Displacement Project (Ong et al. 2017: 65) as well as the threshold commonly used by the City of New York, which measures displacement as the loss in the number of low-income households in a neighborhood, defined as those who make less than 80% of the city's median income.[8] To do this, I use 1-year American Community Survey (ACS) estimates of household income from at the PUMA geography from 2005 and 2011.[9] The median income for New York City for each year is taken, to determine the 80% threshold. Since Census estimates for household income are binned into $5,000 intervals, to determine which estimates should be included in the low-income category, I round to the nearest $5,000. I then take the resulting count estimates of low-income households and subtract the 2011 estimates from the 2008 estimates to determine how many low-income households were "displaced" over the time period in a given neighborhood. I then rank the neighborhoods based on how many people were displaced according to the measure.

Under the individual approach, I use the NYCHVS to measure the number of household moves out of a housing unit between 2005-2011 for each neighborhood in the city, irrespective of their stated motivation for moving or their income. This follows work by (Ding et al. 2016; Ellen and O'Regan 2011; Freeman and Braconi 2004; Vigdor 2002). To do this, I count the number of heads of household who reported that they moved in the past three years, as well as units that were reported vacant, but were not new constructions.[10] I repeat this for each of the three waves of the survey. I then pool the counts of "displacement" by neighborhood and rank the neighborhoods by how many households moved over the time period.

[8]While I use the Census estimates for the city's median income, some use the HUD-designated Area Median Income, which I discuss below.

[9]I use 1-year estimates to align with the years of the NYCHVS survey. 5-year estimates taken at the midpoint are not possible for 2005, since that was the year that the ACS. As a robustness check described later in the paper, I do attempt to make estimates from the 5-year data.

[10]These units could be vacant due to a temporary gap between occupants, renovations, conversion to non-residential purposes, legal disputes, the unit is used for recreational purposes, and other reasons.

The motivational approach also uses the NYCHVS to measure how many households moved between 2005-2011, who also stated that their reason for moving was involuntary. To do this, I include those heads of household who stated that they moved in the past three years and provided a reason why the moved. I then count the number of respondents who said they were "displaced" from their previous residence (according to the definition described in Table 2.2). I then aggregate those respondents by their reported *previous* residence, to determine where they were displaced from. Those neighborhoods are then ranked by the number of people displaced from that neighborhood over each of the three waves of the survey.

2.3.2 Neighborhood rankings of displacement

To see whether the three approaches identify similar neighborhood concentrations of displacement, I compare the rank orders of the 55 neighborhoods according to each displacement approach over the years 2005-2011. To illustrate, in Table 2.3 I show a sample of the top five and bottom five neighborhoods with the most and least displacement according to the motivational approach. Also, in that table are the rankings for those neighborhoods according to the other approaches. (A full table of the rankings for all the 55 neighborhoods can be found in Appendix Table A.1). A neighborhood with rank "1" indicates the neighborhood with the most displacement and "55" is the neighborhood with the least, according to each approach.

Figure 2.1 graphically presents the results of the comparison of the three approaches. The histogram shows how much the ranking of a particular neighborhood under one approach differs from the ranking for that same neighborhood under the reference approach: the motivational approach. In general, a tall, narrow histogram around zero would indicate that the different approaches achieve similar rankings, while a wide histogram would suggest that the rankings differ greatly. Positive values in the histogram indicate that the particular approach under-ranks the amount of displacement in a neighborhood when compared with

Table 2.3: Rank order of relative neighborhood displacement, across approaches

Neighborhood	Rank Motiv.	Rank Indiv.	Rank Pop.
Bedford Stuyvesant	1	23	36
Lower East Side/Chinatown	2	8	19
Bushwick	3	26	17
Upper West Side	4	2	28
. . .			
South Shore	52	38	45
Bayside/Little Neck	53	52	47
Hillcrest/Fresh Meadows	54	37	50
Bellerose/Rosedale	55	34	21

the motivational approach. Negative numbers indicate that it over-ranks the amount of displacement. There are 55 neighborhoods in New York City.

Figure 2.1 graphically presents the results of the comparison of the three approaches. The scatterplot shows how much the ranking of a particular neighborhood under one approach differs from the ranking of the same neighborhood under the reference approach: the motivational approach. Each neighborhood is plotted with their ranking according to the motivational approach on the y-axis, and their ranking according to the individual or population approach on the x-axis. A best-fit line is then plotted to showthe correlation. A line approaching a slope of 1 indicates better congruence between the measures, while a flatter slope line suggests that there is greater difference in the rankings. There are 55 neighborhoods in New York City.

The left-hand plot shows how different the ranks of the individual approach are from the reference group, the motivational approach. The right-hand plot similarly compares the

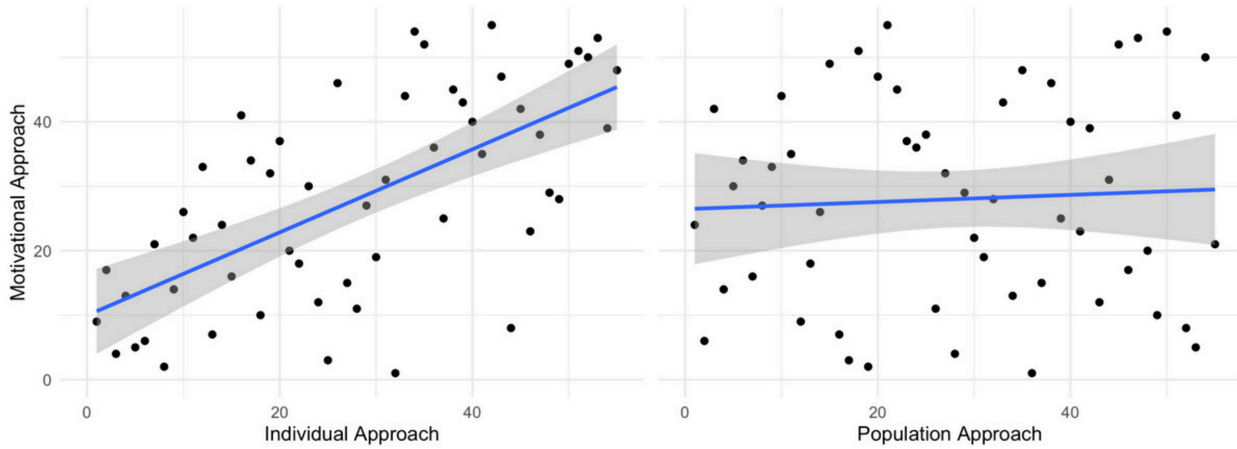

Figure 2.1: Differences in rankings across approaches

population approach to the motivational approach.[11] While the individual approach has greater correspondence with the motivational approach, the figure still shows wide variation in how neighborhoods are ranked in the amount of "displacement" they experience. The difference in rankings across the 55 neighborhoods can be by as much as 36 for the individual approach and 48 for the population approach.

I then calculate Spearman's ρ which measures the correlation between two rankings. Like other correlation coefficients, it ranges between -1 to 1. For the motivational and individual approaches, $\rho = 0.64$, and is statistically significant. The coefficients comparing the motivational and population approaches is $\rho = 0.06$, and is not significant.[12] The population approach is thus a poor proxy when compared to the motivational approach. While the correlation between the motivational and individual approaches is positive, it stretches the bounds of what might be considered a good proxy variable, which should serve as a substitute for the unmeasurable variable.

I conduct a number of robustness checks. To test whether the population approach masks variation within sub-boroughs, I use the same methodology for census tracts, ranking them on a city-wide scale. I then average the rankings within a sub-borough, and then re-

[11]A similar comparison between the population and the individual approaches can be found in the Appendix Figure A.1.

[12]Comparing the individual and the population approaches yields $\rho = 0.12$, and is also not significant.

rank the sub-boroughs based on those averages. This adds more variation in the comparison rankings between the population and motivational approaches. I additionally use 5-year American Community Survey data and the Area Median Income (AMI) levels designated by the Department of Housing and Urban Development. Both of these increase the variation between the rankings of the population and the motivational approaches. I also attempt to estimate the number of low-income households with a linear approximation estimate, instead of rounding to the nearest income bin provided by the Census, which also leads to increased variation in the rankings. Thus the above findings should be taken as a conservative estimate of how far the population approach diverges from the motivational approach in identifying neighborhood concentrations of displacement.

2.4 Why the approaches miscount displacement

Now that we have established that the other measures are inconsistent proxies for displacement, why is that the case? What processes do they mask? I document three ways that these approaches mis-measure displacement: some displaced people stay in their neighborhood, neighborhoods both send and receive displaced people, and displacement is not consistently proportional to other types of mobility.

2.4.1 Staying while displaced

Some are displaced from their home, but not their neighborhood. There has been some prior qualitative research indicating some people find ways to stay in gentrifying neighborhoods (Hyra 2015). I find in New York City that 37% of displaced people stay within their original neighborhood, while an additional 29% move to an adjacent neighborhood (see Table 2.4). Adjacent neighborhoods have borders that touch, identified using the *rgeos* package in *R*. Displaced households seem to have a similar propensity to stay in their neighborhood or

Table 2.4: Mobility rates by destination, for displaced and non-displaced movers

	Non-displaced movers	Displaced
Stayed in neighborhood	0.36	0.37
Moved to adjacent neighborhood	0.29	0.29
Moved to non-adjacent neighborhood	0.35	0.34

move to an adjacent neighborhood as those who move for other reasons. This suggests that most households seek to stay near their original community. While the specific reasons how and why people stay require further investigation, it could be to maintain connections to social and family networks, access to school and work, and the amenities they were used to in their community.

This is a non-trivial share of displaced people who remain in their neighborhood. A majority of the displaced try to stay in or near their community. Not accounting for displaced people who stay in their neighborhood would cause the population approach to undercount the amount of displacement in a neighborhood. This is because the population approach can only account for losses and gains in the absolute number of people residing in a neighborhood between two points in time. A displaced household that remains in their neighborhood would thus not appear as having been "lost" from the neighborhood according to the population approach.

2.4.2 In-displacement

Another limitation of the population approach is that it cannot account for the simultaneous in-migration of people displaced from other neighborhoods. By tracking the origin and destination patterns of displaced households, we can see both where they were displaced from, and where they were displaced to. While there is variation across neighborhoods in how much displacement is occurring, there is also variation in how much neighborhoods are receiving displaced people. To measure the in-displacement for a neighborhood, I aggregate displaced households by their *current* neighborhood, while out-displacement is calculated by aggregating households by their *previous* neighborhood.

Figure 2.2 shows the net displacement across neighborhoods using the motivational approach. This is measured by subtracting a neighborhood's magnitude of in-displacement from its level of out-displacement. Purple indicates a net displacing neighborhood, while orange represents a neighborhood that is a net receiver of displaced households. Bold outlines around neighborhoods indicate displacement "hot-spots," which have the highest levels of both in- and out-displacement. This is measured by calculating the total displacement flow by adding each neighborhood's in- and out-displacement and taking the highest 25% of total displacement flows.

Without accounting for the in-displacement into neighborhoods, the population approach undercounts the amount of displacement. This is because it cannot capture if, for example, a low-income person who had left a neighborhood would be replaced by another low-income person who arrives from another neighborhood. This would lead to a net zero change, according to the population approach.

2.4.3 Proportionality of mobility

The individual approach assumes that the rates of displacement are proportional to rates of mobility for those who move for any reason. The validity of this assumption is testable by comparing the displacement rates to the all-mobility rates for a given neighborhood. Across New York City, I find that on average, every three years 22% of people move residences. Of those movers, about 9.5% are "displaced." For mobility to be a suitable proxy for displacement, we would need to see similar proportions across neighborhoods.

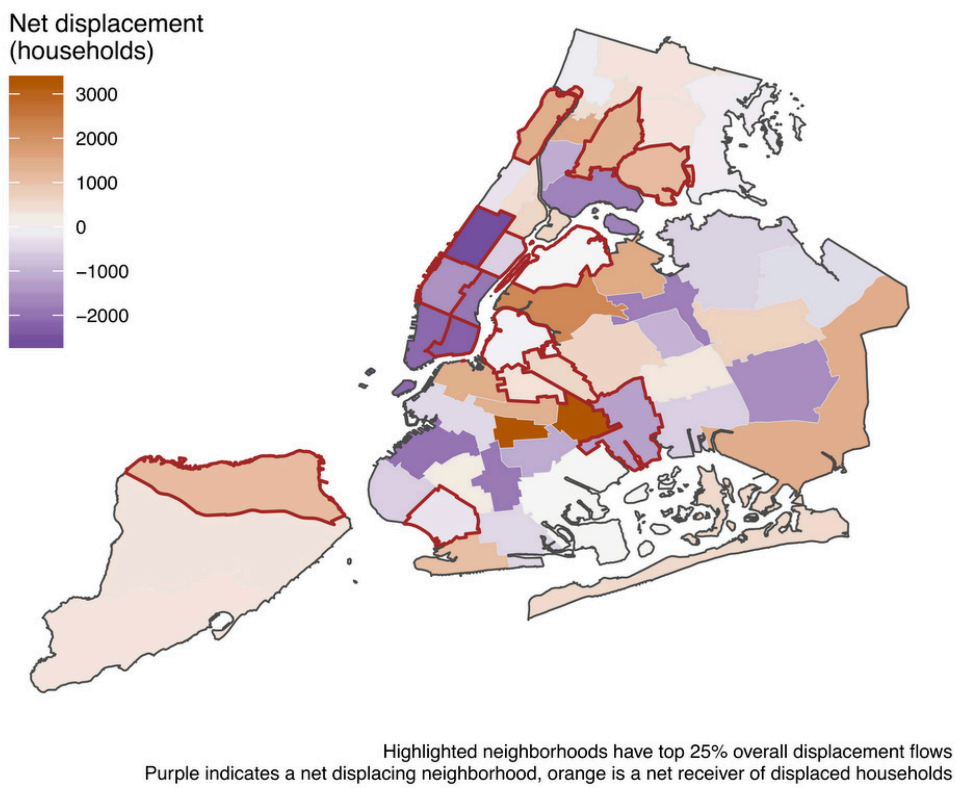

Figure 2.2: Net Displacement

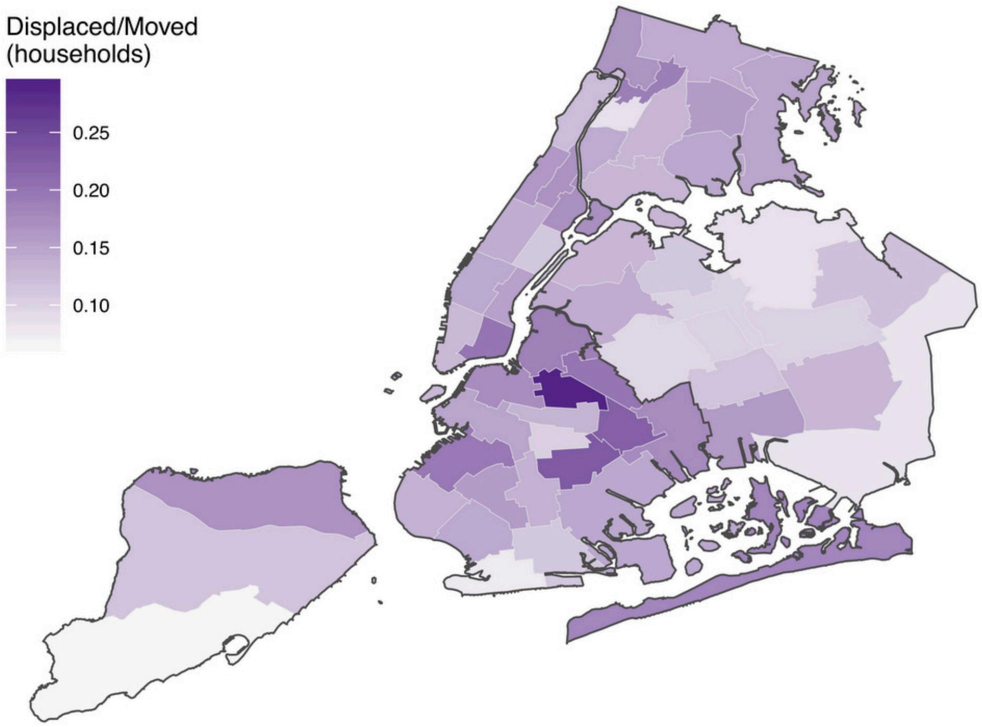

Figure 2.3: Displacement as share of all mobility

Figure 2.3 shows a map of displacement as a share of all mobility across neighborhoods. If displacement was consistently proportional to mobility, we would see little differentiation across neighborhoods, and would be close to 0.09 as the proportion of moves that are due to displacement. Instead we see a range from 0.06 to 0.29. Darker colors mean that displacement is a greater share of all mobility. Moreover, we can see that this disproportionally clusters in certain parts of the city. Given that much of the research on displacement examines the *relative* likelihood of displacement across neighborhoods, this suggests that using the individual approach as a proxy would lead to inconsistent estimates of the amount of displacement across neighborhoods.

2.5 Effects of measurement choices: relating gentrification to displacement

As an exploration of the possible consequences of our measurement choices, I return to the question of the relationship between gentrification and displacement. If the measures are interchangeable, then we should see comparable correlations with between gentrification and displacement across the three measures. Through a series of simple OLS models, I show that one's chosen approach to measure displacement can potentially affect their results. I find that gentrification is positively and significantly associated with higher magnitudes of displacement according to the motivational approach, but not the others. However, given a number of limitations I will discuss below, this analysis should be considered illustrative.

I use a modified version of Freeman's (2005) measurement of gentrification, which has been used elsewhere in the literature (Barton 2016; Martin and Beck 2018). Freeman's measure first identifies "potentially gentrifying" neighborhoods at a initial decennial census which are 1) are within a central city, 2) are below the median income for the metropolitan area, and 3) have a share of housing built within the past 20 years below that of the median for the metropolitan region. Neighborhoods are then considered to have "gentrified" if at the subsequent decennial Census they have 1) had an increase in the share of residents with a college degree greater than the median increase for the metropolitan area, and 2) had an increase in real housing prices. I use Freeman's measure to identify gentrifying neighborhoods in New York City, modifying it in two ways. First, since the NYCHVS data is restricted only to New York City, I instead used city-level comparisons, rather than metropolitan area. Second, I remove the criterion for housing built within the past 20 years. In many places, including New York City, a great deal of gentrification happens through older housing stock. While gentrification often includes new construction, early concepts of gentrification specifically focused on changes through existing housing stock, such as brownstones, lofts, or larger apartment buildings (Davidson and Lees 2010; Smith 1996). Thus, I exclude the new building criterion.[13]

The dependent variables are the magnitudes of displacement according to each of the three approaches, as described in the above sections. I use Census data to determine sub-borough areas that gentrified between 2000 and 2010, of which there are 13 neighborhoods. Table A.1 in the Appendix lists these neighborhoods in bold. This three-level categorical variable (0 = potentially gentrifying, 1 = gentrified, 2 = other neighborhood) is my primary independent variable. I additionally include control variables for the number of low-income households in a neighborhood and the total population, both in the year 2000. This is to account for the possibility that displacement is more prevalent in neighborhoods where there are more people or more at-risk low-income people. I then standardize the variables to facilitate comparisons between the approaches and use OLS regression to estimate parameters.

I find that whether gentrification is a significant predictor of neighborhood displacement levels depends on the choice of measurement. Table 4.2 shows that according to the motivational approach, displacement is approximately 0.84 standard deviations higher in gentrifying neighborhoods than non-gentrifying neighborhoods, while the individual and population approaches do not report a significant relationship between gentrification and displacement. The individual approach – which does not account for whether moving was involuntary – does not report a significant association with gentrification but does with total population and low-income population. This suggests that mobility in general is more prominent in more populous neighborhoods and neighborhoods with fewer low-income households, but *involuntary* mobility is mostly prevalent in gentrifying neighborhoods. The population approach does not report any significant relationship.

This analysis suggests that our measurement choices can be consequential for our

[13] The new building criterion would have excluded the following neighborhoods, which by many accounts should be included in the pool of gentrifying neighborhoods: Central Harlem, East Harlem, Bushwick, Bedford Stuyvesant.

Table 2.5: Relationship between gentrification and displacement, by measurement approach

	Motivational	Individual	Population
Gentrified neighborhood	0.841*	0.486	-0.421
Other neighborhood	0.159	-0.006	0.125
Low-income population	0.115	-0.423	-0.043
Total population	0.153	0.626***	0.034
Constant	-0.271	-0.112	0.043
N	55	55	55
R^2	0.177	0.312	0.061
Adjusted R^2	0.111	0.257	-0.014
Residual Std. Error (df = 51)	0.943	0.862	1.007
F Statistic (df = 3; 51)	2.687*	5.665***	0.811

*p .05; **p .01; ***p .001

findings – but this is subject to a number of important limitations. First, the number of neighborhoods (n = 55) restricts how many variables can be included in the analysis, thus limiting the ability to control for potential confounding variables. Additionally, the challenges in measuring gentrification mirror those for measuring displacement, as numerous approaches are used to identify gentrifying neighborhoods (Drew 2018). A full accounting of those challenges is beyond the scope of this paper. However as a robustness check, I attempted the analysis with two other prominent measures of gentrification by Ellen and O'Regan (2008) and McKinnish et al. (2010).[14] While I find differences between the measures in terms of the size and direction of the coefficients, the gentrification measures produce large standard errors. This is because the Ellen and O'Regan and McKinnish et al. measures identify significantly fewer neighborhoods as "gentrified" – two and five neighborhoods, respectively (See Table A.1 in the Appendix for a comparison of these neighborhoods). Moreover, the neighborhoods identified by these other methods do not correspond as well as the modified Freeman method to neighborhoods that were gentrifying during the time period, according to firsthand knowledge of the city. As a result, these findings should be taken as suggestive evidence of the implications of measurement choices, but robust conclusions of the relationship between gentrification and displacement require further analysis.

2.6 Conclusion

This paper has shown that common proxy measures of displacement lead to different estimates of neighborhood concentrations of displacement. This lack of consistent proportionality across the approaches might lead to biased estimates when examining the comparative

[14]Ellen and O'Regan (2008) define a gentrifying neighborhood as those neighborhoods which start with an average household income that is 70% of the metro area average (in this case, I use the city average to maintain consistency with the other measures.), and subsequently sees at least a ten percentage point increase in the ratio between the average household income of the neighborhood and the MSA (city). McKinnish et al. (2010) identify as gentrifying those neighborhoods that begin in the 20th percentile of average household incomes, and then experience an increase in the average household income by at least $10,000. As in the above measure, I calculate these at these measures at the sub-borough level.

likelihood of displacement across neighborhoods. The population approach – the most common method of approximating displacement – is a particularly volatile measure. This is partly because some households remain in their neighborhood after they are displaced from their home, and neighborhoods both displace and receive displaced people. Displacees also have fundamentally different mobility patterns than those who move for other reasons, leading to divergences between the individual and motivational approach. These findings point the importance of accounting for the motivations behind someone moving when examining mobility patterns, particularly in the context of gentrification.

However, this is not to suggest that measuring the compositional changes of neighborhoods or individual mobility patterns are unimportant or invalid, especially for understanding the various processes associated with gentrification. Indeed, depending on one's research questions, these can be important calculations. My argument is simply that these approaches are fundamentally measuring different things, and we should be careful when assuming they are equivalent. These findings suggest that if our goal is to measure displacement – understood as involuntary household mobility – then the population and individual approaches do not consistently measure that.

In addition to suggesting more precise ways of measuring displacement, this study also points to future avenues of research. As shown above, by tracing the actual mobility pathways of individuals, we see that some might be displaced from their home, but not their community. Despite being involuntarily pushed from one's home, people are resilient and may find ways to stay in their neighborhood. This opens up future research possibilities for the conditions under which households might stay, as well as the consequences of staying. In New York City, 43% of people who stay in their neighborhood after being displaced are still rent-burdened, signaling a risk of future displacement.[15] The extent to which preserving local social networks, ties to schools, and other community assets by staying in one's neighborhood

[15]"Rent-burdened" is a standard definition indicating a household that spends more than 30% of its income on rent.

might help prevent future displacement, or are simply delaying the inevitable, is a possible future research question.

These findings also suggest that displacement does not only harm the poor. Many studies explicitly or implicitly restrict displacement to something that only affects poor households (Ding et al. 2016; Freeman 2005). Displacement does not just affect low-income or gentrifying communities – it occurs in every neighborhood in New York City and across the income distribution. A landlord can raise your rent to the point where you have to move whether you make $30,000 or $90,000 a year. In the context of gentrification, this could be indicative of a cyclical model, where early waves of "gentrifiers" are subsequently displaced by increasingly affluent in-movers. Future research could look at the interactions between the mobility patterns of movers from the mobility patterns of the displaced.

There are some limitations with this data, which also point to further avenues of research to improve methodologies of studying displacement. The survey only allows for one reason why someone moved. People make mobility decisions for a variety of reasons, of which displacement pressures may or may not be primary (Newman and Wyly 2006). For example, someone who primarily moved to begin cohabiting with a romantic partner, but also was facing a steep rent increase, would not be captured as having been "displaced" by this data. This suggests that allowing for multiple responses as in the Milwaukee Area Renters Study (Desmond 2016) or rank-ordering of reasons for moving would be beneficial to capture the complexity in reasons for moving. Moreover, when someone reports moving due to "high housing costs", we don't know if that was because: 1) their housing costs increased, 2) other expenses increased, 3) their income decreased, or 4) they wanted to downsize. The displacement data here is also restricted to households who currently live in New York City. Therefore, if someone is displaced outside of the city, they are lost to the analysis. The data also does not capture someone who enters the shelter system or other institutional housing (Newman and Wyly 2006). The survey also does not have data available at a smaller geography than the sub-borough area, which may mask heterogeneity of displacement patterns within neighborhoods. Data availability also limits the ability to consistently examine this over a longer continuous time period, which could also potentially reveal different patterns.

These results suggest that the reasons why people move are important for explaining their mobility patterns. People who move involuntarily have different movement pathways than those who move of their own volition. When these patterns aggregate to neighborhoods, they identify different hot-spots of mobility, depending on the reason why people move. It suggests that we need to actually measure mobility when we examine displacement. Future research will need to improve data collection or find ways to adjust for these differences. By more accurately measuring displacement, we can more closely understand the various processes and mechanisms that affect the housing security of families in rapidly changing cities and communities.

Chapter 3

Are Gentrification and Displacement Different Across Cities?

Concerns of gentrification and displacement appear in the pages of local news outlets in many cities around the country. Perhaps counterintuitively, most quantitative research finds that displacement is not more likely in gentrifying neighborhoods (Brummet and Reed 2019; Ellen and O'Regan 2011; Freeman 2005; McKinnish et al. 2010), despite a variety of qualitative studies to the contrary. The former studies primarily rely on national-level data to estimate an average effect of gentrification on displacement, regardless of where the gentrification takes place.

Yet cities are different. The factors that shape housing dynamics – particularly those related to gentrification and displacement – vary across cities. Housing markets may be hot or cold, some places are destinations for the creative class and others not (Florida 2017), and capital flows disproportionately into a small pool of global cities (Gyourko, Mayer, and Sinai 2013; Sassen 2001). Thus, there is reason to believe that gentrification and displacement are different in New York, San Francisco, and Los Angeles than in Buffalo, Omaha, or Topeka. Analysis of national-level data without accounting for city-level factors risks masking effect heterogeneity across different urban contexts.

This paper specifies the particular ways that cities are different and how those differences shape local gentrification and displacement processes. The foundation of this paper is a replication of Lance Freeman's (2005) "Displacement or Succession" article. Freeman (2005) was among the first to argue that gentrification had little to no impact on displacement rates, and the study went on to have substantial scholarly and policy influence. I replicate Freeman's findings and update them to include more recent data. I then expand on the study by introducing city-level factors to discern whether gentrification may increase displacement in some places but not others. Using principal component analysis to consolidate a variety of city-level variables, I find that the levels of segregation by race and income lead to divergent effects of gentrification on displacement. In a highly segregated city, you are more likely to be displaced in a gentrifying neighborhood, while in a low-segregation city, you are more likely to be displaced in a poor neighborhood than a gentrifying one. I argue that this is evidence in support of Neil Smith's (1979) rent gap theory of gentrification: that depreciated property provides strong incentives for investors to leverage gentrification to increase economic returns, including through encouraging displacement.

3.1 Background

To motivate this study, I begin by describing the ways that gentrification research has largely avoided taking up the question of variation between cities. Next I discuss some of the specific ways that cities are different in light of gentrification theory, and how those differences might in turn shape gentrification patterns. I give special attention to one gentrification theory, the rent gap, and how it provides important insights to how the metropolitan level context sets important conditions for gentrification dynamics.

3.1.1 Case studies v. Aggregate accounts

The research on gentrification and displacement largely consists of two approaches – *case studies* and *aggregate accounts*. Case studies look within a particular city to describe local gentrification and displacement patterns, while aggregate accounts use national-level data to examine the average effect of gentrification on displacement across all types of places. Both methods have their advantages. Case studies can examine the specific local dynamics that affect neighborhoods and mobility, while aggregate studies help answer questions of generalizability.

Yet it so happens that these two approaches also generally overlap with the two camps in the debate of whether gentrification leads to displacement – case studies often show gentrification to be consequential for displacement while aggregate accounts do not (see Brown-Saracino 2017). The case study approaches generally draw on qualitative studies of particular neighborhoods. Scholars often choose neighborhoods in major cities and where gentrification has already taken hold (Brown-Saracino 2017). As an illustration, Billingham (2015) examines the indices of two prominent recent textbooks on gentrification. One counts references to only 14 different international cities, while the other documents 90 different cities, though in both cases, the overwhelming share of studies focus on cities like New York City, San Francisco, Toronto, Vancouver, London, and Chicago. Thus, there tends to be a selection effect in the choice of research sites that prioritizes places where gentrification and displacement are happening (Brown-Saracino 2017).

On the other hand, aggregate accounts draw upon primarily quantitative data from many different places. In defining gentrification through a set of neighborhood-level variables that can be gathered through Census data, these studies can ask whether every neighborhood in the country is gentrifying or not. While there is an increasing interest in gentrification outside of major cities, such as rural areas and smaller towns (Billingham 2017; Brown-Saracino 2009; Hines 2010), there is reason to believe that housing dynamics differ greatly between cities that could undermine the fruitfulness of the comparison. While researchers often restrict their analysis to metropolitan areas or central cities, there is little consideration of how gentrification and displacement may look different across places. The one exception is that many studies include a control variable for the vacancy rate in their models, on the assumption that it serves as a proxy for the tightness of the local housing market (Ellen and O'Regan 2011; Freeman 2005). Yet as I describe below, the differences between cities with respect to the factors that shape their local housing markets go beyond a single measure of market competition.

However, there are some promising comparative case studies that do examine differences in the gentrification process between places (Brown-Saracino 2009). Hammel and Wyly (Hammel and Wyly 1996) undertook a mixed-methods project to identify gentrifying neighborhoods across different cities, in order to understand some of their variation. Hwang (2015) finds that the amount of gentrification that occurs in a city is different for cities with high versus low foreign-born populations and goes on to examines the differences between Chicago and Seattle. The Great Recession also had differential impact on subsequent gentrification patterns across cities (Hyra and Rugh 2016). Metropolitan area contexts also shape mobility patterns and people's choices of where they want to live with respect to neighborhood racial composition (Crowder, Pais, and South 2012). Wyly and Hammel have also examined how gentrification patterns vary across cities (Hammel and Wyly 1996; Wyly and Hammel 2004). All these studies point to how gentrification and housing dynamics are different between cities, yet they do not look specifically at how displacement patterns vary as a result.

3.1.2 How cities are different

Despite the dearth of systematic analysis comparing cities by their gentrification patterns, the underlying explanations for gentrification and displacement suggest that a city-level perspective would be fruitful, since as we will see the driving mechanisms vary across cities.

Gentrification is often seen either as the flows of people or the flows of capital, where the former examines who moves into gentrifying neighborhoods while the latter considers how gentrification is used as a vehicle for capital accumulation (Zuk et al. 2015). These two perspectives led to heated debates during the 1990s, even though in the end both are important. I will describe a few facets that of the gentrification process arose from these debates and how to consider them in a city-level context.

One driver of gentrification is the shifts in the local employment structure that favor more professionalized workers. Increases in professional workers in previously working-class neighborhoods are seen as indicators of gentrification (Atkinson 2000). The most prominent example of this is Richard Florida's "creative class," who are workers who have higher incomes and cultural tastes that align with gentrification (Florida 2002). With the help and encouragement of Florida himself, many cities have adopted this as an economic development strategy (Peck 2005), though Florida now believes this may have exacerbated inequality (Florida 2017). Conversely, while deindustrialization has affected the US as a whole, places such as the Rust Belt have been affected differently by the decline in manufacturing jobs (Charles, Hurst, and Notowidigdo 2019; Friedhoff, Wial, and Wolman 2010).

Another factor affecting gentrification is the intensity of the local housing market. A hot housing market raises home values and rents, which are key indicators of gentrification and potential displacement. While there are a handful "superstar cities" that have consistently high demand and price appreciation, there is wide variation outside of that category (Gyourko et al. 2013). Rising housing costs can be caused by a variety of factors, including low vacancy rates that reflect constrained supply under increasing demand, which vary across cities (Glaeser and Gyourko 2018; Glaeser and Ward 2009).

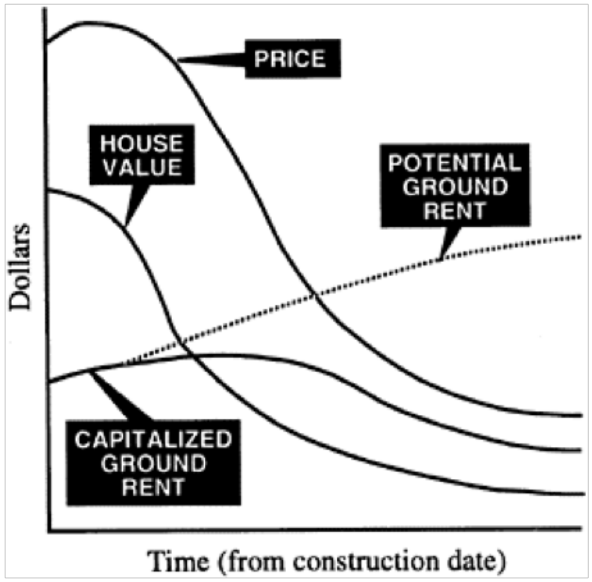

Figure 3.1: Diagram of the rent gap (Source Smith 1996: 63)

3.1.2.1 Rent gap & segregation

Among the various theories, one of the more prominent explanations of gentrification is as a result of the existence of "rent gaps." *Rent gap theory* states that gentrification occurs when there is a gap between the *current* rental income of a property and the *potential* income if that property were brought to its highest and best use (Smith 1979). Figure 3.1 illustrates the theory. Over time as a housing unit is devalorized – whether due to the combination of depreciation of the building structure and changes in a neighborhood – the amount of money an owner receives in rent (capitalized ground rent) also declines. At the same time, the potential ground rent increases if there are structural conditions that allow for more *potential* profit opportunities if certain changes to the property and neighborhood are made. The *rent gap* then is the space between the capitalized ground rent and the potential ground rent. The larger the rent gap, the greater the potential returns to gentrification.

The specific ways that one could bring the curve up to its highest potential value vary. It could be from renovating a property, securing higher paying tenants and pushing out the old ones – or likely a combination of all of them. There are also a variety of contextual factors that shape how those curves change, such as changing overall neighborhood quality, the behavior of other property owners and other renters, and others.

Gaps come where there are pockets of low-valued property amongst a pool of higher valued property. This inequality is a necessary component for the rent gap. For a hypothetical example, an investor in a city with all high-valued property would not have anything undervalued to gentrify, while a city with all low-valued property would not have a higher potential value to strive for. Therefore, the rent gap is a reflection of *spatial inequality.* But what creates the inequality? Smith (1979) argued that it was a pattern of capital depreciation and disinvestment that lowered home values in particular neighborhoods.

One of the prime sources of spatial inequality is the ongoing legacy of racial residential segregation, which Smith noted as one of the key drivers of rent gaps (Smith 1979). Residential segregation is the product of individual and institutional practices to exclude (primarily) black families from housing in white neighborhoods. When harassment of the new black residents to get them to leave did not work, whites fled to the suburbs around cities (Crowder and South 2008; Massey and Denton 1993). In the wake of this urban restructuring, black neighborhoods were denied resources and opportunities. For homeowners, property values declined and remained low, and for renters, many suffered from substandard housing. The result is stark inequality that maps onto racial lines and shapes the spatial configuration of cities.

While few things have shaped the structure of the US housing market as deeply as racial residential segregation, there are other kinds of spatial inequality. Income inequality and income segregation have grown in the US (Reardon and Bischoff 2011). Poor white neighborhoods exist among affluence in the city, and affluent black families are separated from poor black neighborhoods (Quillian 2012; Wilson 1987).

These patterns have historically led to very little variation and mobility in neighborhood attainment. When people move, they tend to move to neighborhoods similar to their origin community – both in terms of racial composition and income level (Sampson and Sharkey 2008). In searching for a place to live, people generate a set of potential destination neighborhoods drawn from their knowledge of desirable or viable communities thus perpetuating a “cycle of segregation” (Krysan and Crowder 2017).

Meanwhile, a variety of trends are breaking down some of those patterns. Whites and the middle classes are increasingly returning to cities. Neighborhoods that whites had marked as “off-limits” are now drawing in newer, affluent residents, and integration is growing and historically black neighborhoods (Ellen, Horn, and O’Regan 2012; Freeman and Cai 2015). Simulation data suggests that declining preferences for segregation can accelerate gentrification (Eckerd, Kim, and Campbell 2019). Still, gentrification may increase racial segregation at the metropolitan level, while decreasing income segregation (Freeman 2009).

Segregation has also been shown to affect other housing trends, such as foreclosure patterns during the 2008 financial crisis. The specific segregation patterns of cities led to differences in foreclosure rates in the wake of the Great Recession as well as their resilience in the recovery (Hall, Crowder, and Spring 2015; Hwang, Hankinson, and Brown 2015; Wang 2018). Foreclosed properties enticed investors to purchase large numbers of properties at low cost (Immergluck 2012). The post-recession housing market has in some cases experienced accelerated gentrification (Hyra and Rugh 2016).

While the rent gap is admittedly a necessary but not a sufficient condition to explain gentrification, it describes where there is the greatest potential for profit-seeking activity. It suggests that the greater the gap, the greater the incentive for investors. Conversely, in spite of large gaps, real estate interests may be dissuaded from investing if securing the higher value is too costly or risky, either due to the large amount of investment capital that would be required, or if the surrounding neighborhood conditions would impede the potential for high returns.

3.2 Research design

This study draws on Freeman (2005), first by replicating the original research and then expanding the analysis to include city-based contextual factors. The data used for this study is the restricted geocoded Panel Study of Income Dynamics (PSID), and the decennial Census and American Community Survey.[1] The PSID is a longitudinal study following households and their descendants since 1968, with surveys every one to two years. Freeman's original study covered the years of 1986-1999, which I include and extend to 2015. First, I will discuss the primary modeling strategy and data, followed by a description of the analysis strategy used to explore the effects of place. As a replication study, I attempt to stay close to the core methodologies of Freeman (2005), to assess robustness to alternate specifications and generalizability to other settings (see Freese and Peterson 2017).

3.2.1 Replicating Freeman's study

Freeman's (2005) study asks whether the likelihood of being "displaced" increases, conditional on living in a "gentrifying" neighborhood. The research strategy is to first take two neighborhoods that at time t_1 could both *potentially gentrify*, and then at time t_2 compare the neighborhoods that gentrified to those that did not. The research question is then whether the likelihood of displacement increases in the gentrifying neighborhood compared to the neighborhood that did not gentrify, controlling for a variety of factors. The study found that residing in a gentrifying neighborhood had little to no effect on the likelihood of displacement.

The key variable of interest is whether someone lives in a "gentrifying" or a "non-gentrifying" neighborhood. Relying on data from the decennial Census, the definition first

[1]Census data comes from Social Explorer, based on the Longitudinal Tract Database to maintain consistent 2010 tract boundaries. Missing tract data is supplemented by the GeoLytics Neighborhood Change Database.

identifies a baseline of "potentially gentrifying" census tracts as those which 1) are within a central city, 2) are below the median income for the metropolitan area at the beginning of the intercensal period, and 3) have a share of housing build within the past 20 years below that of the median for the metropolitan region. What distinguishes gentrifying from nongentrifying is that neighborhoods at the subsequent census taking 1) have an increase in educational attainment greater than the median increase for the metropolitan area, and 2) have an increase in real housing prices. Thus, the comparison is essentially whether there is more displacement in gentrifying neighborhoods than there is in poor neighborhoods. For my study, I use the intercensal periods of 1980-1990, 1990-2000, and 2000-2010. To account for the years after 2010, I use the same comparison between the 2010 census and estimates from the 5-year 2013-2017 American Community Survey.

Freeman measures displacement in two ways: 1) a household moving from their previous residence, and 2) a household who moved *and* who stated that their reason for moving was "involuntary." The first measure is simply whether the household reported moving in the past few years. Then to determine *involuntary* mobility, the second measure relies on a question of the respondent's reason for moving. Among the possible answers that the PSID offers, the following responses are considered to be "involuntary": 1) "contraction of housing: less space; less rent" and 2) "Housing unit coming down; being evicted; armed services, etc.; health reasons; divorce; retiring because of health."[2] This measure is admittedly imperfect for measuring displacement, since it includes many voluntary moves, while also likely underreporting other cases that might be considered involuntary.[3]. While below I employ some ways to improve the measure by excluding moves from divorces and armed services, the limitations are acknowledged. Nonetheless, it does differentiate between people involuntary

[2]The other possible responses are: 1) to take another job; transfer; stopped going to school, 2) To get nearer to work, 3) expansion of housing: more space; more rent; better place, 4) other house-related: want to own home; got married; physical conditions of the previous housing unit, 5) neighborhood-related: better neighborhood; go to school; to be closer to friends and/or relatives, 6) Ambiguous, mixed, or other reasons: including reasons such as to save money; all my old neighbors moved away; retiring

[3]For examples of how survey respondents might not report eviction even when they have been evicted, see Desmond (2016): 330

moves from people who moved for more positive reasons, such as to buy a house or take a new job. Accounting for actual involuntary mobility has been found to be consequential in displacement studies (Carlson 2019).[4] Given this, for my analysis I only use the second measure of displacement, which captures reported involuntary mobility.

The modeling strategy for Freeman is with a discrete time logistic regression. This is a type of hazard model that models the duration to experiencing an event, which in this case is displacement. If gentrification matters, then it will decrease the time to displacement compared to that in a nongentrifying neighborhood. The data is converted to a long *person-year* format, in which each observation is a respondent's survey responses for a given year. For Freeman, a simplified version of the model is:

$$logit(DISPLACED_{ij}) = GENT_{ij} + CONTROLS_{ij} + TIME_{ij}$$

Where for person i at time j, $GENT$ is whether the person lives in a gentrifying neighborhood, $CONTROLS$ are a vector of control variables, and $TIME$ is the number of years living in one's residence.[5] One of the assumptions of the discrete time hazard model is that once the event is experienced, a respondent cannot experience it again (Singer and Willett 2003). Therefore, after a household experiences one displacement, they should be dropped from the remaining analysis, though it is unclear from the documentation whether Freeman follows this assumption.

[4]Indeed, Freeman did find that the effect of gentrification was slightly larger when the second definition of displacement is used.

[5]There are a number of alternate specifications to modeling time. Some include dummy variables for each time period, others use a continuous variable for time and may include quadratic and cubic terms to model the nonlinearity of the effect of time (Singer and Willett 2003). Freeman uses a single continuous time variable.

3.2.2 Extending Freeman's study

To see whether the effect of gentrification varies across cities, I replicate and extend Freeman's study. I first replicate the original findings for their time period. I then extend the analysis by introducing a variety of place variables into the models, which I describe in detail below. In summary, I first use principal component analysis to generate variables for key features of distinction between cities. I then interact those new variables with the original gentrification variable to test for effect heterogeneity across different types of cities.

3.2.2.1 Describing cities - principal component analysis

The PSID does not have enough respondents in any particular city to do direct analysis within cities. Therefore, to ascertain the effect of cities, the best we can do is to look at the effect of living in city with a given set of traits. To capture the many differences between cities while keeping the analysis tractable, I use principal component analysis (PCA) to delineate the most important aspects. PCA takes a battery of variables and consolidates them into "components." Each component is a linear combination of its constituent variables, each weighted according to their importance. The result is a continuous index variable which can be used in a model.[6] This reduces the dimensionality of the data while minimizing the loss of information.

The PCA analysis applies to the set of *central cities* in the US at various time intervals. These are the main urban municipalities within metropolitan statistical areas, though MSAs can have multiple central cities. I collected data for these central cities at the same time periods as for the gentrifying neighborhood identification (decennial censuses and the 2013-2017 ACS), which across the four periods of analysis results in 1,932 observations. The PCA

[6]Factor analysis is a similar methodology but is conceptually different in that it seeks to derive unmeasured latent variables from the data. Since I am looking for composite rather than latent variables, I use PCA, though achieve similar results when using a factor analysis approach.

resulted in four components – size, housing market, workforce, and segregation – which I will describe in detail below along with the process of arriving at the results (See Table 3.1). In selecting the variables for the PCA, I strove for a high percent of the variance between cities explained, as well as interpretability of the resulting components. In the end, the PCA explained 72% of the variation between the cities.

The first component captures the size of a city. This consists of the population of an MSA, population of the city, and the population density of the city. The resulting *Size Index* reflects big versus small cities.

The second component measures the workforce character of the city, based on two variables: the percent “working-class” and “percent professional-managerial class”. I estimate these variables using the occupational classifications from the decennial census and American Community Survey. People in the following occupations were defined as “working-class”: production, craft, repair operations, operators, fabricators, or laborers. “Professional-managerial class” workers were defined as those in the occupations of: management, business, financial operations, professional and related occupations, sales and related occupations, and office and administrative support occupations. These numbers were then divided by the total employed population of a city to determine the share of each type of worker in the city’s labor force. In the resulting *Workforce Index*, larger scores reflect a more professional-managerial city while smaller values indicate a more working-class city.

The third component is the intensity of the local housing market. For this, median rent, rental vacancy rate, and the median home values for cities were collected from the Census and the American Community Survey. Housing Price Index (HPI) data for MSAs were also collected from the Federal Housing Finance Agency. HPI tracks the percent change within a metropolitan area from a base year, in this case 1990, and I adjust for inflation using the Consumer Price Index, less shelter. The *Housing Market Index* scores indicate hot housing markets with larger numbers and cooler markets with smaller numbers.

Figure 3.2: Distribution of index scores across all central cities

Finally, the fourth component describes the spatial inequality of a place. Racial segregation is measured as the black-white index of dissimilarity (D), downloaded from the American Communities Project (Logan and Stults 2011).[7] Income segregation is measured through a decomposition of a spatial Gini coefficient (Rey and Smith 2013).[8] The resulting *Segregation Index* reflects the degree of spatial inequality in a place.

Table 3.1 presents the loadings of each variable on the components. I omit loading scores below 0.5 for ease of reading. From this, I generate the index scores for the four components. The distributions of the indices are presented in Figure 3.2.

[7] The Index of Dissimilarity for two groups is calculated as $D = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{w_i}{W_T} - \frac{b_i}{B_T}\right|$, where n = number of tracts or spatial units, w_i = number of Whites in tract i, W_T = total number of whites in the MSA, b_i = number of Blacks in tract i, and B_T = total number of Blacks in the MSA

[8] The spatial Gini decomposes the Gini into two parts, such that $Gini = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{i,j}|x_i - x_j|}{2n^2\bar{x}} + \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}(1-w_{i,j})|x_i - x_j|}{2n^2\bar{x}}$, where between locations i and j, $w_{i,j}$ is a binary spatial weights matrix indicating a neighbor relationship. If the second term increases relative to the first, this indicates a higher degree of spatial autocorrelation. Thus, the ratio of the first to the second term is used in this study to indicate greater spatial income inequality.

Table 3.1: Principal component analysis, central cities

	Housing Market	Workforce	Segregation	Size
Population (MSA)			0.57	0.58
Population Density (place)				0.73
Population (place)				0.90
Segregation (D-BW) (MSA)			0.79	
Spatial Gini (MSA)			0.82	
HPI (MSA)	0.83			
Rental vacancy rate (place)	-0.74			
Median home value (place)	0.71	0.56		
Median rent (place)	0.62	0.59		
Percent workers		-0.78		
Percent professional managerial workers		0.77		
SS loadings	2.28	2.04	1.84	1.74
Proportion Variance	0.21	0.19	0.17	0.16
Cumulative Variance	0.21	0.39	0.56	0.72

3.2.3 Modeling

With the index scores generated by the PCA, I then attempt to discern how the effect of gentrification may vary across different types of cities. To do this I take the baseline Freeman model and add a series of interaction terms with the gentrification variable. The goal is not to simply control for city-level factors, but rather to see if there is any effect heterogeneity depending on whether gentrification occurs in one type of city versus another. The model is:

$$\begin{aligned} logit(DISPLACED_{ij}) = & GENT_{ij} + SIZE_{ij} + HOUS_{ij} + WORK_{ij} + SEG_{ij} + \\ & GENT_{ij} * SIZE_{ij} + GENT_{ij} * HOUS_{ij} + \\ & GENT_{ij} * WORK_{ij} + GENT_{ij} * SEG_{ij} + \\ & CONTROLS_{ij} + TIME_{ij} + TIME^2_{ij} + TIME^3_{ij} \end{aligned} \tag{3.1}$$

Where for person i at time j, $DISPLACED$ is whether a person was displaced that year and $GENT$ is whether the person was residing in a gentrifying neighborhood. $SIZE$, $HOUS$, $WORK$, and SEG are the four index variables from the PCA. $TIME$ is the number of years someone has resided in their current home, and I additionally account for the nonlinearity of the hazard risk by adding quadratic and cubic terms. I use the same control variables as Freeman did, though I add a categorical variable for the 5-year time period the survey took place in (eg. 1985-1990, 1991-1995, 1996-2000, etc.). This is because the mid-1990s saw a substantial drop in displacement, which then rose again throughout the 2000s (see Appendix Figure A.2). Freeman was thus looking at displacement during a period of historically low displacement rates. As a result, I added this variable to capture the nonlinearity of overall displacement rates over the research time frame.

Freeman does not clearly specify if he drops cases in order to hold to the assumption of hazard modeling, which is that an individual can experience the event only once. It is clear that he does not adopt a recurrent events modeling framework that would account for multiple displacements. To do this, one adds a random effect term for the individual respondent (Steele 2011), which I do in my models.

3.3 Results

Freeman analyzed the full sample, with control variables for renters. Martin and Beck (Martin and Beck 2018) have argued in favor of analyzing renters and homeowners separately. Indeed, these should be considered distinct populations that experience different housing mechanisms that could lead to displacement. Homeowners build equity, while renters make payments to their landlords. Renters live in their homes at the will of their landlord, and can be removed at the landlord's discretion, subject to local renter protection laws. Homeowners cannot be removed from their homes except through foreclosure or other exceptional circumstances. The variability of monthly housing costs is different, as rents are determined by the landlord on a lease-by-lease basis. Homeowners pay mortgages which are generally stable, unless they have an adjustable rate mortgage. Costs may also increase due to property tax changes, but Martin and Beck argue that this is not a significant contributor to homeowner displacement. Renters are thus much more vulnerable to gentrification-related displacement. As a result, I while I analyze the full sample in order to replicated Freeman's process, my main focus in the extension is on the subsample of only renters.

Table 3.2 shows the descriptive statistics of the analysis samples for the full sample and just renters. This is the resulting sample after the data have been cleaned for missing values. The data is in person-year format, where each year's response for a person constitutes a separate observation in the data. Once a respondent moves, that concludes a "spell" in a housing unit. The average time in a residence for the full sample is 3.87 years, with a standard deviation of 4.35 years. To address left censorship in the time in a residence variable, the survey asks when a respondent first moved into their residence, so this time period is added to the total duration. Some spells and respondents were dropped because missing data.[9]

Table 3.2: Descriptive statistics of sample (standard deviations in parentheses)

Variable	Full Sample	Renters
Total person-years	34,212	20,430
Moved	0.27	0.35
Displaced	0.07	0.10
Gentrification status		
- *Non-gentrifying*	0.35	0.40
- *Gentrifying*	0.09	0.11
- *Other*	0.55	0.48
Time in residence (years)	3.87	2.69
	(4.35)	(2.86)
Poor	0.15	0.21
Subsidized housing	0.15	0.24
Income (2015 $s)	$57,861	$36,699
	($85,467)	($36,594)
Renter	0.60	.
Race		
- *White*	0.37	0.26
- *Black*	0.54	0.64

[9]Respondents were dropped if they had fewer than three response waves or they were missing more than 50% of the waves between their first response and their last response. Some missing waves were imputed as having stayed if the respondent was only missing one wave in between successive waves, and they did not change Census tracts. If they moved Census tracts, that spell was dropped. If a respondent said they moved in the recently but had not completed the most recent survey, it was imputed that there was only one move, and the previous spell continued up to the reported move.

Table 3.2: Descriptive statistics of sample (standard deviations in parentheses)

Variable	Full Sample	Renters
- *Latinx*	0.10	0.10
Age (Years)	40.71	38.56
	(14.37)	(14.43)
Female	0.38	0.48
Marital status		
- *Single*	0.33	0.44
- *Separated*	0.27	0.31
- *Married*	0.38	0.23
Any children in home	0.48	0.48
Family unit size	2.70	2.55
	(1.58)	(1.62)
Weeks unemployed past year	1.41	1.87
	(6.09)	(7.00)
Immigrant	0.05	0.05
Education		
- *Less than HS degree*	0.29	0.36
- *HS degree*	0.28	0.29
- *Some college*	0.18	0.16
- *College degree*	0.22	0.14
Crowded	0.07	0.09
Region		
- *Northeast*	0.09	0.10
- *North-central*	0.23	0.24
- *South*	0.46	0.47
- *West*	0.20	0.17
Vacancy rate		
- *Very low*	0.35	0.37

Table 3.2: Descriptive statistics of sample (standard deviations in parentheses)

Variable	Full Sample	Renters
- *Low*	0.27	0.27
- *Average*	0.23	0.23
- *High*	0.13	0.12
- *Very high*	0.02	0.01
Year period		
- *1986-1990*	0.11	0.13
- *1991-1995*	0.27	0.30
- *1996-2000*	0.19	0.18
- *2001-2005*	0.09	0.08
- *2006-2010*	0.17	0.16
- *2011-2015*	0.17	0.15
Workforce Index	0.17	0.14
	(0.88)	(0.90)
Housing market Index	-0.48	-0.52
	(0.84)	(0.82)
Segregation Index	0.32	0.38
	(0.84)	(0.83)
Size Index	1.50	1.79
	(3.43)	(3.76)

My main model of interest focuses on renters and whether accounting for city-level factors leads to a better model. While I will focus on renters in my substantive discussion, as a replication study I estimate a series of models to test the robustness of the original analysis, which I put in the Appendix in Table A.2. First, I estimate Freeman's model on the full sample. I begin by first fitting a model on his original time period, 1986-1999 (not presented here), and then extend it to 2015. Given the level of detail in documentation available in the original publication, I achieve results similar enough to Freeman's original findings (Model 1). I then add the city-level index variables, which lead to a substantial reduction in the AIC and BIC, suggesting improved model fit by accounting for city-level context (Model 2). Next I add interaction terms between the *gentrification* variable and each of the city-level index variables (Model 3). I fit the same models on the subset of renters in Models 4-6. Model 6 is the preferred model with the full interactions and forms the focus of the rest of the discussion. Since interactions are difficult to interpret, I estimate the average marginal effects using Stata's *margins* command to plot the predicted probability of displacement. Since the patterns are similar between the full sample and the renters sample – only with overall lower predicted probabilities of displacement in the full sample – I will only show the marginal effects plots renters sample here.

Figure 3.3 shows the predicted probability of displacement for renters, conditional on whether one lives in a gentrifying neighborhood, according to the Freeman model. The confidence intervals overlap to a degree where there does not seem to be substantial difference in the likelihood of displacement if one lives in a gentrifying or non-gentrifying neighborhood. Figure 3.4 similarly shows the predicted probabilities of displacement but differentiates between high- and low-Segregation Index cities, as estimated by Model 6. To discern high- and low-segregation cities, I took the full distribution of cities in the PCA and took the 5th and 95th percentile values for the Segregation Index (index scores of -1.710 and 1.526, respectively). Cities with low Segregation Index scores are cities like Dover, Delaware and Columbia, Missouri while high Segregation Index cities are places like Camden, New Jersey and West Palm Beach, Florida. These graphs show there is heterogeneity in the effect of gentrification on displacement. In high segregation cities, one is more likely to be displaced in a gentrifying neighborhood than a non-gentrifying one. However, in low-segregation cities the effect flips: displacement is more likely in non-gentrifying neighborhoods than gentrifying ones.

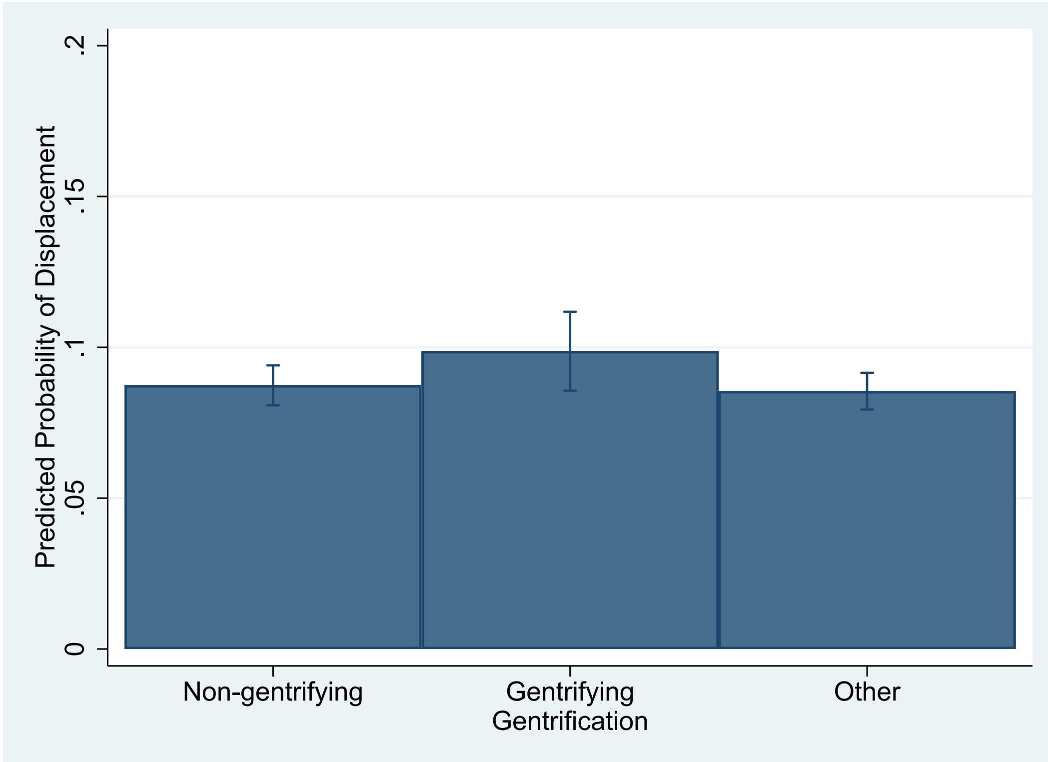

Figure 3.3: Predicted probabilities of displacement, Freeman model (renters)

I repeated the analysis for the other city-level index variables, taking the 5th and 95th percentiles as comparison values for each. I present the results here, which overall suggest that these are not the factors that drive differences in gentrification-induced displacement across cities. For the Workforce Index, I used index scores of -1.786 and 1.497 (see Figure 3.5). These correspond to more working-class cities like Beloit, Wisconsin and Reading, Pennsylvania and to more professional-managerial cities like San Jose, California and Austin, Texas. For the Housing Market Index, I used index scores of -1.375 and 1.770, which reflect colder housing markets like Niagara Falls, New York or El Paso, Texas and hotter ones like Boston, Massachusetts or Fort Collins, Colorado (see Figure 3.6). Lastly for the Size Index, I used scores of -0.652 and 0.992, which are equivalent to smaller cities like Duluth, Minnesota or Slidell, Louisiana and larger cities like Las Vegas, Nevada or Detroit, Michigan (see Figure 3.7).

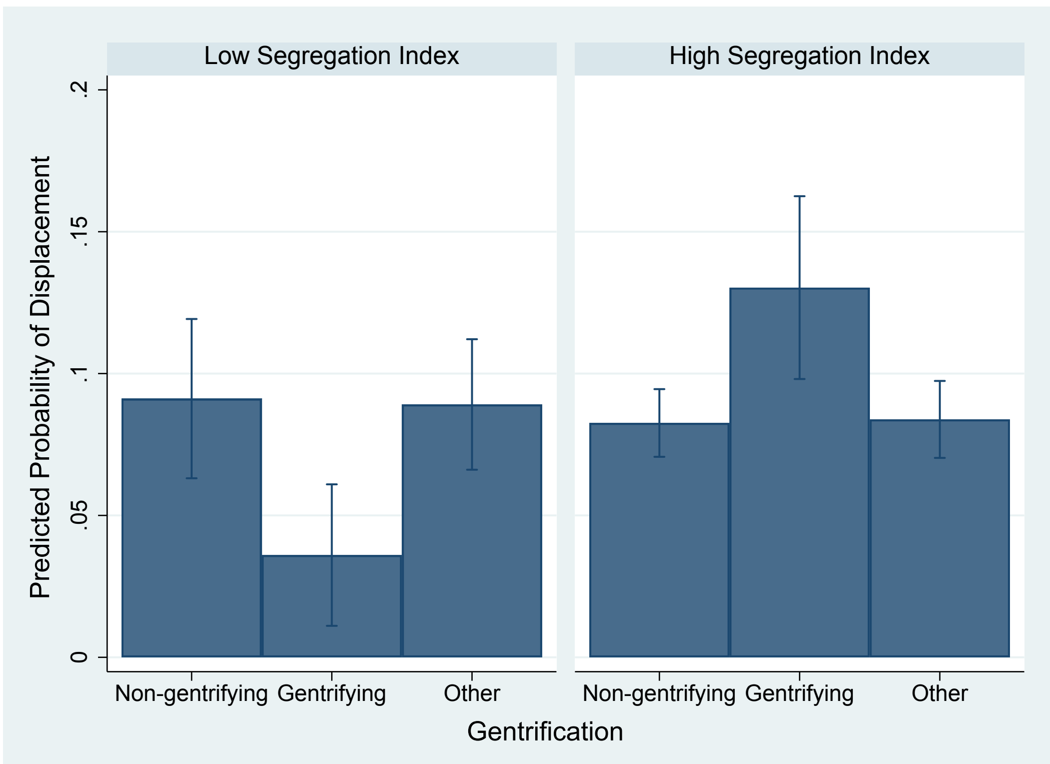

Figure 3.4: Predicted probabilities of displacement, with city context variables for Segregation Index (renters)

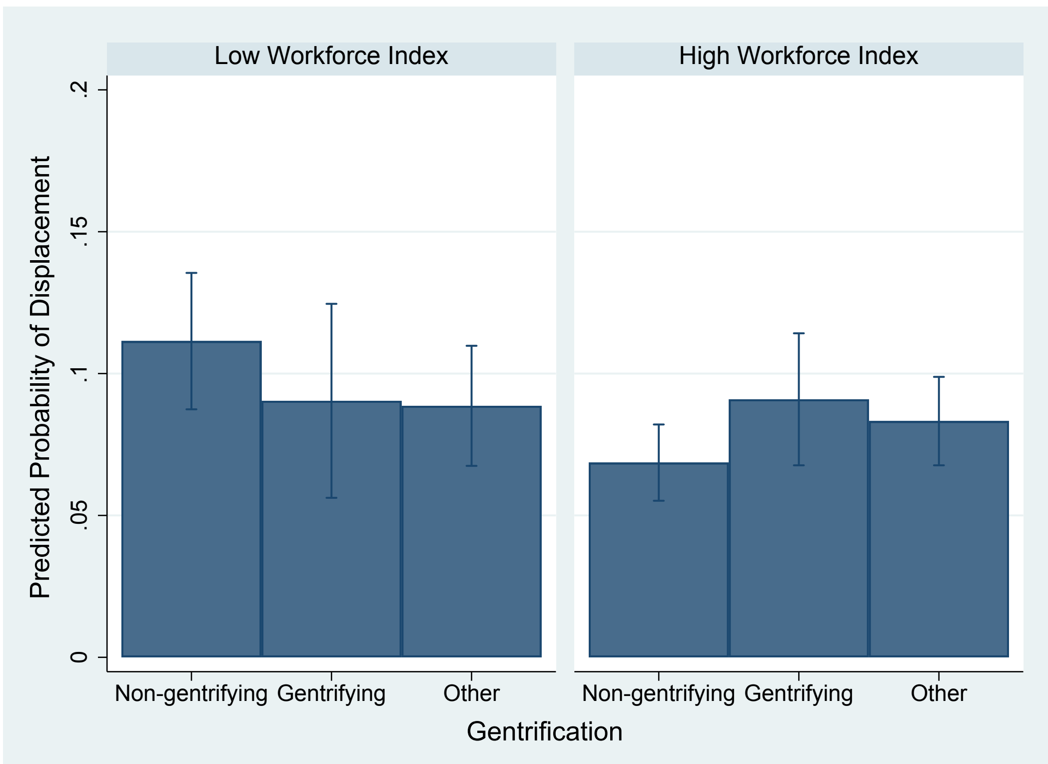

Figure 3.5: Predicted probabilities of displacement, with city context variables for Workforce Index (renters)

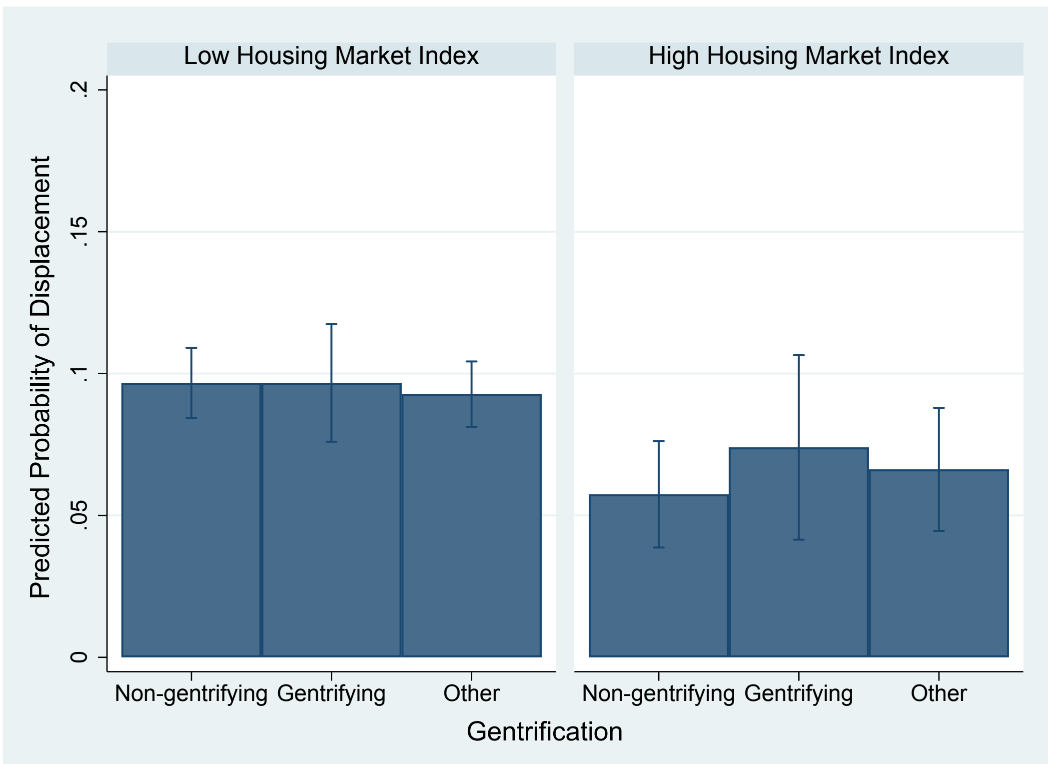

Figure 3.6: Predicted probabilities of displacement, with city context variables for Housing Market Index (renters)

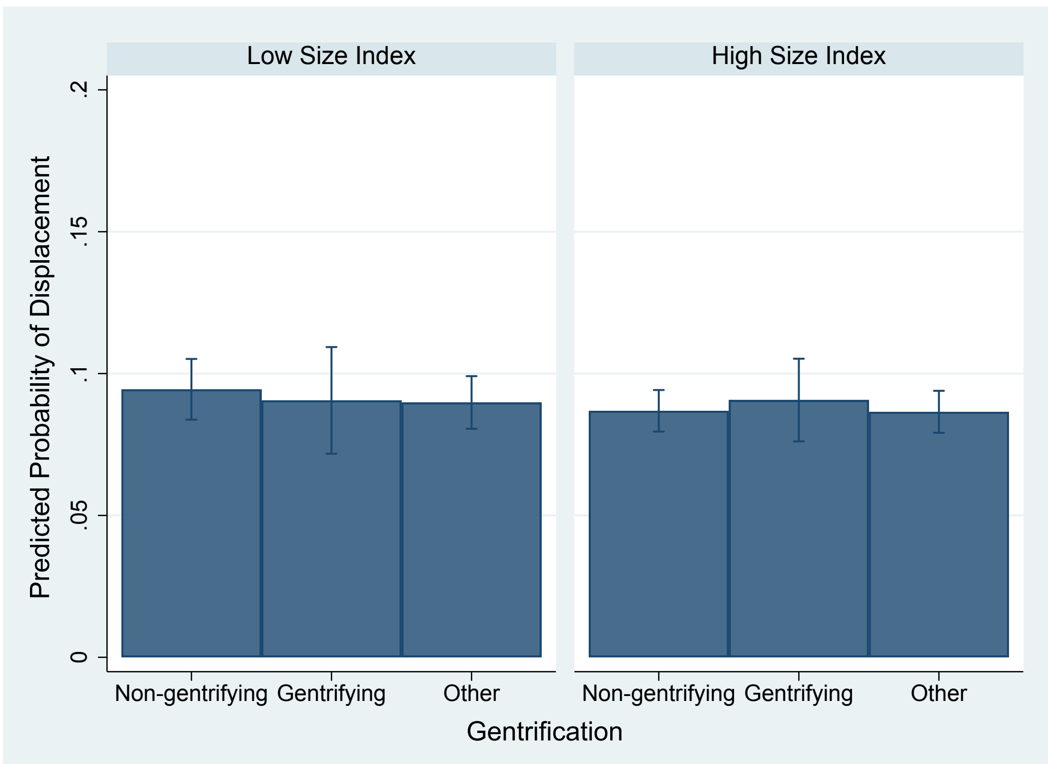

Figure 3.7: Predicted probabilities of displacement, with city context variables for Size Index (renters)

3.3.1 Variation by race of mover

Lastly, I explore whether the gentrification and displacement dynamics described above vary by a person's race. To do this I estimate the model above separately for white, black, and Latinx respondents. To summarize the results, I similarly present the results as predicted probabilities. These use the model above that includes interaction terms for living in a gentrifying neighborhood at the city-level variables. I only present here the predicted probabilities for the effects of the segregation context of the city. Figure 3.8 shows the results for white renters, while Figures 3.9 and 3.10 show the results for black and Latinx renters, respectively. Comparing white and black displacement, black households experience overall higher probabilities of displacement. The large increase in the likelihood of displacement for gentrifying neighborhoods in high-segregation cities is only for black respondents, as there is no discernible difference for white respondents. This suggests that the pattern of gentrification-induced displacement in high-segregation cities is largely driven by black households that experience it. The Latinx figure reports large confidence intervals, like due to small sample size.

3.4 Discussion

These results show that city-level factors are important considerations in gentrification and displacement research, and that not accounting for them can mask effect heterogeneity. Thus, neighborhoods do not just change but they change *within* the context of places. Neighborhoods are not islands, but are situated within a broader ecosystem of a city and a metropolitan region. The extension of this is that there are specific mechanisms and processes that generate displacement pressures, though only in some contexts and not others.

This chapter does not test these mechanisms directly, yet a discussion of how they might work can open doors for future research. In the case of segregated cities, this provides

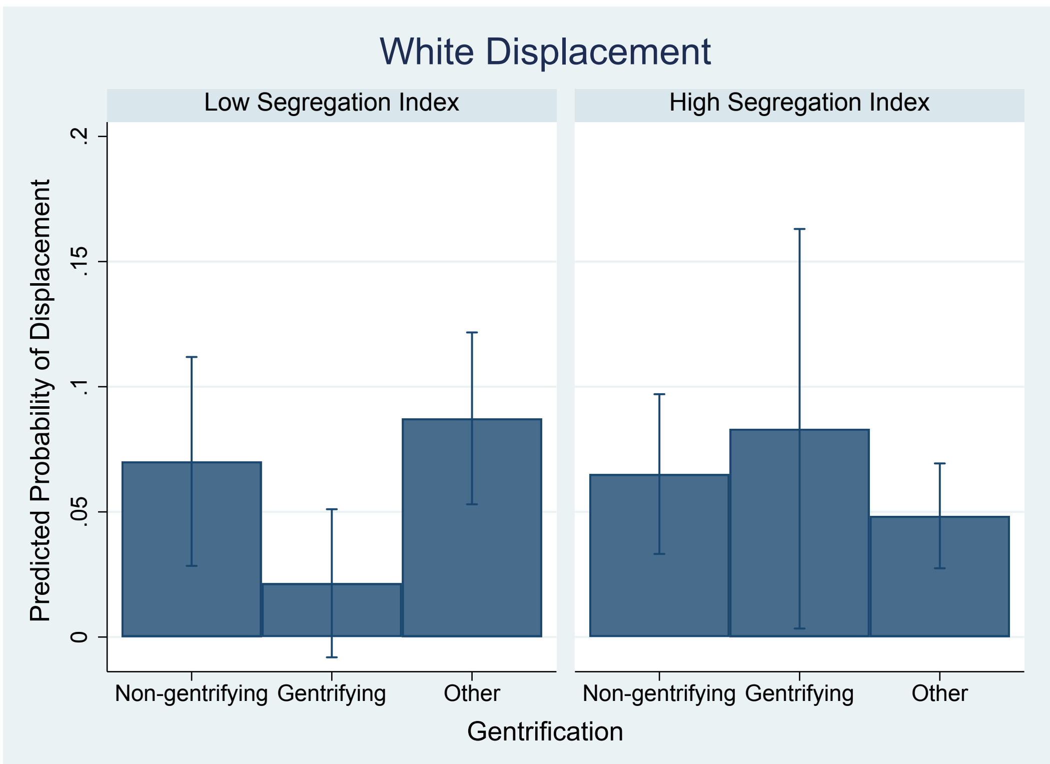

Figure 3.8: Predicted probabilities of displacement for white renters, with city context variables for Segregation Index

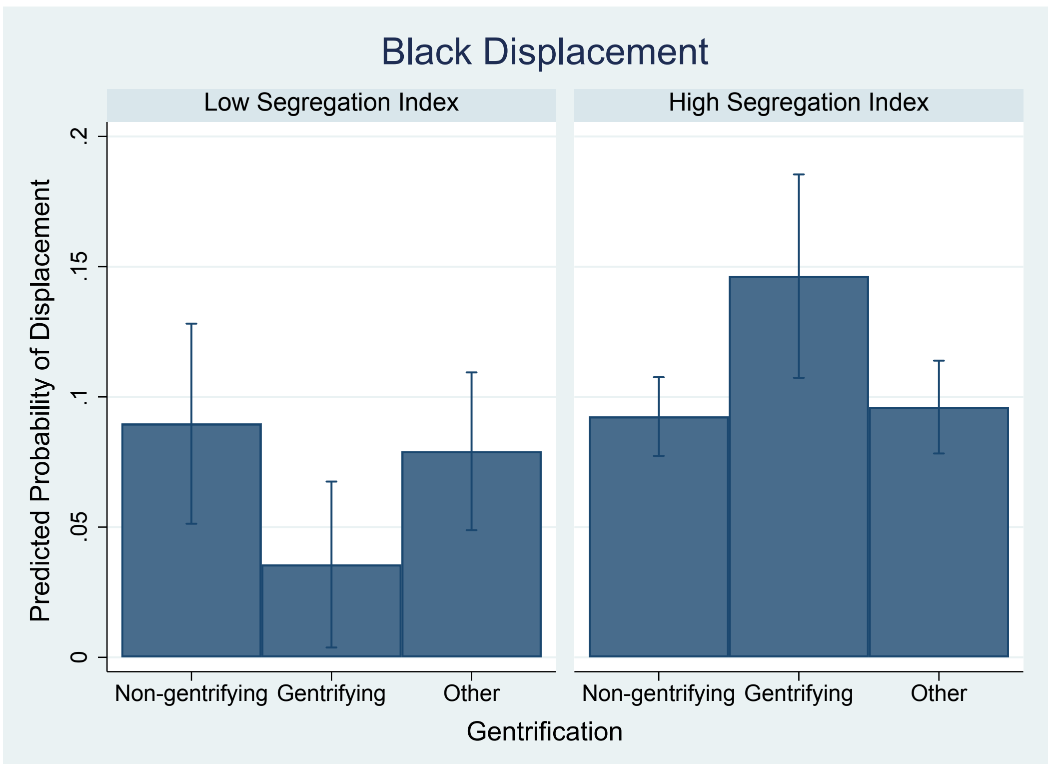

Figure 3.9: Predicted probabilities of displacement for black renters, with city context variables for Segregation Index

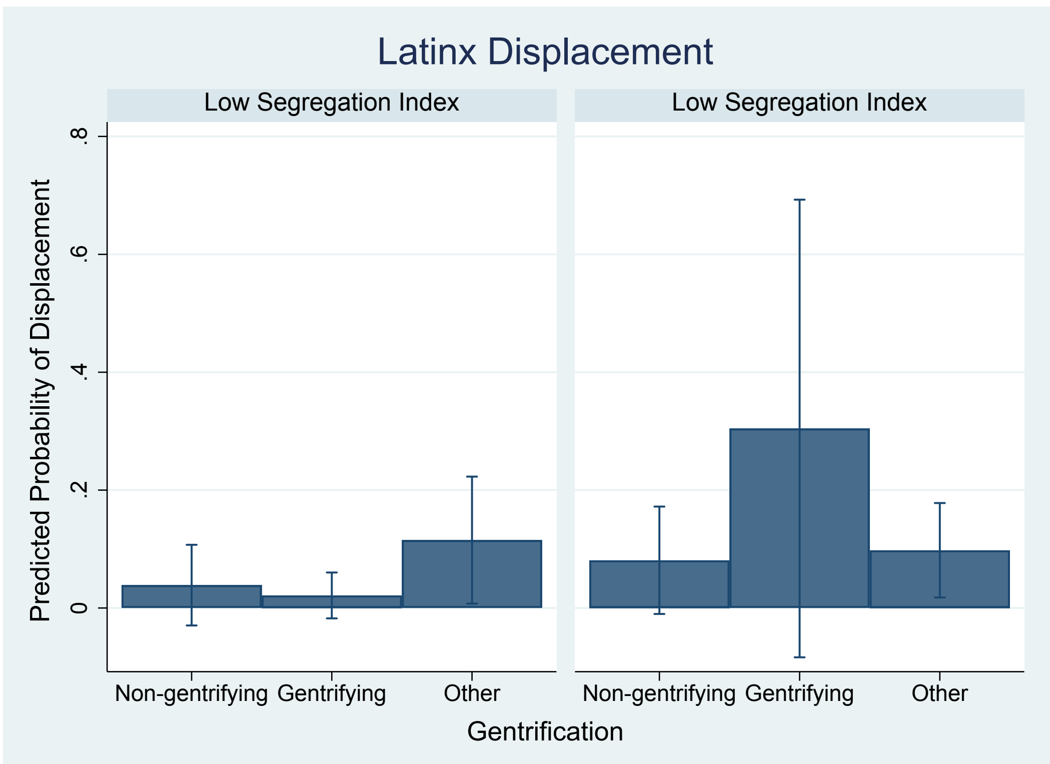

Figure 3.10: Predicted probabilities of displacement Latinx renters, with city context variables for Segregation Index

suggestive evidence of the effect of the rent gap. Many gentrification stories begin in a historically black neighborhood as real estate interests find significantly undervalued property to invest in. Since the flip-side of disadvantage is advantage, this means that someone can live in a city with access to advantages, without having to pay the high cost of residing near them. The result is that historically black neighborhoods are no longer black as people have dispersed to other places. Indeed, today in neighborhoods affected by redlining – one of the policies at the core of racial residential segregation – black people make up only 28% of the residents (Perry and Harshbarger 2019).

Why do the other urban contextual variables – the housing market, the workforce, and the size of the city – not lead to differences in displacement rates? These factors are often thought to drive gentrification patterns in cities. While I do not have a conclusive explanation, I suspect that part of the explanation is a variety of selection effects. Palo Alto has a hot housing market, but this is largely about already high-value property becoming even more expensive. Similarly, for the workforce, cities with large professional managerial labor pools have a broader base of people with secure housing. As for size, while there are a few cities with very large populations, the vast majority of cities are in the middle range. These places often have more plentiful land and low travel costs, so the premium of living in a gentrifying neighborhood is low, when anyone can easily access it by driving. Overall these findings suggest the need for more – particularly qualitative – research to further explicate the underlying processes and mechanisms.

3.5 Conclusion

Communities across the US are changing. Importantly, there is not one way that communities are changing – research shows that communities experience a variety of change trajectories, including the most common, that they stay the same (Owens 2012; Wei and Knox 2014).

For those that do change, they do not do so on their own, but rather within the context of the cities and regions that surround them.

Does gentrification increase displacement? The answer from this research is: it depends. It depends specifically on the kind of city you live in. Cities with greater racial and economic segregation create urban contexts that increase the likelihood of displacement. I argue that this is because segregation creates rent gaps that provide fertile ground for investors to leverage gentrification for profit maximization. Meanwhile in low-segregation cities, displacement is still more likely in poor neighborhoods.

While this research shows that the likelihood of displacement in gentrifying neighborhoods can change depending on the city, the question of whether gentrification *causes* displacement is a complicated one both empirically and conceptually. The way the research question is set up across all of these studies asks whether the likelihood of displacement is greater in gentrifying neighborhoods than it is in poor ones. The answer is that the likelihood is high in both types of neighborhoods. Still, to say that gentrification causes displacement would imply that something about the gentrification process creates distinct conditions in a neighborhood that make displacement a lucrative pathway. An eviction-based economy is profitable (Desmond 2016) as is a gentrification-based one, yet the mechanisms for profitability are different. An eviction-based economy relies on exploiting the constrained choices of those who often have no other options, while gentrification relies on replacing prior residents with those who can pay more money. These are distinct mechanisms that likely play out in all cities, though perhaps to varying degrees. Future research will need to further explore how those mechanisms operate in diverse contexts.

Chapter 4

The Urban Displacement Network: Intra-City Neighborhood Mobility Patterns

Displacement is a concern across urban areas because of the ways it can affect households and neighborhoods. Forms of displacement like eviction can be both a cause and a consequence of poverty (Desmond 2016). In the context of gentrification, displacement can lead to increased commute times as people have to move farther from the central business district in order to afford housing (Dougherty and Burton 2017). It can also lead to the diminished cultural and political influence of existing residents (Hyra 2015).

Gentrification and displacement are ultimately questions of mobility. In gentrification, it is not that the incomes of incumbent residents grow, rather it is that more affluent people *move in*. Similarly, displacement is when households *move out* involuntarily from their homes.[1] In the framework of gentrification, the in-mobility of people to a neighborhood

[1] In this case I am only referring to physical, residential displacement. Others have described cultural displacement or political displacement (Brown-Saracino 2009; Hyra 2015), which are important issues as well.

creates increased the pressure on existing residents, leading to displacement.

Yet in our studies of gentrification and displacement, we often do not have direct measures of mobility. Most commonly, we use Census data that shows the changing composition of a neighborhood over time in order to indirectly make inferences about mobility (Carlson 2019). Sometimes we do use longitudinal data that follows households as they move (Freeman 2005; Martin and Beck 2018), or that follows housing units as people move through them, like the American Housing Survey or the New York City Housing and Vacancy Survey (Ellen and O'Regan 2011; Freeman and Braconi 2004; Newman and Wyly 2006; Vigdor 2002). The Panel Study on Income Dynamics is one of the most robust longitudinal studies to trace mobility, but it does not contain enough density in any one city to describe mobility patterns within a particular urban area. Longitudinal studies that follow families over time are the best way to discern these patterns. Yet such studies are resource intensive and take a long time to produce enough waves to yield findings. Increasingly, scholars are using administrative data to track individual mobility (Brummet and Reed 2019; Dragan, Ellen, and Glied 2019).

When mobility is directly measured, there is often no distinction between displacement and non-displacement mobility. Studying displacement is an inherently difficult endeavor, since displaced people are by definition not where we would expect to find them (Atkinson 2000; Wyly et al. 2010). Yet scholars have found directly measuring displacement distinctly from general mobility to be consequential for their results (Carlson 2019; Freeman 2005; Martin and Beck 2018).

As households move throughout the city, the typical process for finding a place to live often first involves selecting a set of possible neighborhoods, and then selecting a housing unit within that set – all of which is importantly shaped by a variety of structural and individual factors (Krysan and Crowder 2017). The patterns of people moving in and out of one neighborhood are simultaneously shaped by people moving in and out of other neighborhoods in a city. By tracing the origin and destination patterns of households, the ties that connect neighborhoods together show how communities relate to one another. As people move between neighborhoods, what emerges is an urban mobility network. Thus, one can take an ecological approach to mobility in the city, that accounts for the totality and interaction between multiple entities.

This paper makes a number of methodological and substantive contributions. First, I recover people's mobility patterns using existing data from the New York City Housing and Vacancy Survey (NYCHVS), based on a household's reported current and previous neighborhood of residence. Second, I combine this with their stated reasons for moving from their prior residence to separate "displaced" movers from other types of movers. This allows me to examine how displacement relates to the mobility of other households that move. Lastly, I use a network analysis approach to map the relationship between displacement patterns and the patterns of other types of mobility. This type of analysis considers the structure of the full network and the mobility ecology of the city as a whole, beyond isolated connections to neighborhoods. I find that it is not simply that there are more people moving into a neighborhood that increase displacement, but rather that it is when particular neighborhoods act as funnels in the broader mobility network of a city. These neighborhoods act as bridge points to other portions of the urban network. This paper documents preliminary findings on an ongoing project. First, I document the background of displacement and mobility research within urban regions. Next, I describe the data and methodology, drawing primarily on network analysis. Then, I present preliminary results of the various centrality measures of neighborhoods, and their correlations. Finally, I draw conclusions on the findings and discuss what possibly creates the funneling process in cities.

4.1 Mobility in the city

"Gentrification" is used to describe a variety of demographic, cultural, and political economic changes in neighborhoods. Demographically, gentrification describes the in-mobility of people with increased economic or cultural capital into predominantly low-income, working class, and/or minority neighborhoods. For a neighborhood to change its composition, there are two sides to the equation: in-mobility and out-mobility. On the in-mobility side, gentrification is often associated with the arrival of more highly educated residents, particularly white college graduates under 40 without children (McKinnish et al. 2010). This can be due to a variety factors, including the availability of attractive amenities (Baum-Snow and Hartley 2016). Perceptions of neighborhoods with respect to racial composition and crime can attenuate gentrification in neighborhoods (Hwang and Sampson 2014; Krysan and Crowder 2017).

The out-mobility side is where more contentious debates lie. The primary question is whether gentrification leads to the displacement of people from their homes. Some have argued that displacement is not more likely in gentrifying neighborhoods (Ellen and O'Regan 2011; Freeman 2005; Freeman and Braconi 2004; McKinnish et al. 2010; Vigdor 2002), while others claim that it is (Martin and Beck 2018; Newman and Wyly 2006). Displacement is a complex process that is difficult to study for a variety of reasons. First, displacement needs to be distinguished from other types of mobility. Freeman (2005) argues that people are not more likely to be *displaced* from gentrifying neighborhoods, but rather *replaced* through neighborhood succession processes over the course of the turnover of housing. Thus, we need to consider whether the changing composition of a neighborhood is due to people being pushed out or due to some more "natural" patterns of mobility. Second, there are various ways that people measure displacement, which have implications for their studies. Carlson (2019) shows that some of the discrepancies lie in how displacement is measured, whether by a "population approach" that aggregate loss of vulnerable populations from a neighborhood's composition, an "individual approach" that treats any type of individual mobility as displacement, and a "motivational approach" that measures both individual mobility and that the reason for moving was somehow "involuntary." Thirdly, some people may be displaced from their home, but not their community (Carlson 2019). Methods that do not account for actual mobility may miss how people move within a neighborhood. Intra-neighborhood mobility does not lead to someone exiting a community and ignoring this may underestimate the amount of displacement from housing units.

In considering gentrification as a mobility process, the focus is on individuals moving, but it is importantly people moving *between neighborhoods*. This means that part of the story is how and why people move into and out of gentrifying neighborhoods from other neighborhoods in a city. Broader studies of mobility often focus on neighborhood selection, focusing on the traits of the origin and destination neighborhoods. Lee (2017) describes underlying perspectives in mobility studies that either align with a "dissatisfaction model" where people move because they do not like their neighborhood, or a "locational attainment model" where people search out for a desirable racial neighborhood composition. Sampson and Sharkey (2008) argue that neighborhood attainment is not random but conditioned on their neighborhood of origin. When people do move, they are most likely to end up in a similar neighborhood, with respect to neighborhood-level racial composition and median income. In the context of gentrification, people moving from gentrifying neighborhoods display unique mobility patterns, with particularly low-income renters often ending up in lower-income neighborhoods than they started in (Ding et al. 2016).

Mobility patterns do not reflect isolated choices but take place in the broader context of a city or region. These are based on historical patterns of segregation and a variety of other factors that distinguish neighborhoods within a city and cities within a metropolitan region (Crowder et al. 2012; Crowder and South 2008; Crowder, South, and Chavez 2006; Lichter, Parisi, and Taquino 2015; Massey and Denton 1993). The push and pull factors of one neighborhood in turn affect other neighborhoods. This resembles the early Chicago School work that examined “invasion”, “succession”, and the ecology of cities (Burgess 1925; McKenzie 1925; Park 1925). People move to neighborhoods based on a variety of factors and perceptions of desirable and/or accessible places to live (Krysan and Crowder 2017).

Most residential moves are moves within a city (Sampson and Sharkey 2008). Unlike a model of economic rationality in which people seek to maximize a set of desirable neighborhood traits, people make moving decisions based on a variety of social factors. They are bound by social networks, information access, perceptions of hostility, and other factors. The Moving to Opportunity (MTO) study showed that when people left their previous housing, they often returned to similar and nearby neighborhoods from their origin (Briggs et al. 2008). Part of the reason for this was a lack of social connection – even hostility – in their new neighborhoods, as well as housing pressure from their landlords. Subsequent moves were influenced by things like the search for schools, which were shaped by information gathered through social networks they had retained from their original neighborhoods (DeLuca and Rosenblatt 2010).

Within gentrification studies, mobility and neighborhood change can evolve over time and affect those higher along the income distribution. Stage models of gentrification describe phases of in-movers who are increasingly more affluent (Blasius, Friedrichs, and Rühl 2016; Clay 1979). “Super-gentrification” is a term that has been used to describe a heightened neighborhood affluence beyond the scope of “normal” gentrification. This suggests that middle-class households can be negatively affected by gentrification, perhaps to the point of displacement. When those people do move, they are likely to move to nearby neighborhoods, as middle-class households tend to stay near to more affluent communities (Guerrieri et al. 2013). Thus, neighborhoods that gentrify early can serve as jumping-off points for gentrifiers to move to other neighborhoods after they are priced out.

4.2 Data

The New York City Housing and Vacancy Survey (NYCHVS) is a survey administered every three years by the US Census Bureau, under contract from the City of New York. The sample is based on the most recent decennial Census and is longitudinal between Census takings. The unit of analysis is the household within a specific housing unit. If a family moves out of a that unit between waves of the survey, then the new household is surveyed, but the housing unit remains constant. The survey is administered by an in-home interviewer. The main focus for this paper is on sample years 2005, 2008, and 2011.[2]

The two main aims of the survey relate to the demographic and economic characteristics of the respondent, as well as the physical condition and traits of the housing unit itself. The survey records the amount that the respondent pays in rent, utilities, mortgage, and other housing expense information. It includes their income, differentiated by a variety of sources, including wages, SSI, TANF, unemployment, financial receipts, and others. It also includes a number of physical descriptors of the building, such as peeling paint and leaky pipes, recorded by the interviewer. The history of maintenance issues is included, as well rent regulation status.

The geographical unit of analysis is the sub-borough, which is nested within a borough. Boroughs are large areas in New York City, equivalent to counties, of which there are five. The sub-boroughs roughly correspond to "community districts," which are administrative subdivisions that each have their own Community Boards of appointed residents to make community-level decisions. Geographically they are bigger than census tracts and zip codes, but smaller than counties. Community districts vary widely in population, ranging from about 52,000 to about 247,000 people, with an average size of about 139,000, according to 2010 New York City Department of City Planning data. In this article, the words "sub-borough" and "neighborhood" will be used interchangeably.

[2]This is due to the removal in more recent years of the neighborhood of previous residence question.

Table 4.1: Reasons for moving, among the displaced

Reasons	Share of displaced movers
Wanted less expensive residence/difficulty paying rent or mortgage	0.59
Poor building condition/services	0.14
Displaced by private action (other than eviction)	0.13
Evicted	0.08
Harassment by landlord	0.05

4.2.1 Measuring Displacement

There are numerous ways that researchers measure displacement. In this paper I use a "motivational approach" – one that captures that someone actually moved, and whether that move was "involuntary" (Carlson 2019). The survey asks about the most recent neighborhood the householder lived in for six months or more. The survey also asks why the person moved. There are thirty-three possible options for the respondent, such as "job transfer", "needed larger house or apartment", "to attend school", and others. To help isolate people who moved due to displacement, the responses I am concerned with are: "Wanted less expensive residence/difficulty paying rent or mortgage", "Evicted", "Poor building condition/services", "Harassment by landlord", "Displaced by urban renewal, highway construction or other public activity", and "Displaced by private action (other than eviction)" (see Table 4.1 for a summary of reasons for moving, among displaced movers). Any of these responses are coded as "displaced," as they indicate an involuntary move. This is the same definition used by other sources for the NYCHVS (Newman and Wyly 2006; Wyly et al. 2010), and a similar definition of displacement is used with the PSID (Freeman 2005; Martin and Beck 2018).

Nearly 25% of all people moved within the three years prior to completing the survey. Displacement is a somewhat rare event in the sample. 9% of moves were a result of "displacement". Of those who were displaced, 57% were displaced due to the cost of the unaffordability of their previous housing (see Table 2.2). This suggests that while the research on eviction is an important area of study (See Desmond 2016), it is but one manifestation the broader issue of displacement.

4.3 Methodology

Mobility patterns between neighborhoods can be thought of as an urban network. Networks are made up primarily of nodes and the ties between them (See Wasserman and Faust 1994). Ties can be non-directed (such as ties between friends) or directed (such as ties representing emails sent in a company). For our case, we will look at the movement of people (directed ties) between neighborhoods (nodes) in New York City. A network approach to examining mobility and displacement in a city sees neighborhoods as inter-related. Network analysis tools examine the overall structure of a network and the flows of information through it, and thus can show something about a neighborhood *and* its relationship to other neighborhoods in a broader urban ecosystem.

To visualize the urban displacement network, I created a map that displays the pathways of mobility across the city for the displaced and the non-displaced movers. Centroids were calculated for each neighborhood and used to draw lines between origin and destination neighborhoods. Each line represents and ordered pair of neighborhoods, indicating where a displaced individual came from, and where they ended up. Since the density of ties in full city map makes it difficult to visualize, I only present here an illustrative map of one neighborhood with purple lines for out-displacement and orange lines for in-displacement (see Figure 4.1 below).

Figure 4.1: Bedford-Stuyvesant: purple lines indicate out-displacement and orange lines indicate in-displacement.

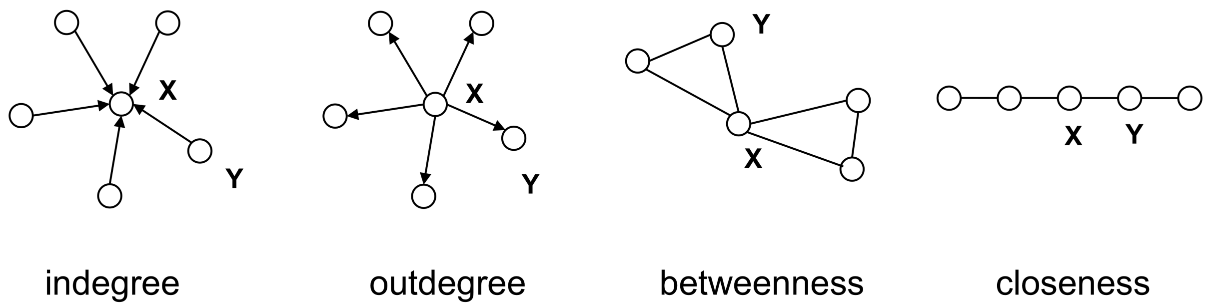

Figure 4.2: In each of the graphs, X has higher centrality than Y according to each measure.

4.3.1 Centrality

In network analysis, measures of "centrality" describe how a particular node relates to other nodes in the network. There are numerous measures of centrality, all of which indicate different ways that a given node might be important within the network. For example, a node might be prominent because many nodes connect to it (degree centrality), it can easily reach other nodes in the graph (closeness centrality), or because a node lies on a bridging point that other nodes must traverse through to access other nodes (betweenness centrality). Figure 4.2 provides simple illustrative graphs of the main types of centrality.

Betweenness centrality describes the extent to which a node lies on a key pathway between other nodes, such that information must pass through it in order for the other nodes to connect. High betweenness centrality nodes act as bridges that connect other communities of nodes, or act as pathways of least resistance. A node x_i is between nodes x_j and x_k if x_i lies on the shortest pathway connecting the other two nodes.

These measures of centrality work for simple network graphs – where ties reflect a binary state (connection/no connection) between two nodes – but need to be adjusted for network graphs where ties can have a magnitude to their connection. These networks are known as weighted or valued networks, such as the New York City mobility network that shows the number of people moving between neighborhoods. Thus, I will use *strength* and *flow betweenness* as analogous measures to degree and betweenness centrality, respectively.

For neighborhood i, given a directed adjacency matrix a for the connections between neighborhoods, and a weights matrix w for the number of moves between i and j, its strength s is

$$s_i = \frac{\sum_{j=1}^{N} a_{ij} wij}{1 - E}$$

This includes the denominator that standardizes the measure from 0 to 1 by dividing by 1 minus the total number of ties E. This is calculated both for strength out of neighborhoods and into neighborhoods, reflecting for each neighborhood the levels of displacement and mobility that originated or terminated there, respectively.

Flow betweenness centrality is a modification to betweenness centrality that accounts for weighted networks (Freeman, Borgatti, and White 1991). It captures how much the flow of information in the network depends on passing through a given node. "Flow" is the amount of information passing between two nodes. In this case, if $m_{jk}(x_i)$ is the maximum flow between two neighborhoods x_j and x_k that passes through neighborhood x_i, then the flow betweenness centrality of x_i is:

$$C_F(x_i) = \frac{\sum^{n} \sum^{n}{}_{j<k} m_{jk}(x_i)}{\sum^{n} \sum^{n}{}_{j<k} m_{jk}}$$

The denominator standardizes the measure from 0 to 1 by dividing by the total flow between the two points.

The strength and flow betweenness centrality of neighborhoods capture two distinct types of neighborhood mobility patterns. Strength shows the total volume of people moving in or out of a given neighborhood, useful for identifying "hotspots" of mobility. Since people often move within clusters of neighborhoods, flow betweenness shows funnel or bridging points that connect one cluster of neighborhoods to another. They thus serve as liminal spaces as people move from one part of the urban network to another. After calculating these measures of centrality for each of the neighborhoods, I use OLS regression to show correlations between the different centrality measures. By comparing strength and flow betweenness centrality, we can see whether it is the overall in-mobility to neighborhoods that affects displacement rates or the funneling process that intensifies displacement pressure.

4.4 Findings

I estimate the number of households who moved between 2005-2011 as sample respondents are multiplied by their household weights. Table A.3 in the Appendix describes patterns of displacement and mobility in New York City. The table separately presents estimates for the neighborhood level of mobility for all movers as well as those who were "displaced." Mobility is displayed as *out-mobility*, where the neighborhood was the origin, *in-mobility*, where the neighborhood was the destination, and *stayed*, where the origin and destination neighborhood are identical.[3] The table is arranged in order of the neighborhoods with the highest amount of out-displacement.

When mapped, the connections between neighborhoods show a few patterns. Moves are generally short distance to nearby neighborhoods. They often travel along subway lines, and people often move within their own borough. The five boroughs of New York City – Manhattan, Brooklyn, Queens, The Bronx, and Staten Island – are socially salient geographies in the city. People have strong identification with their borough and often form social networks within them. Traversing borough boundaries have symbolic as well as material implications, and as a result moves between boroughs are comparatively less frequent.

I then calculate measures of standardized in- and out-strength and flow betweenness centrality for each neighborhood, for both the network of displaced people, and for network of all movers (See Table A.4 in the Appendix for the measures for each neighborhood).

[3]Both out-mobility and in-mobility can include stayers.

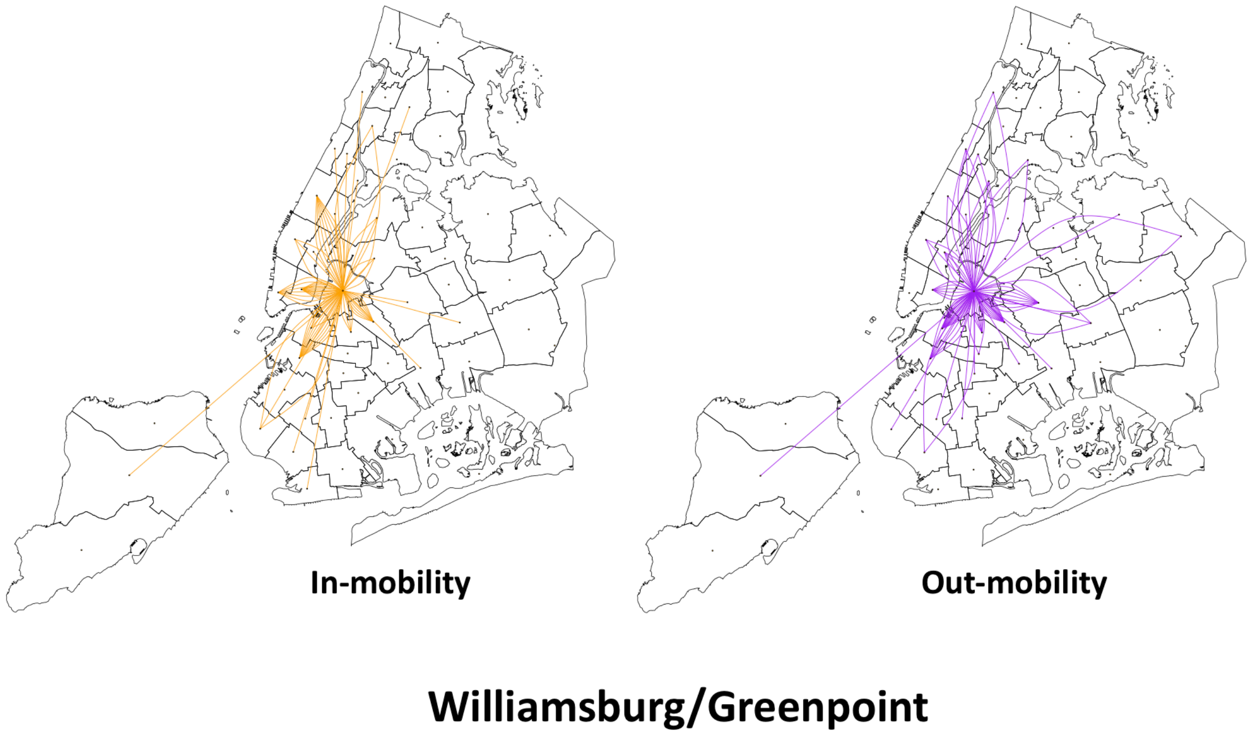

Figure 4.3: High flow betweenness - Williamsburg/Greenpoint: purple lines indicate out-displacement and orange lines indicate in-displacement.

Neighborhoods exhibiting high flow betweenness centrality look different than those with lower centrality. High betweenness centrality reflects more connections between key clusters of neighborhoods, particularly between boroughs. Williamsburg/Greenpoint and Astoria, shown below in Figures 4.3 and 4.5, are neighborhoods with high betweenness centrality. They connect neighborhoods in Manhattan to neighborhoods in Brooklyn and Queens. This is contrasted with neighborhoods with low betweenness centrality, which are more peripheral to the city network. South Crown Heights and Kew Gardens/Woodhaven, shown in Figures 4.4 and 4.6, have more connections within-borough. These different patterns suggest that high betweenness centrality neighborhoods serve as funnel points where people – particularly from Manhattan – move to before subsequently moving within other parts of Queens and Brooklyn.

Next I model the level of out-displacement based on various centrality measures, through a series of OLS regressions. These regressions are not meant to be causal, but

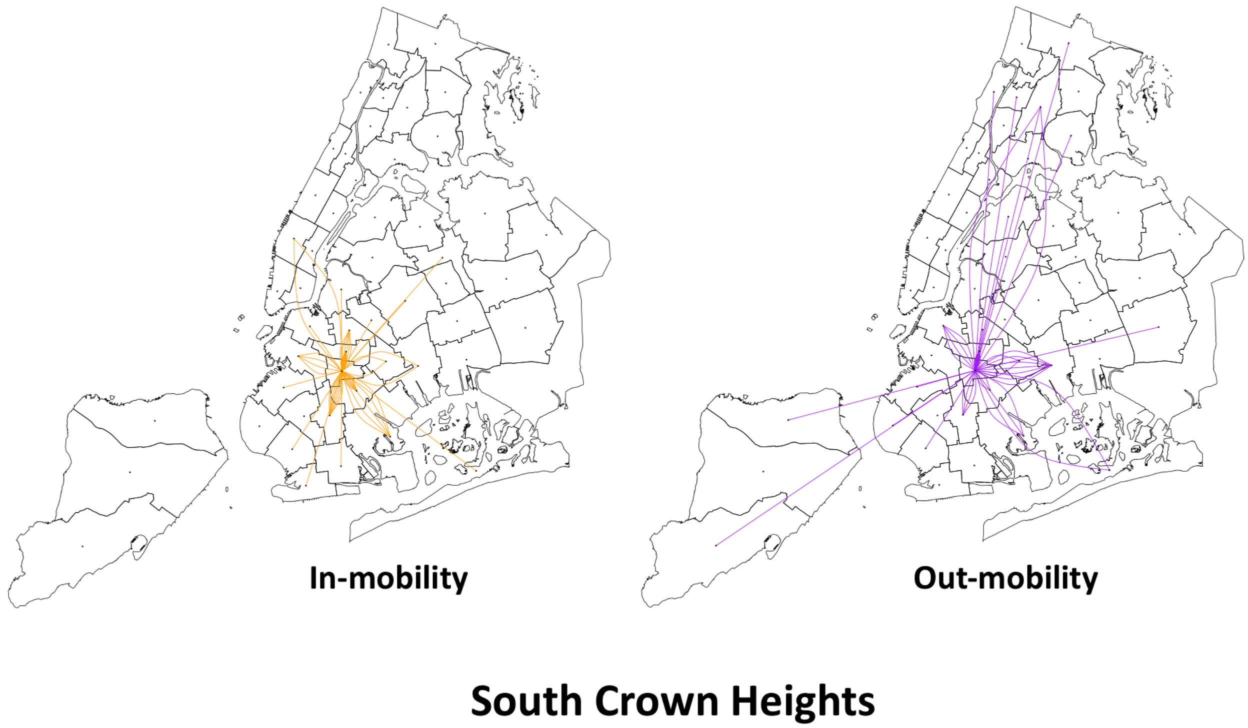

Figure 4.4: Low flow betweenness - South Crown Heights: purple lines indicate out-displacement and orange lines indicate in-displacement.

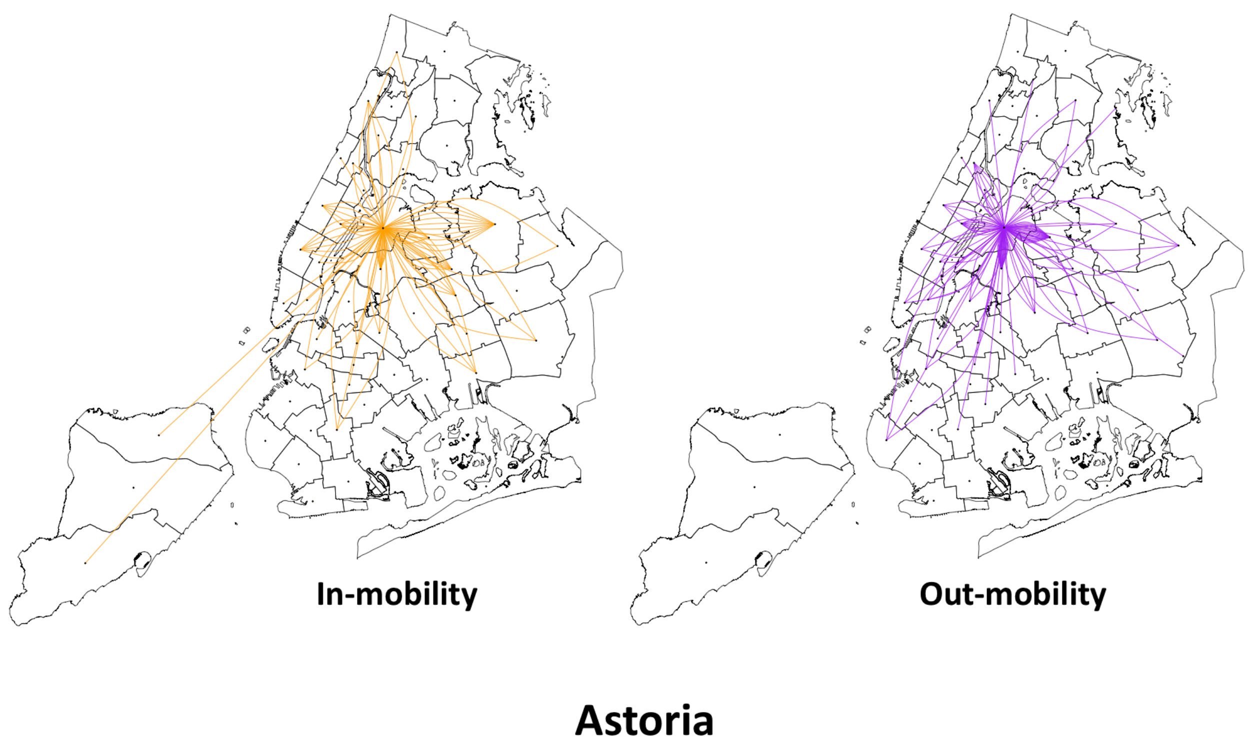

Figure 4.5: High flow betweenness - Astoria: purple lines indicate out-displacement and orange lines indicate in-displacement.

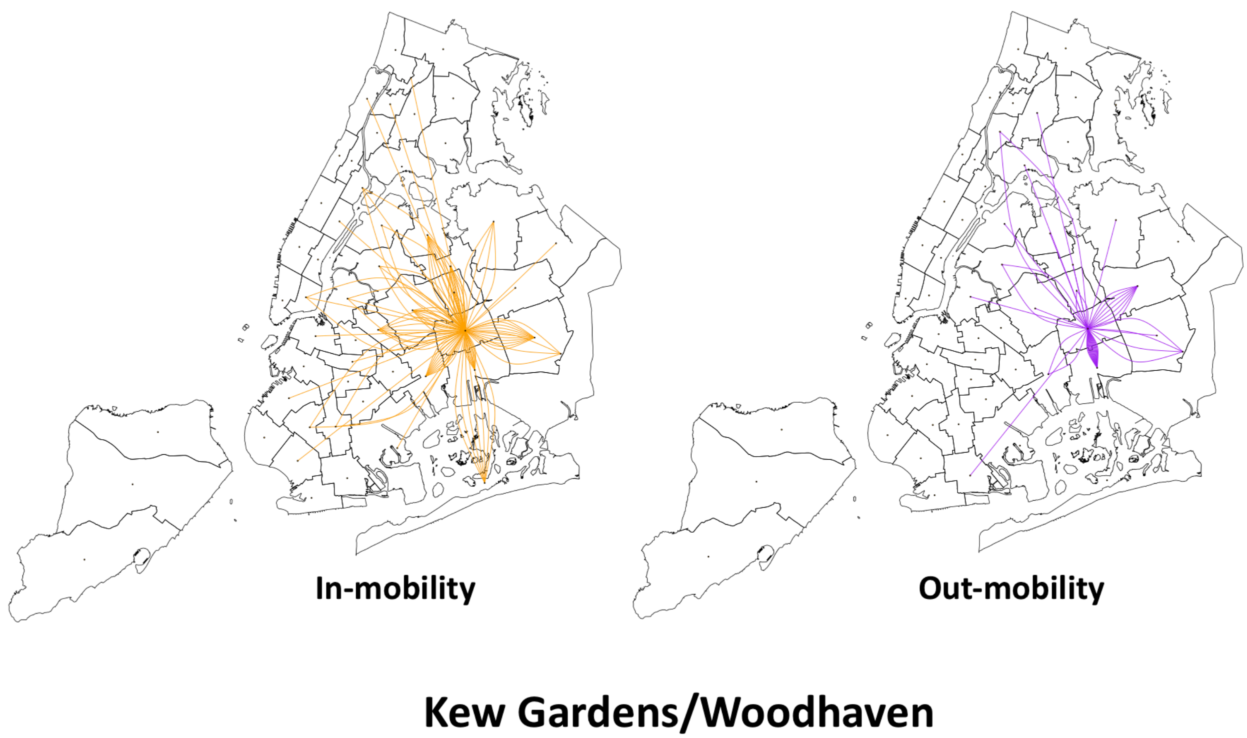

Figure 4.6: Low flow betweenness - Kew Gardens/Woodhaven: purple lines indicate out-displacement and orange lines indicate in-displacement.

rather to assess correlations, net of other factors. Table 4.2 shows preliminary results from a comparison of the predictors for neighborhood levels of displacement. I regress the dependent variable, standardized out-displacement in a neighborhood, on the other measures of centrality for both movers and the displaced. The first and second regressions present coefficients for two variables to show important baseline patterns. The first shows that in-displacement is highly correlated with out-displacement. The second is to set a baseline to test how correlated displacement is with people moving into a neighborhood. The third regression adds flow betweenness centrality measures for displaced and all movers, showing a significant and positive association for movers, but not the displaced. This reduces the effect size of the in-strength of movers, and the effect size is greater for betweenness than strength. The final model adds a control for the percent of low-income people in a neighborhood, defined as those who have a household income less than 80% of the city's median income.

Table 4.2: OLS Regression of Neighborhood Displacement Strength (standardized)

	(1)	(2)	(3)	(4)
In-strength (displaced)	0.665***		0.374**	0.413**
In-strength (moved)		0.874***	0.462**	0.389*
Flow betweenness (displaced)			0.135	0.148
Flow betweenness (moved)			0.544*	0.590*
Percent low-income				-0.006
Constant	0.006**	0.002	-0.010*	-0.008
N	55	55	55	55
R^2	0.417	0.276	0.590	0.595
Adjusted R^2	0.406	0.263	0.557	0.553
Residual Std. Error	0.007	0.007	0.006	0.006
	(df = 53)	(df = 53)	(df = 50)	(df = 49)
F Statistic	37.843***	20.232***	17.952***	14.383***
	(df = 1; 53)	(df = 1; 53)	(df = 4; 50)	(df = 5;49)
*p .05; **p .01;	***p .001			

These findings suggest that it is not only the number of people moving into a neighborhood, but the positionality of a neighborhood within a broader urban network that leads to higher levels of displacement. While there is still a positive and significant effect for in-mobility of movers, it is smaller than the effect for flow betweenness centrality for movers. This suggests a funneling process for movers creates pressure on particular neighborhoods and has an impact beyond that of simply the volume of in-mobility.

4.5 Discussion

The funneling process within the urban network opens a variety of questions for future exploration. In previous generations, people may have move straight from the city to the suburbs. This process suggests that there are pathways of incremental mobility as people move throughout the city. People may not move from Manhattan to deep Brooklyn in one move, but rather they move their incrementally, starting first with more proximal neighborhoods. These neighborhoods with high flow betweenness centrality are thus landing points for people from Manhattan before they continue on to more distal parts of the city. Further exploration of these different pathways is necessary, as well as how similar pathways might vary across cities.

But what creates the funnel? It could be that some neighborhoods become “hot,” either due to increased real estate activity or attention from media sources. This adds a new neighborhood to the set of possible destination neighborhoods when someone is considering moving. It could be due to a desire to stay close to more affluent neighborhoods, since poor neighborhoods near affluent ones have been shown to experience some of the greatest income increases (Guerrieri et al. 2013). There is also the question of once someone makes the move to a new borough, why they choose to stay. This could be due to the increasing formulation and consolidation of social networks in close proximity, such that maintaining social ties in far off neighborhoods becomes difficult and less important. While this is the case in New York City where travel times are long, this might be less so in places where traveling across the city is easy. Indeed, in Sims and Iverson's (Sims and Iverson 2019) mapping of where people move after eviction, the pathways suggest that people are more likely to travel long distances than one would expect from this analysis of New York City where moves are generally shorter and more condensed. All of these suggest important avenues of future – particularly qualitative – work on how and why people move where they do.

4.6 Conclusion

In this study, I argue that gentrifiers do not simply move in, they funnel in. I show this by considering the broader ecology of a city and how people move through it. Neighborhoods are connected to one another by the people who move through them. These neighborhood connections constitute overlapping an urban mobility network and an urban displacement network. These networks are related to one another by the ways that in-mobility can in some cases create a greater likelihood of displacement. While the particular mechanisms are not clear yet, mobility patterns in a city demonstrate a funneling process that create a mobility convergence on particular neighborhoods as people move from one cluster to another. In this case, people do not make long jumps from the central part of the city to the fringes but strive to stay close to their prior neighborhood and borough. As they do, they consolidate in a few key neighborhoods, likely with better access to the city. As this happens, it creates pressure on existing residents that leads to increased displacement. This study opens the door for future research into the ways people move through the city, and how displaced people are affected by those who move in.

Chapter 5

Conclusion

Media and policy reports claim with certainty that gentrification does not lead to displacement. When they do so, they often rely on a fairly small pool of academic papers – the ones cited throughout this manuscript. It is striking that such confidence is supported by a relatively small handful of studies. Nonetheless, these studies in turn has shaped a policy discussion that argues that the risks of gentrification are unfounded, and that those who resist gentrification are obstructionists. This has appeared recently in many cities in the form of the "YIMBY" (Yes in My Backyard) movement, which advocates that the solution to the affordable housing crisis lies in simply removing regulations to development in order to expand the supply of housing. While most of the construction we have seen in the recent period has been for high-cost housing, YIMBY advocates argue that the overall expansion of supply will lead affordability to trickle-down to lower-income residents.

Gentrification is indeed complex, with multiple and competing interests at play. But this dissertation suggests that to claim with certainty that there are no potential downsides to gentrification is misguided, especially in certain types of cities. While expanding housing supply will certainly be a necessary component of a robust affordable housing policy, we should not see it as a silver bullet that will solve all of our problems.

I would argue that the shape of the policy discourse around gentrification is in part the result of ceded research ground on the part of "critical" urban scholars. They preferred to reject the arguments of the displacement skeptics out of hand. "These perspectives … dressed up in methodological sophistication and nuanced reasoning, have proved highly seductive to journalists seeking sound bytes and neat statistics, and to urban policy-makers" (Slater 2009: 307). Arguing against "methodological sophistication" and "nuanced reasoning" is not a particularly strong basis of social science critique or helpful for trying to inform policy. Indeed, the result has been as Lance Freeman warned in those debates: "Critical scholarship… [has] apparently not been that effective in convincing policymakers to take seriously affordable housing problems in gentrifying neighborhoods. … What is in need, then, is more empirical research that documents how gentrification affects people and neighborhoods" (Freeman 2008: 190).

I am optimistic for a resurgence of gentrification scholarship, particularly among quantitative researchers. New scholars are currently bringing innovative methods and analysis to help solve unanswered questions or challenge previous findings. Rather than shying away from complicated empirical realities, these scholars are embracing them. I was recently privileged enough to attend a research summit on quantitative approaches to studying gentrification. At this conference there were a number of exciting projects breaking new ground on gentrification research, drawing on new data, methods, and perspectives. Many of the projects indeed challenge perceived consensus that gentrification does not lead to displacement. The conference organizers also took care to have leading *qualitative* gentrification scholars as discussants. Thus, the future of gentrification studies will also require more mixed-method and collaborative research. This is a vast and crucial improvement of previous eras of gentrification research when qualitative and quantitative researchers largely did not talk to one another.

The hope of this dissertation is to contribute to our understanding of gentrification and displacement. In it, I have argued that many of the previous studies have missed important dynamics in the gentrification and displacement process. This is rooted in part in fuzziness in how we have conceptualized and operationalized both gentrification and displacement. We have also not paid attention to how housing dynamics vary within and across cities. These contributions hopefully put us on a sounder basis for empirically and theoretically grounded debates among scholars, policy makers, and social movements.

Appendix

Table A.1: Rank order of relative neighborhood displacement, across approaches

Neighborhood	Rank Motiv.	Rank Indiv.	Rank Pop.
Bedford Stuyvesant †	1	23	36
Lower East Side/Chinatown	2	8	19
Bushwick †	3	26	17
Upper West Side	4	2	28
Chelsea/Clinton/Midtown	5	4	53
Astoria	6	7	2
Williamsburg/Greenpoint ‡ †	7	15	16
East New York/Starrett City	8	41	52
Upper East Side	9	1	12
Jamaica	10	19	49
North Shore	11	14	26
Flatbush	12	30	43
Greenwich Village/Financial District	13	5	34
Bensonhurst	14	11	4
Sunset Park	15	29	37
Park Slope/Carroll Gardens	16	16	7
Stuyvesant Town/Turtle Bay	17	3	46
Elmhurst/Corona	18	36	13
Bay Ridge	19	27	31
Morrisania/East Tremont	20	20	48

Neighborhood	Rank Motiv.	Rank Indiv.	Rank Pop.
Flushing/Whitestone	21	6	55
Soundview/Parkchester	22	18	30
Highbridge/S. Concourse	23	39	41
Washington Heights/Inwood	24	17	1
Flatlands/Canarsie	25	33	39
Brooklyn Heights/Fort Greene	26	9	14
Morningside Heights/Hamilton Heights	27	25	8
Rockaways	28	40	32
East Flatbush	29	42	29
Forest Hills/Rego Park	30	32	5
Williamsbridge/Baychester	31	24	44
Jackson Heights	32	22	27
Sunnyside/Woodside	33	21	9
North Crown Heights/Prospect Heights	34	10	6
Mott Haven/Hunts Point	35	50	11
East Harlem	36	43	24
Central Harlem ‡ †	37	13	23
Borough Park	38	44	25
Howard Beach/S. Ozone Park	39	55	42
Pelham Parkway	40	49	40
Middle Village/Ridgewood	41	12	51
Mid-Island	42	47	3
Sheepshead Bay/Gravesend	43	35	33
Kingsbridge Heights/Mosholu	44	28	10
Brownsville/Ocean Hill †	45	46	22
Kew Gardens/Woodhaven	46	31	38
University Heights/Fordham	47	45	20

Neighborhood	Rank Motiv.	Rank Indiv.	Rank Pop.
Throgs Neck/Co-op City	48	54	35
Riverdale/Kingsbridge	49	48	15
South Crown Heights	50	53	54
Coney Island †	51	51	18
South Shore	52	38	45
Bayside/Little Neck	53	52	47
Hillcrest/Fresh Meadows	54	37	50
Bellerose/Rosedale	55	34	21

Bold = Freeman (2005); † = McKinnish et al. (2010); ‡ = Ellen & O'Regan (2008)

Table A.2: Fits for discrete time logistic regression models, for full sample and renters-only sample (coefficients as log-odds, standard errors in parentheses)

	Full Sample			**Renters**		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Time	-0.296***	-0.288***	-0.287***	-0.315***	-0.317***	-0.316***
	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)
Time^2	0.026***	0.024**	0.024**	0.026**	0.025**	0.025**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Time^3	-0.001**	-0.001*	-0.001*	-0.001*	-0.001*	-0.001*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Gentrification						
- *Gentrifying*	0.123	0.121	-0.25	0.14	0.127	-0.231
	(0.09)	(0.1)	(0.17)	(0.09)	(0.1)	(0.18)
- *Other*	-0.01	0.016	-0.004	-0.026	-0.001	-0.009
	(0.06)	(0.07)	(0.09)	(0.06)	(0.07)	(0.1)
Renter	1.124***	1.064***	1.048***	.	.	.
	(0.08)	(0.1)	(0.1)	.	.	.

Poor	0.064	0.057	0.056	0.041	0.024	0.023
	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Subsidized	-0.331***	-0.262***	-0.267***	-0.326***	-0.263***	-0.272***
	(0.07)	(0.08)	(0.08)	(0.07)	(0.08)	(0.08)
Log-income	-0.03	-0.035	-0.033	-0.039	-0.047*	-0.045*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Age						
- *25-34*	-0.221**	-0.131	-0.131	-0.200*	-0.107	-0.106
	(0.08)	(0.1)	(0.1)	(0.08)	(0.1)	(0.1)
- *35-44*	-0.254**	-0.15	-0.158	-0.201*	-0.087	-0.095
	(0.09)	(0.11)	(0.11)	(0.1)	(0.11)	(0.11)
- *45-54*	-0.168	-0.103	-0.111	-0.137	-0.054	-0.069
	(0.11)	(0.13)	(0.13)	(0.12)	(0.13)	(0.13)
- *55-64*	-0.405**	-0.297	-0.293	-0.273	-0.146	-0.149
	(0.14)	(0.16)	(0.16)	(0.15)	(0.17)	(0.17)
- *65+*	-0.403**	-0.359*	-0.351*	-0.527**	-0.394*	-0.376*
	(0.15)	(0.17)	(0.17)	(0.17)	(0.19)	(0.19)
Female	-0.123	-0.14	-0.14	-0.088	-0.113	-0.11
	(0.06)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)
Marital status						
- *Married*	-0.255**	-0.301**	-0.286**	-0.216*	-0.297**	-0.285**
	(0.08)	(0.1)	(0.1)	(0.09)	(0.11)	(0.11)
- *Separated*	0.039	0.039	0.042	0.022	0.009	0.011
	(0.07)	(0.08)	(0.08)	(0.07)	(0.08)	(0.08)
Kids	0.103	-0.175	-0.187*	-0.077	-0.15	-0.167
	(0.08)	(0.09)	(0.09)	(0.09)	(0.1)	(0.1)
Number in family unit	0.054*	0.072*	0.069*	0.047	0.075*	0.074*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Weeks unemployed	0.006	0.007*	0.007	0.005	0.006	0.006
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Immigrant	-0.27	-0.269	-0.397	-0.255	-0.176	-0.383
	(0.17)	(0.23)	(0.25)	(0.18)	(0.25)	(0.27)
Education						
- *High school*	-0.138*	-0.104	-0.105	-0.101	-0.07	-0.07

	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
- *Some college*	-0.279***	-0.263**	-0.250**	-0.217*	-0.192*	-0.175
	(0.08)	(0.09)	(0.09)	(0.08)	(0.1)	(0.1)
- *College degree*	-0.523***	-0.379***	-0.358***	-0.559***	-0.382***	-0.350**
	(0.09)	(0.1)	(0.1)	(0.1)	(0.11)	(0.12)
Crowded	0.199*	0.058	0.057	0.177	-0.008	-0.012
	(0.1)	(0.12)	(0.12)	(0.1)	(0.12)	(0.12)
Region						
- *North Central*	0.161	-0.038	-0.036	0.13	-0.108	-0.108
	(0.11)	(0.12)	(0.12)	(0.11)	(0.13)	(0.13)
- *South*	0.183	0.083	0.053	0.151	0.008	-0.031
	(0.1)	(0.12)	(0.13)	(0.11)	(0.13)	(0.13)
- *West*	0.372***	0.281	0.319	0.350**	0.184	0.223
	(0.11)	(0.18)	(0.18)	(0.12)	(0.2)	(0.2)
Vacancy rate						
- *Low*	0.124	-0.013	-0.013	0.166*	0.026	0.028
	(0.07)	(0.09)	(0.09)	(0.08)	(0.09)	(0.09)
- *Average*	0.300***	0.11	0.1	0.343***	0.123	0.117
	(0.08)	(0.11)	(0.11)	(0.08)	(0.12)	(0.12)
- *High*	0.200*	-0.083	-0.089	0.168	-0.087	-0.087
	(0.09)	(0.13)	(0.13)	(0.1)	(0.14)	(0.14)
- *Very high*	-0.597*	-1.483*	-1.483*	-0.578	-1.547*	-1.574*
	(0.28)	(0.59)	(0.59)	(0.32)	(0.72)	(0.73)
Year period						
- *1991-1995*	-0.543***	-0.546***	-0.579***	-0.548***	-0.563***	-0.595***
	(0.08)	(0.09)	(0.09)	(0.08)	(0.1)	(0.1)
- *1996-2000*	-1.263***	-1.287***	-1.317***	-1.265***	-1.271***	-1.293***
	(0.11)	(0.13)	(0.13)	(0.12)	(0.14)	(0.14)
- *2001-2005*	-0.338**	-0.266	-0.294*	-0.405***	-0.324*	-0.346*
	(0.11)	(0.14)	(0.14)	(0.12)	(0.15)	(0.16)
- *2006-2010*	0.162	0.233*	0.208	0.135	0.192	0.173
	(0.08)	(0.12)	(0.12)	(0.09)	(0.13)	(0.13)
- *2011-2015*	-0.638***	-0.457**	-0.479***	-0.700***	-0.540***	-0.558***
	(0.11)	(0.14)	(0.14)	(0.11)	(0.15)	(0.15)
Segregation		0.036	-0.076		0.043	-0.035
		(0.04)	(0.07)		(0.05)	(0.08)

Workforce		-0.094	-0.202**		-0.09	-0.169*
		(0.05)	(0.06)		(0.05)	(0.07)
Size		-0.022	-0.052*		-0.027	-0.058*
		(0.01)	(0.02)		(0.01)	(0.02)
Housing market		-0.143**	-0.196**		-0.156**	-0.186*
		(0.05)	(0.07)		(0.05)	(0.07)
Black			0.202*			0.226*
			(0.09)			(0.1)
Latinx			0.320*			0.446**
			(0.16)			(0.17)
Gentrifying x Segregation			0.540***			0.478**
			(0.15)			(0.16)
Other x Segregation			0.071			0.014
			(0.09)			(0.1)
Gentrifying x Workforce			0.184			0.172
			(0.1)			(0.11)
Other x Workforce			0.204**			0.148
			(0.07)			(0.08)
Gentrifying x Size			0.052			0.059
			(0.04)			(0.04)
Other x Size			0.034			0.032
			(0.02)			(0.03)
Gentrifying x Housing market			0.09			0.088
			(0.11)			(0.12)
Other x Housing market			0.101			0.066
			(0.08)			(0.09)
Constant	-2.259***	-2.087***	-2.149***	-1.017***	-0.843**	-0.946**
	(0.28)	(0.32)	(0.32)	(0.26)	(0.3)	(0.31)
lnsig2u	-2.747***	-4.514	-5.007	-2.809**	-5.449	-6.805

	-0.82	-5.41	-8.78	-0.94	-6.89	-33.36
AIC	12169.35	9435.429	9426.708	10038.17	7953.044	7949.46
BIC	12492.45	9779.539	9850.844	10334.19	8270.812	8342.887
* p<0.05,	** p<0.01,	*** p<0.001				

Table A.3: Mobility for displaced and all movers by neighborhood (households)

Neighborhood	Out (displaced)	Out (moved)	In (moved)	In (displaced)	Stay (displaced)	Stay (moved)
Bedford Stuyvesant	8504	29268	23509	8869	4005	7455
Lower East Side/ Chinatown	6611	33283	31060	4331	1860	10567
Bushwick	6414	32203	21381	7029	2278	6800
Upper West Side	5791	41859	32587	3203	1678	14358
Chelsea/ Clinton/ Midtown	5675	39238	29802	4178	1743	9383
Astoria	5210	40767	38894	5206	3465	21462
Williamsburg/ Greenpoint	5105	27288	26371	5037	1974	11191
East New York/ Starrett City	4957	28284	21574	3706	557	7234
Upper East Side	4618	41262	41241	4073	1779	17236
Jamaica	4547	35361	25352	2985	1463	11683
North Shore	4513	26807	27703	5629	3461	16602
Flatbush	4399	32318	22422	2515	655	6864
Greenwich Village/ Financial District	4350	34393	32981	2230	1242	12062
Bensonhurst	4323	29899	30958	4077	2260	13664
Sunset Park	4293	21965	22081	2327	1179	7568
Park Slope/ Carroll Gardens	4236	28269	24073	3815	1036	7916
Stuyvesant Town/ Turtle Bay	4233	27896	26386	2322	1268	8505
Elmhurst/ Corona	4022	39636	26140	2222	794	14460

Neighborhood	Out (displaced)	Out (moved)	In (moved)	In (displaced)	Stay (displaced)	Stay (moved)
Bay Ridge	3790	27932	21415	3217	1500	9532
Morrisania/ East Tremont	3670	28395	26082	5004	1685	7164
Flushing/ Whitestone	3667	42294	36356	3145	2634	23005
Soundview/ Parkchester	3575	24588	31652	4707	1116	9001
Highbridge/ S. Concourse	3427	24068	18286	2363	610	4377
Washington Heights/ Inwood	3347	27290	24877	4743	1915	12108
Flatlands/ Canarsie	3325	22914	21461	3334	1106	8229
Brooklyn Heights/ Fort Greene	3280	18924	24733	4686	1551	3455
Morningside Heights/ Hamilton Heights	3019	18772	14432	2745	709	3463
Rockaways	3007	16551	17580	3541	1841	9530
East Flatbush	2984	13016	18684	1864	193	3167
Forest Hills/ Rego Park	2953	28958	22627	1953	806	10767
Williamsbridge/ Baychester	2918	20580	20328	3229	1276	9022
Jackson Heights	2880	25839	31378	4353	1258	10862
Sunnyside/Woodside	2872	20603	24591	5067	1719	9431
North Crown Heights/ Prospect Heights	2781	20917	27803	4155	422	5552
Mott Haven/ Hunts Point	2758	21114	18347	1029	248	7238
East Harlem	2681	15658	15517	3290	956	4409
Central Harlem	2608	15541	20675	3043	753	4533
Borough Park	2493	15909	16124	2733	1249	6450
Howard Beach/ S. Ozone Park	2480	15587	16268	1918	1058	5217
Pelham Parkway	2445	15595	17358	2753	900	4469

Neighborhood	Out (displaced)	Out (moved)	In (moved)	In (displaced)	Stay (displaced)	Stay (moved)
Middle Village/ Ridgewood	2401	24756	28391	3034	1440	13802
Mid-Island	2270	19566	21923	2613	1321	7624
Sheepshead Bay/ Gravesend	2254	20242	20191	1795	817	9247
Kingsbridge Heights/Mosholu	2225	11784	22005	2680	139	2727
Brownsville/ Ocean Hill	2171	9758	20923	5423	417	3735
Kew Gardens/ Woodhaven	1805	15533	27728	2103	1430	7030
University Heights/Fordham	1789	20637	20203	3272	180	4069
Throgs Neck/ Co-op City	1732	11701	10739	1614	561	4170
Riverdale/ Kingsbridge	1711	10286	11785	1563	380	2504
South Crown Heights	1256	12172	14830	4516	612	3507
Coney Island	1083	13923	14472	2163	752	5748
South Shore	1054	16060	25523	1364	482	9177
Bayside/ Little Neck	989	8351	12965	608	377	2409
Hillcrest/ Fresh Meadows	771	7566	20016	1478	442	3201
Bellerose/ Rosedale	643	7799	18390	2061	211	3264
Average	*3325*	*23294*	*23294*	*3325*	*1232*	*8331*

Table A.4: Standardized centrality measures by neighborhood

Neighborhood	Out (displaced)	Flow Betw (moved)	Flow Betw (displaced)	In (moved)	In (displaced)	Pct Low Inc
Bedford Stuyvesant	0.04649	0.02833	0.03221	0.01835	0.04849	0.62954

Neighborhood	Out (displaced)	Flow Betw (moved)	Flow Betw (displaced)	In (moved)	In (displaced)	Pct Low Inc
Brooklyn Heights/ Fort Greene	0.01793	0.02706	0.01670	0.01930	0.02562	0.40954
Jamaica	0.02486	0.02689	0.03763	0.01979	0.01632	0.41892
East New York/ Starrett City	0.02710	0.02483	0.03125	0.01684	0.02026	0.57469
Flatbush	0.02405	0.02453	0.02640	0.01750	0.01375	0.49237
Chelsea/ Clinton/ Midtown	0.03103	0.02430	0.02634	0.02326	0.02284	0.32100
Astoria	0.02848	0.02361	0.00921	0.03036	0.02846	0.49846
North Crown Heights/ Prospect Heights	0.01521	0.02325	0.02728	0.02170	0.02271	0.55536
Flushing/ Whitestone	0.02005	0.02324	0.00988	0.02838	0.01720	0.37716
Central Harlem	0.01426	0.02317	0.02335	0.01614	0.01664	0.66202
Forest Hills/ Rego Park	0.01614	0.02268	0.03217	0.01766	0.01068	0.36196
Morrisania/ East Tremont	0.02007	0.02231	0.02136	0.02036	0.02736	0.71250
Washington Heights/ Inwood	0.01830	0.02229	0.02315	0.01942	0.02593	0.58250
East Harlem	0.01466	0.02208	0.02303	0.01211	0.01799	0.66039
Bushwick	0.03507	0.02190	0.02382	0.01669	0.03843	0.65944
Bay Ridge	0.02072	0.02135	0.02188	0.01672	0.01759	0.40790
University Heights/ Fordham	0.00978	0.02060	0.04371	0.01577	0.01789	0.67452
Bensonhurst	0.02364	0.02060	0.03105	0.02416	0.02229	0.49284
Lower East Side/ Chinatown	0.03614	0.02028	0.03575	0.02424	0.02368	0.58571
Soundview/ Parkchester	0.01954	0.02007	0.02553	0.02471	0.02573	0.57675
Sunset Park	0.02347	0.01994	0.01921	0.01724	0.01272	0.52487

Neighborhood	Out (displaced)	Flow Betw (moved)	Flow Betw (displaced)	In (moved)	In (displaced)	Pct Low Inc
Highbridge/ S. Concourse	0.01874	0.01988	0.02439	0.01427	0.01292	0.69301
Rockaways	0.01644	0.01981	0.01949	0.01372	0.01936	0.45969
Upper West Side	0.03166	0.01944	0.02981	0.02543	0.01751	0.27646
Flatlands/ Canarsie	0.01818	0.01939	0.02099	0.01675	0.01823	0.31974
Pelham Parkway	0.01337	0.01900	0.01307	0.01355	0.01505	0.45690
Williamsburg/ Greenpoint	0.02791	0.01873	0.02376	0.02058	0.02754	0.61754
Sunnyside/ Woodside	0.01570	0.01865	0.02505	0.01919	0.02770	0.43119
Upper East Side	0.02525	0.01829	0.03105	0.03219	0.02227	0.19273
Kew Gardens/ Woodhaven	0.00987	0.01817	0.01146	0.02164	0.01150	0.37135
Williamsbridge/ Baychester	0.01595	0.01806	0.02676	0.01587	0.01765	0.45213
Mott Haven/ Hunts Point	0.01508	0.01799	0.01268	0.01432	0.00562	0.64112
Coney Island	0.00592	0.01789	0.01054	0.01130	0.01183	0.60417
Howard Beach/ S. Ozone Park	0.01356	0.01777	0.02117	0.01270	0.01049	0.33988
Morningside Heights/ Hamilton Heights	0.01650	0.01759	0.01531	0.01126	0.01501	0.51498
Park Slope/ Carroll Gardens	0.02316	0.01701	0.02569	0.01879	0.02086	0.33294
Elmhurst/ Corona	0.02199	0.01693	0.02336	0.02040	0.01215	0.47587
Middle Village/ Ridgewood	0.01313	0.01637	0.01102	0.02216	0.01659	0.40781
Stuyvesant Town/ Turtle Bay	0.02314	0.01611	0.01700	0.02060	0.01269	0.22465
Sheepshead Bay/ Gravesend	0.01232	0.01597	0.01426	0.01576	0.00981	0.43519
Bellerose/ Rosedale	0.00352	0.01579	0.01172	0.01435	0.01127	0.24347

Neighborhood	Out (displaced)	Flow Betw (moved)	Flow Betw (displaced)	In (moved)	In (displaced)	Pct Low Inc
Jackson Heights	0.01574	0.01563	0.02188	0.02449	0.02380	0.42550
Riverdale/ Kingsbridge	0.00936	0.01533	0.00936	0.00920	0.00855	0.41080
Brownsville/ Ocean Hill	0.01187	0.01524	0.02271	0.01633	0.02965	0.67655
North Shore	0.02467	0.01514	0.02506	0.02162	0.03078	0.35773
South Shore	0.00576	0.01484	0.01461	0.01992	0.00746	0.20294
Hillcrest/ Fresh Meadows	0.00421	0.01449	0.01382	0.01562	0.00808	0.32567
Greenwich Village/ Financial District	0.02378	0.01440	0.01111	0.02574	0.01219	0.24445
Borough Park	0.01363	0.01425	0.01105	0.01259	0.01494	0.52617
Kingsbridge Heights/ Mosholu	0.01216	0.01403	0.02859	0.01718	0.01465	0.61657
Bayside/ Little Neck	0.00541	0.01395	0.00937	0.01012	0.00332	0.25855
South Crown Heights	0.00687	0.01369	0.01780	0.01158	0.02469	0.55469
East Flatbush	0.01631	0.01355	0.00978	0.01458	0.01019	0.46320
Throgs Neck/ Co-op City	0.00947	0.01203	0.01080	0.00838	0.00882	0.35352
Mid-Island	0.01241	0.01184	0.00908	0.01711	0.01429	0.27576

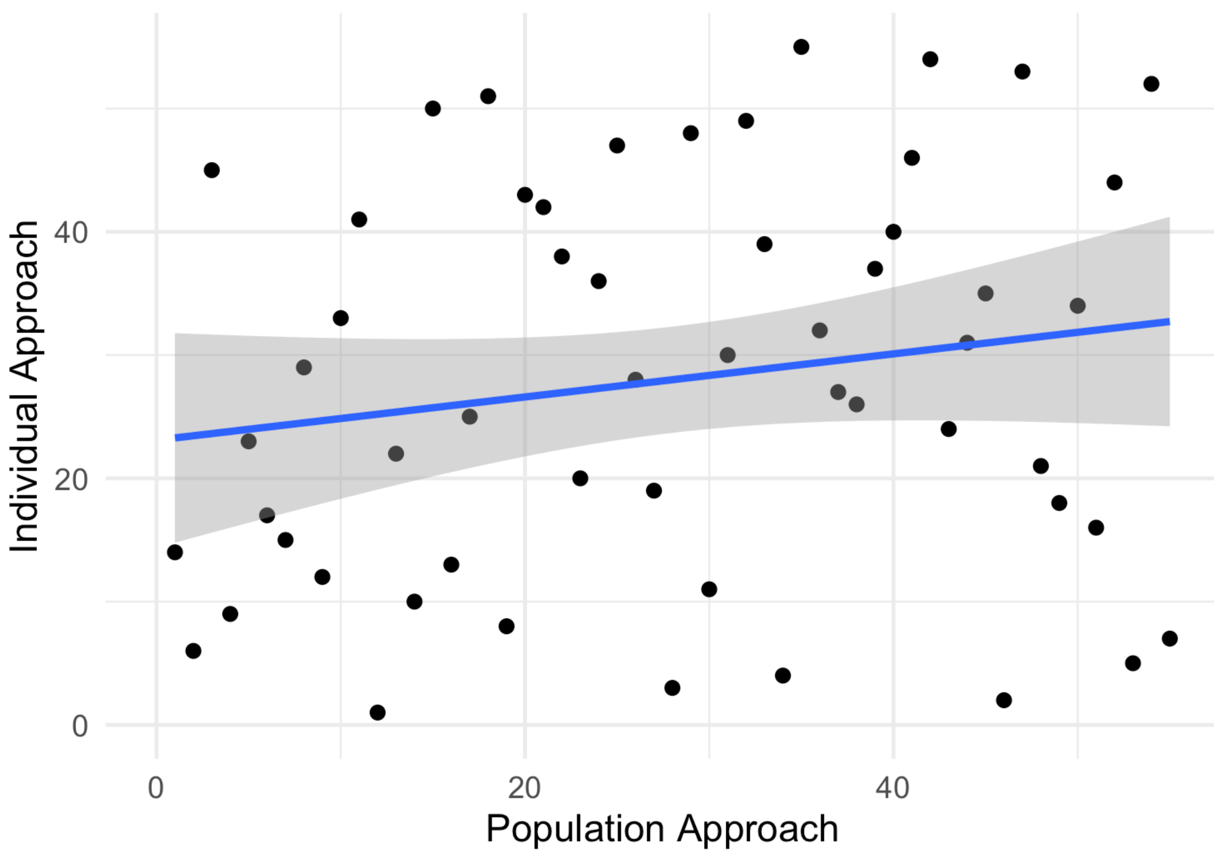

Figure A.1: Differences in rankings, individual and population approaches

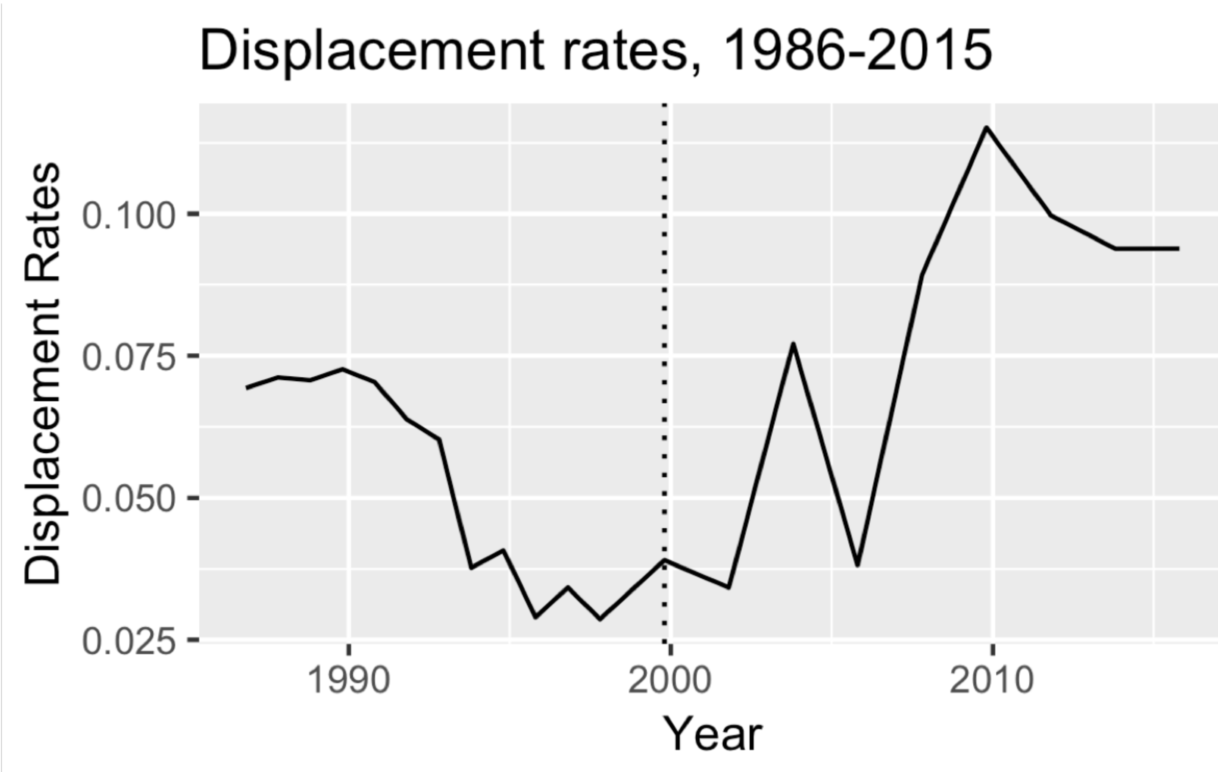

Figure A.2: US displacement rates (Freeman's analysis is to the left of the dotted vertical line)

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