DESIGNING TO (DE)CONCENTRATE

AN ANALYSIS OF POVERTY DECONCENTRATION GOALS IN QUALIFIED ALLOCATION PLANS

by

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ABSTRACT

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Under the Supervision of Professor Marcus L. Britton

Since its inception in 1986, the Low-Income Housing Tax Credit (LIHTC)—one of the largest subsidized affordable rental housing programs in the U.S.—has been criticized for exacerbating poverty concentration by clustering low-income housing in racially segregated minority communities and high-poverty neighborhoods. Such clustering is deemed problematic, as the adverse effects of concentrated poverty on life chances and outcomes for individuals and families are well documented in social science research. Since states establish guidelines and criteria for tax credit awards through Qualified Allocation Plans (QAPs), scholars argue that it could serve as a powerful tool to promote poverty deconcentration. This study, thus, employs theoretical approaches to poverty concentration, neighborhood effects, and housing policy to investigate whether QAPs have promoted poverty deconcentration between 2005 and 2015. Using mixed methods, this study analyzes QAP changes and assesses their impact on LIHTC siting.

This research finds that majority U.S. states prioritized poverty deconcentration goals in their QAPs between the selected years. By creating an index, this research categorizes states into three distinct groups based on the degree of their prioritization of poverty deconcentration and finds that QAPs significantly influence the socio-spatial pattern of LIHTC development. In general, states with higher index values promoted poverty deconcentration by increasing LIHTC developments in low-poverty, high-opportunity areas, whereas states with lower index values limited LIHTC developments in high-poverty areas.

Keywords: Low-Income Housing Tax Credit (LIHTC), Qualified Allocation Plan (QAP), Poverty Deconcentration, Low-Income Housing Policy

To
my dear departed mother who cared deeply for the deprived,
and
my ever-loving and supportive wife, Sejuti

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LIST OF ABBREVIATIONS

ACS	American Community Survey
AFFH	Affirmative Furthering Fair Housing
AMGI	Area Median Gross Income
APD	Advancing Poverty Deconcentration
APDI	Aggregate Poverty Deconcentration Index
DDA	Difficult Development Areas
DiD	Difference-in-Differences
DPD	Deprioritizing Poverty Deconcentration
HCV	Housing Choice Vouchers
HFA	Housing Finance Agency
HUD	U.S. Department of Housing and Urban Development
IRS	Internal Revenue Service
LIHTC	Low Income Housing Tax Credit
MSA	Metropolitan Statistical Area
MTO	Moving to Opportunity
NDPS	Net Poverty Deconcentration Score
PCS	Poverty Concentration Score
PDS	Poverty Deconcentration Score
PPD	Prioritizing Poverty Deconcentration
QAP	Qualified Allocation Plan
QCT	Qualified Census Tracts

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My race needs no special defense, for the past history of them in this country proves them to be equal of any people anywhere. All they need is an equal chance in the battle of life.

—Robert Smalls, U.S. congressman, 1895

To be a poor man is hard, but to be a poor race in a land of dollars is the very bottom of hardships.

—W. E. B. Du Bois, *The Souls of Black Folks*, 1903

We can't solve poverty without addressing racial inequality, and we can't solve racial inequality without addressing poverty.

—William Julius Wilson, *More than Just Race,* 2009

Affirmatively furthering fair housing means taking proactive steps to address segregation and ensure that everyone has the opportunity to live in safe, healthy, and thriving communities. It's not enough to simply outlaw discrimination; we must actively work to undo the legacy of housing segregation and create a truly just and equitable society.

—Angela Davis, 2015, Interview with National Low Income Housing Coalition

I'm making an argument in favor of more neighborhood choice to ensure that the zip code where a child is born does not so powerfully predetermine the story of her life. … I feel a little stupid making the case that a child's environment matters. We know it does, which is why many of us expend so much energy and treasure fortifying our own schools and neighborhoods, hoarding the promise and security that come with them. What are we teaching our children when they plainly see us barring the doors of opportunity for other children—and doing it in their name?

—Matthew Desmond, *Poverty, by America,* 2023

CHAPTER 1
Introduction

In late July of 2016, I landed at the O'Hare International Airport in Chicago, excited to embark on an 80-mile drive north—to Milwaukee, a city I had only ever glimpsed through the pixelated lens of Google Maps. Despite my previous visits to the US, which had taken me to the polished downtowns of New York City, Chicago, and Atlanta, as well as the historic charm of Savannah, Georgia, I found myself unprepared for the reality of this new city which I would call my home for the next few years. As I drove east on Locust Street, taking Exit 72 on Interstate 43, enroute to my new American address, the sights, sounds, and smells of the city were overwhelming, and I couldn't help but feel a sense of despair and neglect all around me as I passed through. It was as if Appadurai's (1996) distinction between the "imagined" and "imaginary" had been brought to life before my very eyes, with the physical reality of this part of the city bearing little resemblance to the idealized vision I had in my mind. A state of despair and neglect seemed to be the norm here! Amid the ramshackle houses, I couldn't help but notice one tall building that seemed out of place. As I continued my journey, I couldn't shake the feeling that I had witnessed something important—a side of urban America that few people ever see.

A few days later, my septuagenarian landlady and I sat on the sunny porch of her duplex (I rented the upper unit with other students) near the UW-Milwaukee campus and talked about my life back in India. After a while, I asked her about the tall building and the neighborhood I saw on the west bank of the Milwaukee River. She sat in silence, briefly, perhaps collecting her thoughts, and mentioned the tall building as a "project" where one of her friends lived. And the rundown areas were—once a vibrant African American neighborhood, and now an outskirt of the ghetto—where the "othered" Americans live, plagued with poverty. A few days later, she brought me some books she read for her church's book club. One of these books was hot off the press—Evicted by Mathew Desmond (2016). She thought these books would help me find some answers; instead, they only served to deepen my curiosity and raise more questions! About housing, poverty, and race in America.

More than 80 years ago, the federal government began taking action to ensure the availability of affordable housing for low-income families in the United States. The 1937 Housing Act identified two central issues—an acute shortage of decent and safe dwellings and a shortage of housing affordable to low-income families—and proposed a national goal of "providing decent and affordable housing for all citizens through the efforts and encouragement of Federal, State, and local government" through Title 42, Section 8, §1437.[1] The first action taken by the federal government was the development of public housing projects, one of the many problematic instruments of low-income housing policies in this country.

Fifty years later, in his pivotal work William Julius Wilson (1987) criticized public policies that spatially concentrated the racial minorities and the poor in unfavorable geographic locations in urban America. Since then, a large body of scholarship examined how racial-residential segregation induced concentrated poverty[2] in inner-city neighborhoods. They documented that for families and individuals, living in a high-poverty neighborhood effectively

[1] For details, see Legal Information Institute: https://www.law.cornell.edu/uscode/text/42/1437
[2] Concentrated poverty is often operationalized as census tracts having more than 40% of people having income below the poverty line. There is no consensus for a benchmark of poverty rates, but pioneering studies have used 40% as the standard. See Jargowsky (1997), Jargowsky and Bane (1991).

diminishes life chances and produces poor socio-economic outcomes by thwarting access to resources and social networks, thereby spatially entrapping the poor in socio-economic and geographic isolation (Jargowsky, 1997; Jencks & Mayer, 1990; Massey, 1990; Massey & Denton, 1993; Sampson, 2008, 2012; Wilson, 1987, 2009).

Why was this so, when several policy measures attempted to provide housing for the low-income population, and some even forced people to move out of high-poverty areas? There are primarily three critical, and perhaps interlaced, challenges: first, serving the neediest households and achieving economic integration; second, supporting housing in high-opportunity neighborhoods for low-income families; and third, achieving the broader integration goal while combating racial discrimination (U.S. Department of Housing and Urban Development (HUD), 2015).[3] These three challenges indeed unravel the overarching tension between cost-effectiveness in producing a large quantity of low-income housing in high-poverty areas, and the higher cost of production of fewer low-income units in high-opportunity neighborhoods.

Ultimately, the cost of integration (both economic and social) is relatively higher, and therefore, the geography of opportunities (high-opportunity neighborhoods with low poverty rates) is rather impenetrable for low-income housing development. As a result, concentrations of affordable housing units, especially Low-Income Housing Tax Credit (LIHTC) developments, are largely found in high-poverty areas of metropolitan America (Oakley, 2008). Moreover, scholars have pointed out that incentivizing LIHTC developments in Qualified Census Tracts

[3] Ellen and Yager (Chapter 3) discussed this in detail in this report.

(QCT)[4] and Difficult Development Areas (DDA)[5] allowed developers to produce a large number of units in high-poverty areas (Dawkins, 2013; Freeman, 2004; Oakley, 2008; Rohe & Freeman, 2001) while relatively expensive land and high housing construction cost in high-income, low-poverty areas allow significantly fewer low-income units (HUD, 2015; McClure et al., 2020; McClure & Schwartz, 2021; Norman, 2014). Clearly, there is a shortage of housing for low-income people in high-opportunity neighborhoods.

LIHTC projects, like other affordable housing programs, are clustered in high-poverty areas with a disproportionate share of minority (especially, African American) residents and cost-burdened households (Dawkins, 2013; Freeman, 2004; Khadduri et al., 2006; Williamson, 2011; Williamson et al., 2009). As this program was neither directly befitting the federal housing goal of poverty deconcentration, nor upholding fair housing objectives (Bookbinder et al., 2008), some scholars speculated that Qualified Allocation Plans (QAPs) could serve as an effective policy instrument to solve low-income housing shortages, affordability problems, and barriers to access housing in high-opportunity neighborhoods for low-income groups (Blancato, 2020; Ellen & Horn, 2018; Johnson, 2013; Long, 2010; McClure & Schwartz, 2021; Oppenheimer, 2015; Spotts, 2016; Walter et al., 2018).

Since state housing finance authorities (HFAs) influence LIHTC developments (geographically and otherwise), QAPs—as a policy instrument—then, have substantial scope in addressing poverty deconcentration and promoting LIHTCs in high-opportunity areas. This

[4] US Department of Housing and Urban Development (HUD) defines QCT as any census tract (or equivalent geographic area defined by the Census Bureau) in which at least 50 percent of households have incomes below 60 percent of the Area Median Gross Income (AMGI) or have a poverty rate of 25 percent or more.
[5] HUD defines DDA as an area with high construction, land and utility costs relative to its Area Median Gross Income (AMGI) and the area is designated along Census Zip Code Tabulation Area (ZCTA) boundaries.

assumption served as the basis for my research for the last few years, and I present my findings in this dissertation. In nutshell, while the findings are optimistic, I conclude that there is significant room for improvement for state QAPs as a policy instrument to offset the historic injustice perpetrated by state QAPs.

Low-Income Housing Tax Credit Program

Established by the Tax Reform Act of 1986, LIHTC is a federal program administered by the U.S. Department of the Treasury that incentivizes the development of rental housing projects for low-income households by issuing tax credits. LIHTC, as a supply-side or project-based component of the U.S. rental housing policy, allows private developers or investors to receive federal tax credits in return for the development of affordable rental housing (Cummings & DiPasquale, 1999). These tax credits are given to new construction, rehabilitation, or acquisition of rehabilitated buildings; and, are open to both, for-profit and non-profit housing developers or investors (Oakley, 2008). So far, an average of over 1,500 projects and 104,000 units were placed in service annually, totaling a placement of 52,006 projects and 3.55 million housing units in service between 1987 and 2021 (HUD website[6], n.d.). State HFAs are responsible for creating the QAP policy document to screen LIHTC applications based on several guidelines and criteria and over the entire process of LIHTC development and tax-credit distribution.

Low-Income Housing Tax Credit Allocation Process

The process of credit allocation starts at the federal level. In 2023, states received an allocation of $2.75 per person ($2.60 in 2022) with a minimum allocation of $3,185,000 for states with a small population (Keightley, 2023). From 1986 to 2000, the initial credit allotment was

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[6] HUD LIHTC Property level data portal

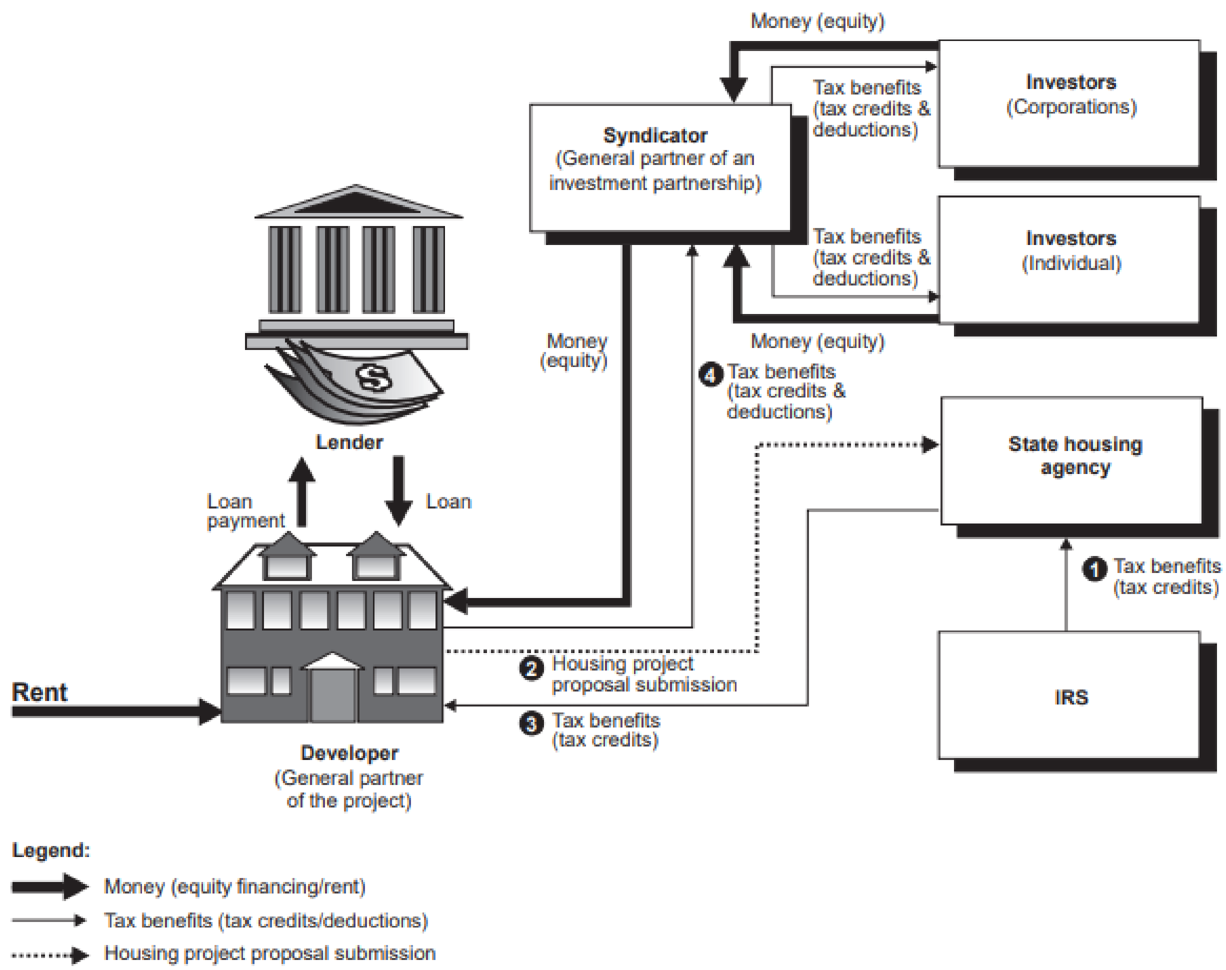
$1.25 per person, which increased to $1.50 in 2001, and $1.75 in 2002, and was indexed for inflation annually thereafter (Keightley, 2023). To apply for a tax credit, first, a developer must irrevocably elect one of the two sets of income tests. Either 20% of the units must be occupied by individuals having an income of 50% or less of the Area Median Gross Income (AMGI)[7] or at least 40% of the units must be occupied by individuals with incomes of 60% or less of the AMGI, both adjusted to family size. In 2018, the Consolidated Appropriations Act (P.L. 115-141) appended another income test under which at least 40% of the units must be occupied by tenants with an average income of no greater than 60% of AMGI, and no individual tenant has an income exceeding 80% of AMGI.[8] Additionally, the gross rent test limits the rent at or below 30% of either the 50% or 60% AMGI income test criterion elected by a project initially (Keightley, 2023). Each state HFA prepares QAPs keeping in mind the three Internal Revenue Service (IRS) mandated requirements (serving residents with the lowest income; serving income-eligible residents for the longest period of time; and located in QCTs and DDAs, so long as the project contributes to a concerted community revitalization plan), and additional criteria based on the housing need and market scenario (Keightley, 2023). Although it varies across states, in general, points are allocated for each criterion in the QAP to score applications and award the successful ones.

LIHTC developers can claim a basis boost of 130% for locating a project in a QCT or a DDA defined under the Section 42(d)(5)(c) of the IRS Code of 1986, which implies that LIHTC developments are highly incentivized in high-poverty census tracts, thereby, leading to poverty

[7] HUD calculates AMGI using census data, for metropolitan level and non-metropolitan counties. See HUD website.
[8] See Consolidated Appropriation Act, 2018: https://www.congress.gov/bill/115th-congress/house-bill/1625/text

concentration. Several state QAPs still use this criterion (since IRS requires the QCT and DDA priorities) yet award the least points for this criterion to discourage LIHTC developments in high-poverty census tracts, thereby incentivizing poverty deconcentration.

Figure 1: *Tax Credit Transfer Process*



Source: United States General Accounting Office, 1997, p. 24 (GAO/GGD/RCED-97-55)

The last phase of LIHTC development involves developers and investors. Once the credit allocation is completed, and a project is awarded tax-credit[9], developers would trade the credit

[9] Here is an example of tax credit calculation: Suppose a new LIHTC project with 100 units (all units are for low-income families) is developed in a QCT. The total project cost is $50,000, of which $10,000 was spent on land purchase and marketing. First the *eligible basis* is calculated, which is $40,000 i.e., total development cost minus the land and other costs (this list is long, ranging from marketing to syndicate fees). Since all units are available for low-

for equity from an investor. A tax credit can be claimed only after the project has been completed and fully operational (also known as placed in service). Typically, two types of tax credits are awarded depending on the nature of LIHTC development. The 9-percent credit is given for new constructions and the 4-percent credit is awarded for rehabilitation projects and tax-exempt bond projects (Keightley, 2023). Also, each state uses a mandatory 10% set-aside criterion for low-income housing developments by non-profit organizations.

Qualified Allocation Plan

As stated before, a QAP is a guiding policy document crafted by state HFAs to evaluate applications and to award tax credits to the successful ones based on several guidelines and scoring criteria that often uses a point system. QAPs generally prioritize three essential goals mandated by the IRS: serving residents with the lowest incomes; serving income-eligible residents for the longest period of time; and locating in QCTs and DDAs as long as the project contributes to a concerted community revitalization plan.[10] However, an IRS notice rightly pointed out that, since there is no guidance defining what counts as a concerted community revitalization plan, often LIHTCs are awarded and treated “as if it were such a plan,” which often eventually exacerbates concentrated poverty.[11] Besides the three essential guidelines, the IRS also mandates that a state HFA must take into account local housing needs and as such prepare

income families, the *qualified basis* is 100% of $40,000, i.e., $40,000. As this project is located in a QCT, therefore, a 130% *basis boost* will be applied to the credit. Hence, $52,000 is the final amount for which tax-credit will be applied. Now, as it is a new development, a 9% annual tax credit for 10 years will be earned. Hence, the *tax-credit size* equals ($52,000*9%*10 years) $46,800. So, each year a developer earns $4680 as tax-credit. Under the appropriate interest rate, the present value of $46,800 should equal to $36,400, or 70% subsidy.

[10] National Low Income Housing Coalition document explains these criteria and several others in detail. https://nlihc.org/sites/default/files/2014AG-259.pdf Accessed on 3/21/2022.

[11] IRS Notice 2016-77 (p. 2) stated that, in the absence of defined community revitalization plan, often LIHTC implementation becomes the sole component of such plans and therefore requested comments from the public on how to operationalize the definition so that LIHTC developments can contribute to community revitalization. https://www.irs.gov/pub/irs-drop/n-16-77.pdf Accessed on 3/21/2022.

QAPs in a manner that ultimately resolves those needs.

State HFAs create QAP criteria and point systems to evaluate competing applications. For example, the Texas 2005 QAP used "Development Location" as a criterion and awarded a maximum of 4 points if a project was located in an economically distressed area such as a DDA or a Colonia.[12] The 2016 Texas QAP used an opportunity criterion where a maximum of 7 points would be awarded if a LIHTC project was located in a census tract in the top quartile of the median household income distribution for the county or Metropolitan Statistical Area (MSA). In the same QAP, an economically distressed area would receive a maximum of 1 point. In 2009, Wisconsin's QAP allotted 10 points (2.6% of total points) for siting a LIHTC development in a lower-income area, while, in 2019, only 5 points (1.6% of total points) were reserved for the same criterion. Moreover, in 2016, Wisconsin's QAP created an opportunity zone criterion; however, in 2019, it was replaced with areas of economic opportunity.[13] Thus, after sampling QAPs for 21 states for the years 2002 and 2010, Ellen et al. (2015) concluded:

> Overall we find evidence suggesting that QAPs matter. … We find that overall states which increased priorities towards higher opportunity areas exhibited increases in the share of tax credits allocated for projects in low poverty areas, decreases in the share of tax credits allocated for projects in high poverty areas as well as decreases in the overall exposure to poverty of projects allocated tax credits. (p. 16)

[12] Colonia is a slum-like unincorporated informal settlements developed in border states of US such as Texas. For details, see Ward (1999).

[13] Although this study examines QAPs for 2005 and 2015, I examined several state QAPs beyond the said time-period to understand the trend in (de)prioritizing a few criteria, particularly, opportunity, low-income areas, QCTs, neighborhood and transit services. I studied Wisconsin QAPs from 2000 to 2021 for each year, among other states.

Their research, and others that examined the role of QAPs, indeed provided a deep insight into the matters of changes in the location incentives that could potentially increase the number of LIHTC developments in low-poverty areas. However, as I explained later (in Chapter Two), there were several limitations of these studies that I addressed in my research. I argue that poverty deconcentration goals are embedded in the location and opportunity criteria and hypothesize that changes in location and opportunity criteria in QAPs have a significant impact on poverty deconcentration.

Research Question

My research aims to examine whether changes in the QAP location and opportunity criteria have encouraged poverty deconcentration. As one of the largest subsidized housing programs in the country, how well does LIHTC serve the goal of poverty deconcentration advocated by policymakers and scholars alike? Since a QAP regulates the siting pattern, it can, therefore, be argued that changes in the allocation process for a QAP over time (due to local housing market conditions, state political philosophies and policy regime, or external forces such as the Texas Department of Housing and Community Affairs v. Inclusive Communities Project, Inc., 576 U.S. 2015[14]) would bring about changes in siting of LIHTC projects. Since I am interested in examining poverty deconcentration, it is therefore imperative to understand the patterns of change in the QAP allocation criteria that determine the siting pattern of LIHTC projects. Thus, I propose the major research question:

Did Qualified Allocation Plans (QAPs) promote poverty deconcentration?

[14] For details, see https://www.law.cornell.edu/supremecourt/text/13-1371.

To answer the above research question, I formulate the following minor research questions:

[1] Have states prioritized poverty deconcentration criteria in the QAPs?

[2] Did changes in QAP criteria towards poverty deconcentration influence LIHTC Siting?

By 2023, an estimated 14% of existing LIHTC units will be eligible for market-rate conversion (Freddie Mac, 2022), while there is an acute shortage of 7.3 million affordable rental units for the extremely low-income population (National Low Income Housing Coalition, 2023). Thus, this research is a time-sensitive evaluation of affordability, siting patterns, and opportunity themes that may guide the formulation of future QAPs so that LIHTC developments could more effectively serve to provide access to high-opportunity neighborhoods. It is also a timely evaluation of the program in compliance with the Affirmatively Furthering Fair Housing (AFFH)[15] requirement by HUD which intended to foster economic integration, building inclusive communities, and access to community assets.

Research Design

The Mixed Method

Often considered the "third methodological movement", mixed methods combine both quantitative and qualitative research and methods to enhance the scope of analysis in a research study (Creswell & Plano Clark, 2017). The procedures largely include collecting and analyzing data based upon the research question; combining this data using sequential, embedded, or concurrent forms; using this data to support either a single-phase or multiphase study; framing these procedures using a specific theoretical lens; and combining these procedures into a

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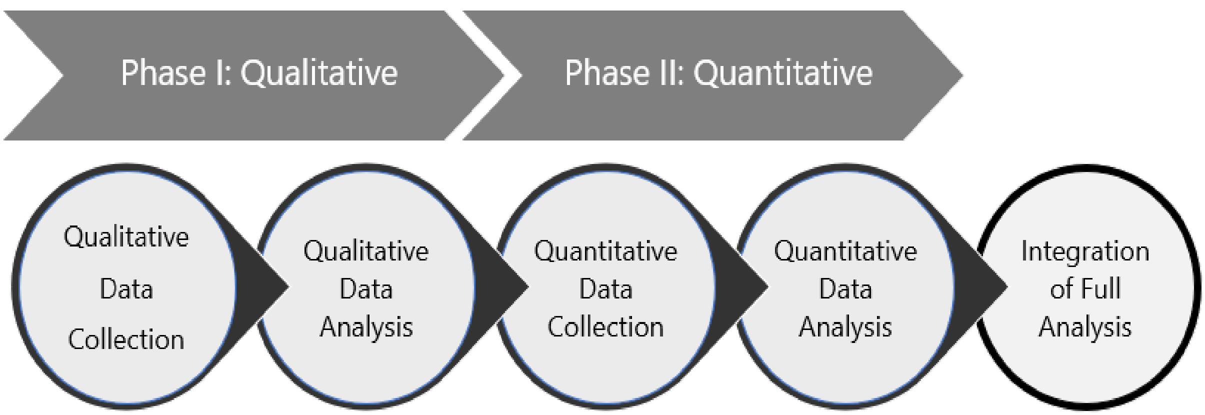
[15] In 2020, HUD has proposed changes in the AFFH rules that would, arguably, affect the progress of fair housing practices. For details, see PRRAC (2020) https://prrac.org/affirmatively-furthering-fair-housing/

cohesive research design that directs the study (Creswell & Creswell, 2018; Creswell & Plano Clark, 2017; Fetters et al., 2013).

There are at least three key reasons behind selecting a mixed-method approach for this research. First, as this method uses a mix of both qualitative and quantitative tools, it allows us to overcome the inherent weakness of pure quantitative or qualitative analysis. To understand the contextual underpinning of the QAP allocation process, the content analysis method served as a useful tool. To understand the outcome of those contextual underpinnings at the neighborhood level, regression modeling certainly provided interesting insights on the estimation of the effects of QAP changes.

Figure 2: *Framework for Sequential Exploratory Mixed Method*



Source: Adopted from Creswell & Creswell (2018)

Second, for this research, a mixed-method approach bridged the gap between the two very different data types that were required to effectively answer the overarching research question. So far, the nature of data available to answer the research questions I posed are textual (the QAPs) and numerical (for example, the poverty rate for a census tract), and therefore require two dedicated research methods, namely, qualitative and quantitative, to explore each type of data and make connections.

Third, as the mixed-method approach allowed for both inductive and deductive problem-solving and analysis (Creswell & Creswell, 2018; Creswell & Plano Clark, 2017; Edmonds & Kennedy, 2017), it, then, became the most practical approach to gaining a better understanding of changes in the poverty deconcentration goals in QAPs and its correlation with changes in LIHTC siting. For this research, I employed a sequential exploratory mixed method (Fetters et al., 2013) that includes qualitative data collection and analysis for the first phase, and quantitative data collection and analysis for the second phase, followed by an integration of the results from the previous two phases into the last phase.

Data Sources

The QAP documents were the essential textual data for this research which were obtained from Novogradac[16] (or by contacting state HFAs whenever the documents are missing) for the year 2005 through 2015 to examine the changes in the allocation criteria. Almost all the QAPs for 50 states have been available from Novogradac since 2000; however, in the early years, only a few states had submitted or made QAPs publicly available. Novogradac archives hosts most of the state QAPs available since 2005, and therefore, for this study, I selected 2005 as the benchmark year.

The other essential component of this research was the project level characteristics, such as location, number of low-income units, and types of units (i.e., new or existing) of LIHTC

[16] Novogradac is a national professional services organization that provides services in areas such as public accounting, valuation, and consulting services for affordable housing. https://www.novoco.com/

developments. This form of data on LIHTC is available from its inception until 2020 from the HUD LIHTC Database.[17] For assessing the changes in LIHTC siting, the census tract poverty rate was an important factor. Most socio-economic data for the final part of the analysis were obtained from the Integrated Public Use Microdata Series National Historical Geographic Information System (IPUMS NHGIS, 2022)[18] for the U.S. Census Bureau's American Community Survey (ACS) 5-Year Estimates for 2005-2009 and 2015-2019.

Sample Size

For this study, 38 states were selected based on a sampling process (explained in Chapter Three) and 76 QAPs were analyzed not including and change documents that states periodically generate to point out the major changes between two QAP years. From the LIHTC database a total of 134,297 units in 2005-07, and 84,192 units in 2015-17 were included in the final sample which were developed in 5,331 unique census tracts.

Data Analysis

To assess the changes in the allocation criteria for QAPs, detailed scrutiny of these documents is essential. I used Content Analysis to effectively capture and categorize the QAP criteria. Kaplan (1943) defined content analysis as a "technique [that] attempts to characterize the meaning in a given body of discourse in a systematic and quantitative fashion" (p. 230). Content analysis has been used by scholars to create frameworks for a systematic review of the state QAPs (for example, see Ellen & Horn, 2018; Johnson, 2013, 2015; Walter et al., 2018). The content analysis method could support discovery and analysis in an unobtrusive yet insightful

[17] HUD database for LIHTC project: https://lihtc.huduser.gov/

[18] For details see https://www.nhgis.org/

manner since the intent of this study is to illuminate priorities within a state's LIHTC allocation documents (Krippendorf, 2018; Vaismoradi et al., 2013). As I am interested in the changes, a categorization of the thematic of changes can be effectively captured and quantified using this technique as Franzosi (2004) affirmed that one of the most common approaches of content analysis is the "*thematic analysis*, where the coding scheme is based on categories designed to capture the dominant themes present in a text" (p. 550, italics in original).

Furthermore, to examine the concomitant effect of QAP changes on LIHTC siting, I used state and census tract level OLS linear regression models using several control variables. The dependent variable was the change in LIHTC units, and the independent variable was an index value (see Chapter Three) that estimated the changes in QAP poverty deconcentration criteria between 2005 and 2015. The regression models are estimated at the state and the census tract level. Additionally, to test the effects of QAP criteria change on LIHTC siting I used Difference-in-Differences (DiD), a quasi-experimental design, which I explained in further detail in Chapter Four.

Chapter Organization

This dissertation is composed of five chapters, which present a comprehensive and structured analysis of the research topic. In the first chapter, the context and core concepts of the dissertation are introduced, followed by an understanding of the LIHTC program and the QAPs. Additionally, the research design and research question are briefly explained.

The second chapter provides a detailed review of existing scholarship on poverty concentration, low-income housing policy, and the interaction between poverty concentration and neighborhood effects. This serves as the foundation for the fundamental themes explored throughout the research, and the chapter concludes by highlighting the research gap and explaining how this study contributes to existing knowledge.

The third and fourth chapters present the empirical findings of the research, with each chapter examining specific aspects of the overarching research question. The third chapter provides a detailed understanding of the QAP criteria for poverty deconcentration, followed by the development of a thematic scheme to understand the varied strategies for addressing poverty deconcentration. Finally, the chapter introduces a classification scheme to evaluate states based on their performance in prioritizing poverty (de)concentration in the QAPs.

Building on the results from Chapter Three, I assessed the role of QAPs in influencing LIHTC siting by examining the correlation between changes in QAPs and the corresponding changes in the siting of LIHTC units in Chapter Four. The chapter presents an estimation of the effects of QAP changes on LIHTC unit developments using regression models.

Finally, the concluding chapter summarizes the research findings, draws conclusions, explains the limitations, and presents policy recommendations based on the research outcomes. By adopting this chapter organization, the dissertation ensures coherence and flow throughout the document while providing a comprehensive analysis of the research topic.

CHAPTER 2
Literature Review

This research focuses on the interaction between two main themes, poverty concentration and low-income housing policies. First, I introduce the theoretical understanding of poverty concentration, its causes, and the interaction of space and poverty concentration followed by the measurement issues, and the interrelation between poverty concentration and neighborhood effects. In the second part, I provide a brief historical overview of low-income housing policies followed by an in-depth understanding of LIHTC and its allocation process and the interaction between low-income housing policies and poverty concentration. Finally, I explain the gaps in the literature and how this research aims to contribute to expanding our knowledge on the issue of poverty deconcentration and LIHTC.

Poverty Concentration

Poverty concentration, interchangeably known as concentrated poverty, is defined as "the confinement of the poor to a subset of neighborhood locations rather than their dispersion across all parts of an urban area" (Greene, 1991). Research showed how poverty concentration often leads to social disorder and economic disparities (Schwartz et al., 2006; The Brookings Institution, 2006). Moreover, poverty concentration is correlated with a host of socioeconomic handicaps and outcomes including but not limited to lower educational attainment, lower economic opportunities, increased joblessness, and health disparities (Galster et al., 2008; Rosenthal, 2008). Jargowsky (1996, p. 985) observed that poverty concentration created a snowball effect where "families have to cope not only with their own poverty but also with the social isolation and economic deprivation of … other families who live near them. This spatial concentration of poor people acts to magnify poverty and exacerbate its effects." This effect, in turn, has led to a spatially ostracized "underclass" where "certain social pathologies among the poor are ascribed to their geographic confinement and social isolation from the mainstream" (Green, 1991, p. 240). It is important to note that indeed these scholarly works offer an image of how concentrated poverty exacerbates the effects of household-level poverty but stops short of identifying specific patterns. Much of the neighborhood effects literature aims to identify these patterns which I examine in the later section.

Causes of Poverty Concentration

Deindustrialization directly impacted the economic well-being of the working poor, especially African American communities across the U.S. cities, which resulted in neighborhoods and families experiencing rapid disinvestment and decline. As a result, inner-city poverty, more specifically in the form of concentrated poverty, began to attract attention due to the visibility of poverty-stricken segregated neighborhoods, especially adjacent to the downtown areas of the post-industrial cities of the U.S., calling for serious policy attention. In 1995, Henry Cisneros, former secretary of HUD, indicted previous HUD policies for "warehousing poor people in high-rise buildings" that led "many Americans… [to be] dismayed by the seeming magnitude of urban poverty," whereas, to him "the problem's size is an illusion created by its concentration" (Cisneros, 1995, cited in Goetz, 2003a, p. 43). According to Fletcher (2008), three main approaches can be found to establish the causes of concentrated poverty. Fletcher mentioned an individual-behavioral explanation that existed before the 1960s; a structural and economic explanation during the 1960s; and a combination of both structural and economic inequalities and individual-behavioral explanations since the 1970s. Wilson (1987) directly pointed to housing policies, that were “routinely locating housing for low-income people in the poorest neighborhoods of a community where their neighbors will be other low-income people usually of the same race,” as the vital factor contributing to the problems associated with poverty concertation in low-income communities. Eventually, the by-products of these policies were the “combined effect on intergenerational poverty and joblessness, the flight of working class, a lack of self-supporting role models and failed schools” (Grogan & Proscio, 2001, p. 226).

While Wilson’s (1987) research focused on structural issues (deindustrialization, urban policy, job-skill mismatch, etc.) that produced concentrated poverty, Massey & Denton (1993) argued that exogenous economic shocks (such as the Great Depression and the stagflation and subsequent recession of the late 1970s and the early 1980s) necessarily resulted in extreme concentration of poverty, given the combination of racial inequality in socio-economic conditions and high levels of residential segregation by race. Similarly, (Quillian, 2012) showed, aligned with Massey and Denton’s (1993) work, that racial segregation and economic segregation within race jointly contributed importantly to poverty concentration. In a national-level study, Jargowsky (1997) indicated that increased poverty concentration between 1970 and 1990 could be attributed to rising income segregation and poor regional and metropolitan economic performance. For the following segment, I expand upon the role of housing policy in engendering and sustaining poverty concentration.

Poverty Concentration and Space

Poverty is frequently conceived as a spatial issue in academic and public discourses. The conventional perception of poverty in America aligns considerably with geographic boundaries of urban districts, which are often labelled with pejorative terms such as "ghettos," "inner city," and "barrios," thereby casting their inhabitants in an unfavorable light. These districts are emblematic of racialized poverty and territorial stigmatization (Loyd & Bonds, 2018), which further reinforces negative stereotypes and exacerbates social marginalization. While exploring what kind of problem poverty is, Katz (2015) asserted a direct relationship with place and wrote:

> Poverty as a problem of place … which has dominated discussions, conditions *in* places – most notably, substandard housing – produce, reinforce or augment poverty. On the other side, poverty is a product of place itself, reproduced independent of the individuals who pass through it. The first vision holds out the hope of improvement; its paradigmatic strategy is housing reform, which has come in many guises. (p. 49, italics in original)

Similarly, Wilson (1987, p. 55) recognized the persistence of “high and extreme poverty areas that epitomizes the social transformation of the inner city” and labeled it as “concentration effects” caused by a massive structural change in the economy, joblessness, and middle-class out-migration, thereby producing disadvantaged “ghetto underclass”[19] concentrated within specific neighborhoods of abject poverty.

According to Massey and Denton (1993), the persistence of concentrated poverty neighborhoods was a direct result of racial segregation. For them, a segregated community was the core cause for furthering the concentration of poverty as they wrote:

> Geographically concentrated poverty is built into the experience of urban places by racial segregation. Concentrated poverty is created by the pernicious interaction between a group’s overall rate of poverty and its degree of segregation in society. When a highly segregated group experiences a high and rising rate of poverty, geographically

[19] Later, Wilson announced that he would not use this term. See Gans (2010).

> concentrated poverty is the inevitable result, and from this geographic concentration of poverty follows a variety of other deleterious conditions. (p. 118)

Concentrated poverty neighborhoods are often characterized by welfare dependency, low educational attainment, unemployment, and so on, as Jargowsky (1997) elucidated, which resulted from the economic decline of the U.S. Metropolitan areas since the 1970s. Concurring with William J. Wilson's concept of social isolation, his analysis rejected the celebrated culture of poverty[20] thesis, and hence, Jargowsky (1997) concluded that:

> neighborhood poverty is not primarily the product of "the people who live there" or a "ghetto culture" that discourages upward mobility, but the predictable result of the economic status of minority communities and the degree to which minorities are residentially segregated from whites and from each other by income. (p. 193)

In subsequent years, an academic debate would emerge to determine the best practice for poverty deconcentration between place-based versus people-based strategies in policy design (Galster, 2017), which would influence the narratives of the scope of affordable housing policies. Furthermore, a dispersal consensus would dominate much of the central arguments for poverty deconcentration as an effective policy design (Imbroscio, 2016).

Poverty Concentration Measures

Many quantitative studies have attempted to define, operationalize, and measure poverty concentration. For example, Danziger & Gottschalk (1997, p. 45), operationalized a

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[20] Oscar Lewis in 1966 articulated this concept that blamed the victim for reproduction and sustenance of intergenerational poverty. Wilson (1987) argued that this thesis became a tool for politicians to explain the persistence of poverty rather than finding way out of it. A similar notion was echoed by Jargowsky (1997), as well.

concentrated poverty neighborhood as a census tract in which at least 40% of the residents are poor. Other studies confirmed the validity of this threshold of 40% with field observations (Iceland & Hernandez, 2017; Jargowsky & Bane, 1991). Although there are moderate variations in defining concentrated poverty neighborhoods, most researchers have used measures based on the federal poverty threshold. The variation only occurs in terms of benchmarking the percentage of families below the federally defined poverty line. For example, Wilson (1987) used a 20% or more cut-off for his study of Chicago. Jargowsky (1997), however, argued that the choice of benchmark could effectively distort the share of poor people living in concentrated poverty areas. In his research, Jargowsky (1997) used a 40%-or-more threshold consistently and explained that a "ghetto" is a predominantly black neighborhood; a "barrio" is a predominantly Hispanic neighborhood; a "white slum" is a predominantly white neighborhood; a "mixed slum" is where no racial predominance is prevalent (p. 14) that offered nuanced understanding. Similarly, Kneebone and colleagues (2011, 2016) used the same 40%-or-more threshold when they studied the re-emergence of concentrated poverty.

In 2013, HUD constructed two measures of poverty concentration to enforce the AFFH rule.[21] The first one is 'Racially/Ethnically-Concentrated Areas of Poverty (R/ECAPs)' which identifies racial/ethnic concentration (50% or more non-white population) and a poverty threshold test of 40% in a given census tract. The other one, Poverty Index, is "a linear combination of two vectors"—family poverty rate and the percentage of households receiving public assistance— "that captures the depth and intensity of poverty in a given neighborhood"

[21] HUD AFFH Data Documentation draft in June 2013 elaborates on requirements for AFFH along with measures for neighborhood opportunity.

(HUD, 2013, p. 5). As of 2019, HUD's poverty concentration measure for R/ECAPs has remained the same; however, a simplistic measure has been introduced for the poverty index using a census tract's poverty rate, the national mean, and the standard error distribution of poverty at the census tract level.[22]

Similar to the scenario of establishing a standard benchmark of poverty concentration using the federal poverty threshold, efforts to spatially demarcate neighborhoods also confront researchers with various dilemmas. While Wilson (1987) used the city of Chicago's official community areas[23] as neighborhoods, Jargowsky (1997) pointed out the lack of city-designated boundaries in any other U.S. cities. Hence, he proposed to use census tracts as analogous to a neighborhood in ascertaining poverty concentration or other such related studies, to attain feasibility and comparability of quantitative measures. It has been, thereafter, a standard procedure to use census tracts as the spatial unit corresponding to a neighborhood as many pivotal scholarly works are based on this spatial unit.

Poverty Concentration and Neighborhood Effects

Mainly from a sociological perspective, concentrated poverty neighborhoods often demonstrate negative neighborhood effects. The production, reproduction, and persistence of poverty in the confined geographies of urban space and its iconography of how the other half lives[24] triggered interest among academicians and the public alike. Whether it is Wilson (1987), for whom the concentration effects of the underclass; for Massey and Denton (1993), the racial

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[22] This index excludes public assistance, unlike the 2013 document, and uses a national level mean and standard error. In the 2013 document metropolitan level mean and standard error were taken into account instead.

[23] Chicago's "community areas" were delineated between 1924-1930 by the Local Community Research Committee. For details, see Owens, (2012).

[24] Jacob Rii's photojournalism titled How the Other Half Lives: Studies among the Tenements of New York (Riis, 1890) captured the detrimental condition of tenement housing in New York City in the late 19th century.

segregation; for Jargowsky (1997), the economic decline; or for Sampson (2012), the ecology of space that shapes individual outcomes—the systemic production and persistence of poverty have been strongly correlated with space, i.e., a neighborhood.

Neighborhood, as an early 20th-century concept proposed by the Chicago School scholars, was construed as a subsection of a larger community, both people and institutions, occupying a spatially defined area influenced by ecological, cultural, and sometimes political forces (Robert Park 1916, paraphrased in Sampson et al., 2002, p. 445). With a further modification of the concept, a neighborhood is now analogous to the geographic boundary of census tracts and in some cases school districts and/or other administrative boundaries such as zip codes or school districts. A census tract, defined by the U.S. Census Bureau, is "designed to be homogenous, with respect to population characteristics, economic status, and living conditions" (U.S. Bureau of the Census 1992, Appendix A, cited in Jargowsky 1997, p. 8). Despite the complexity of defining a neighborhood, scholars have unequivocally asserted the importance of neighborhoods in shaping one's life chances.

Concerns about the dysfunctional aspects of poor neighborhoods and the barriers people face while living in those neighborhoods to escape poverty have been under examination, mostly through neighborhood effects (Sampson, 2008, 2011; Sampson et al., 2002). Especially, in the context of neighborhood disadvantages, concentrated poverty plays an adverse role in individual-level outcomes. Living in a concentrated poverty neighborhood, thus, produces negative effects that constrain the ability of an individual or a family to escape poverty. Broadly speaking, studies that have assessed neighborhood effects raise particularly pressing concerns about specific age groups (children and adolescents) and racial minorities (especially, African Americans or Latinx vis-à-vis non-Latinx Whites). As Desmond (2023) pointed out that:

> Poor white families tend to live in communities with lower poverty levels than poor Black and Hispanic families. There is no metropolitan area in the United States where whites experience extreme concentrations of disadvantage, … But across the nation, many poor Black and Hispanic families live under these conditions. That means most poor white children attend better- resourced schools, live in safer communities, experience lower rates of police violence, and sleep in more dignified homes than their poor Black and Hispanic peers. Poverty not only resides in people; it lives in neighborhoods, too, with poor Black and Hispanic families being much more likely to experience the kind of hardship that results when personal poverty collides with community-level poverty. (pp. 22-23)

Synthesizing from a vast body of literature, Ellen & Turner (1997) categorized six different ways neighborhood effects could bring adverse outcomes for residents: lack of quality of services; process of socialization; peer influence of having role models; social isolation and fear; and, finally, physical isolation from opportunities in education and labor market. To determine how much effect the social composition of a neighborhood had on children's life-chances, (Jencks & Mayer, 1990) tested five outcomes—educational attainment, cognitive skills, criminal activity, sexual behavior, and economic success—on children, drawing from an extensive body of literature. For them, conclusively, poor disadvantaged neighborhoods adversely affected children's life-chances.

Other studies echoed similarly about the negative impact of concentrated poverty neighborhoods on individuals and families in terms of social and health outcomes (Browning & Cagney, 2003; Desmond & An, 2015); duration of exposure to neighborhood poverty and its outcome on teenage pregnancy (Wodtke, 2013); effects of duration of exposure to disadvantaged neighborhoods on high school graduation (Wodtke et al., 2011); neighborhood structural disadvantages in generating crime (Krivo et al., 2013; Krivo & Peterson, 1996); social network composition and degree of isolation for the inner-city African-American families living in high poverty neighborhoods (Rankin & Quane, 2000); and even how concentrated poverty increased anti-social behavior and that in turn affected property values and rents (Galster et al., 2008). Conversely, researchers found that mobility programs (to high-opportunity, low-poverty neighborhoods) enabled better educational attainment and higher earning for children as compared to adolescents (Chetty et al., 2016); led to improvements in adult physical and mental health and subjective well-being (Ludwig et al., 2012).

Such a multifaceted way of examining the importance of neighborhood effects calls for serious attention. As a result, policy measures, mainly through several housing programs commissioned by HUD, were taken to deconcentrate poverty and relocate poor people to areas of opportunity to induce positive neighborhood effects. It is worth mentioning that both the objectives of poverty deconcentration and the operational tactics of dispersal and deconcentrating poverty received flaring criticism (Crump, 2002; Gans, 2010; Goetz & Chapple, 2010). Nonetheless, the relationship between neighborhood effects and poverty concentration, and the deleterious effects of housing policies in exacerbating poverty concentration are well established.

It is important to note that while this research examines the degree to which changes in state policy design may promote deconcentration, I acknowledge that poverty concentration has been used as a shorthand for racial and spatial stigmatization as Loyd & Bonds (2018) argued that framing poverty, spatialization and racialization of poverty, and, consequently, poverty solutions are embedded in a narrative that "make poverty a simplistic problem of concentration and local place, rather than one produced by structural and discursive processes" (p.903). Moreover, as Dantzler (2021) pointed out that strategies for neighborhood change, including poverty deconcentration, "rest upon a detachment of people from place *and* resources" (italics in original, pp. 10-11). In this research, however, I frame poverty deconcentration as a policy measure for low-income, especially minority renters to access areas that offer a set of resources essential to improve life-chances and in turn expand opportunities for desegregation through LIHTC (Dantzler & Reynolds, 2020). Interestingly, these areas are often white-majority and rich, which directly speaks to an un-equal urban process, embodied by profiting from racial capitalism (Dantzler, 2021) and further reinforces the racial and wealth segregation (Bonds, 2019; Loyd & Bonds, 2018).

An Account of Concentrated Poverty Neighborhoods

Jargowsky (2003, 2015) noted that nationally the number of high-poverty neighborhoods[25] increased between 1970-1990, followed by a sharp decline during the 1990s, and estimated that the number of people living in high-poverty tracts nearly doubled between 2000 and 2013. Similarly, at the beginning of the 20th century, Kneebone et al. (2011) found a 45% increase in the number of extremely poor neighborhoods (with more than 40% of people

[25] A census tract with more than 40 percent of people living below the federal poverty line. See footnote 1 on page 2.

living below the federal poverty line) and a 57% increase in the number of people living in those neighborhoods between the ACS year 2005-09 and 2010-2014. Their report also mentioned that 13.5% of the nation's poor families are doubly burdened by being poor and living in high-poverty neighborhoods.

According to the ACS 5-year Estimates, 18,238 census tracts across the contiguous U.S. recorded poverty rates over 20% for the years 2017-2021. This represents 22% of all tracts in the country. Of those, more than 62% have a minority concentration of over 50%. These tracts are home to 46.5% of those living in poverty. Furthermore, there are 2,863 tracts, accounting for 3.45% of all tracts, with a poverty rate over 40%. In which, only 1.42% of the White population and 5.64% of the poor White population live. In contrast, 7.56% of all African Americans and 17.24% of all poor African Americans live in these tracts. (see Appendix A). Given the statistics, the scholarly attention to the high-poverty neighborhoods and life chances of people living in them suggests the need for strong poverty deconcentration goals to be prioritized in public policies, especially in the realm of low-income housing policies.

Affordable Housing Policy in the U.S.

The Housing Act of 1949 marked the beginning of policy development toward enabling the development of affordable housing for the low-income population. Orlebeke (2000) pointed out two segments of policy implementation: first, housing production subsidies (1949 to 1973), and second, the diminishing federal leadership and devolution of housing policy. However, a major share of the federal money was spent on subsidizing homeownership and not directly aiding low-income renters to access affordable housing. Means-tested affordable housing programs, as Collinson et al. (2015) observed, were classified under the main categories: (1)

public housing; (2) privately owned, subsidized housing; and (3) tenant-based vouchers. All three of these policies have been criticized for contributing to poverty concentration, especially in the inner-city areas of urban America.

Historical Overview of the Major Low-Income Housing Policies

Established by the Housing Act of 1937, public housing became the first attempt at a federally funded low-income housing development. Although initially, the target group was low-income families, the Congress in 1974 amended to diversify the range of income groups (partly, to reduce the concentration of low-income families) for public housing occupants to avoid soaring poverty concentration and subsequently reversed itself in 1981, again shifting to prioritize low-income tenants alone (Schwartz, 2021). Over the years, this program came under serious criticism for contributing to poverty concentration as well as dismantling concentration through project demolition (Crump, 2002; Ficenec, 2011; Goetz, 2000, 2013). In 1992, the HOPE VI program was designed to replace, rehabilitate, and revitalize distressed public housing and communities in them with more mixed-income housing to avoid poverty concentration (Schwartz, 2021).[26]

A similar attempt to deconcentrate poverty was introduced in 1965 through Section 23, the Scattered Site program, which was intended to increase the supply of privately-owned subsidized housing. This program, although it promised to provide geographic mobility, as well as income and residential integration (Orlebeke, 2000), failed to increase the supply of low-income housing stock (Friedman & Krier, 1968). In 1974, Section 8 Existing Housing Program[27] of

[26] In an overview of HOPE VI by HUD, resident empowerment and lessening concentration of poverty were the two main elements considered. For details, see HUD website.
[27] For further details, see HUD website on Section 8 Program Background Information.

the United States Housing Act of 1937 (42 U.S.C. §1437f) was authorized by Congress that would subsidize "housing development under New Construction and Substantial Rehabilitation program" and provide "rental certificates to households with incomes up to 80% of the area median" (Schwartz, 2021, p. 178). In 1983, the Freestanding Voucher program was introduced, and in 1998 The Quality Housing and Work Responsibility Act merged this program with Section 8 to create the Housing Choice Voucher (HCV) program.[28] The Vouchers, administered by local housing authorities, were subsidies for low-income families to lower their rents in the private market. However, the increasing cost of this program led to the termination of the new construction and rehabilitation assistance component and only continued to have the vouchers (Collinson et al., 2015). The Tax Reform Act of 1986 introduced the Low-Income Housing Tax Credit (LIHTC) program, which provided the largest subsidy[29] for private rental housing production in the form of tax credits. This program is administered by state HFAs while the Department of Treasury is responsible for fund allocation.

This concise overview of low-income housing policies is clearly not adequate to understand the underlying pattern that resulted in poverty concentration. However, this short review reveals one critical tension between concerns about maximizing the supply of affordable housing (which often means building or maintaining units in high-poverty areas where land and construction costs are cheaper) on one hand; and using housing policy to leverage socio-

[28] The Housing Choice Voucher program, as a component of Section 8, was established in 1974. It was a "tenant-based" program that allowed an eligible tenant to find a suitable housing in the private market. Typically, a tenant paid only 30 percent of the income towards fair market rent and the difference was paid by the federal government. While some criteria had to be fulfilled to be eligible to qualify for vouchers for housing units, the owner/landlord's participation in this program was voluntary. See Collinson et al. (2015) for further details.

[29] Subsidies are normally calculated on the basis of 70% or 30% of the total tax basis for 10 years for new constructions and rehabilitations respectively.

economic opportunities for low-income families on the other. For example, HCV potentially provides a relatively cost-effective approach to meeting basic needs for housing while also helping to ensure that low-income families have better access to high-opportunity neighborhoods as researchers pointed out (HUD, 2015).[30] In practice, of course, HCV performed poorly, insofar as most voucher holders ended up back in high-poverty neighborhoods, as several analyses of the Moving to Opportunity (MTO) experiment and various other sources of evidence suggest (see Clark, 2008; Briggs et al., 2010a; Newman & Schnare, 1997; Sampson, 2008). However, Britton & Goldsmith (2013) argued that residential mobility could hasten desegregation and noted a significant rise in interaction with Anglo-Americans was observed among Black young adults who relocated to urban areas with newer housing stock. This trend was especially noticeable as it provided an opportunity for them to evade the institutionalized discrimination that existed in the older housing stock areas of the Northeast and Midwest.

Poverty Concentration and Low-Income Housing

Federal housing programs before 1974 largely subsidized low-income housing production and not low-income households. This practice, in turn, produced low-income enclaves and a cycle of poverty and social isolation with very little improvement to the neighborhoods in which projects were placed (McClure, 2008). The initial effort by the federal government to house the low-income population started in 1937 and was later amended in 1949, in the form of a public housing program aimed at the production of subsidized housing. Several studies have concluded that, as an institutional mechanism, this program exacerbated

[30] Ellen and Yager (in Chapter 3 of this report) pointed out three critical tensions, one of which is directly related to the issue discussed above.

poverty concentration, especially for minority groups (Carter et al., 1998; Massey & Kanaiaupuni, 1993). Partly due to the cost-effectiveness of locating public housing in poverty-stricken areas to maximize the availability of low-income housing, and, partly due to political and community level (NIMBY,[31] for example) barriers to building low-income housing in high-opportunity neighborhoods, this program led to severe concentration effects that were largely ignored (Goetz, 2000, 2013).

In 1965, the Section 23 program was, thus, instrumented in a bid to deconcentrate low-income families housed in the "projects". Although new construction of public housing projects stalled, and the Scattered Site program gained popularity, the latter had limited achievements due to the resistance from middle-class residents, the lack of knowledge, preparation at the local government level, and the pressure from the private real estate market opposing such dispersal (Goetz 2003a).

Hence, a demand-side solution was implemented in 1968 through Section 8 or HCV that allowed renters[32] to find suitable units at fair market rates. Studies suggest that the outcomes of this program were somewhat mixed and did not effectively propagate dispersal (DeLuca et al., 2013; McClure, 2008; Owens, 2012, 2015). In another study, Williamson et al., (2009) found that 30% of HCV holders lived in LIHTC units that were located in QCTs in Florida which further increased poverty concentration. Nationally, only one in five HCV holders was located in a low-poverty neighborhood (McClure & Johnson, 2015).[33]

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[31] NIMBY, an acronym for "Not In My Backyard," refers to a phenomenon where individuals or communities express opposition to the location or implementation of certain projects or facilities, such as affordable housing, homeless shelters, power plants, or waste management sites.
[32] Renters/voucher recipients are screened based on the area median income. Schwartz (2021) expands on the voucher recipients and types of units one can rent in detail.
[33] This study defines low poverty neighborhood as one where less than 10 percent households are poor.

The failures of public housing and the subsequent policies summarized above to effectively desegregate poor families led to what Goetz, (2003a, 2003b, 2013) termed as "second generation dispersal" through mobility programs. Influenced by the outcomes of the Gautreaux program in Chicago, Moving to Opportunity[34] (MTO) became the flagship program to disperse poor families with housing assistance (vouchers) and mobility counseling. In their study of MTO's fifteen-year performance, Briggs, Commie, and Weisemann (2010a) argued that beyond the supply-side barriers existing in the housing market across the nation, several demand-side barriers were stalling the performance of voluntary movement of low-income renters. Furthermore, while studying the spatial composition of poverty in post-Katrina New Orleans, Briggs, Popkin, and Goering (2010b) asserted that the MTO program was seriously affected by the constricted supply of affordable units. The impact of MTO was diverse on the issue of class, race, gender, and age, and as Briggs et al. (2010b) maintained, the uneven geographies of opportunity produced diverse outcomes for poor families and concluded:

> *Housing mobility is a powerful, and indeed essential, tool for fighting ghetto poverty—but one that is extraordinarily vulnerable to the strong-idea-weakly-implemented problem, as well as unfounded assumptions about how persistently poor people can escape the* risks *of ghettos, regardless of where they are able to live.* (p. 20, italics in original)

Parallel to the mobility program, mixed-income developments came to the forefront as a sort of reverse dispersal policy aimed at bringing the higher-income groups to poor

[34] In 1992, Housing and Community Development Act Section 152 authorized this program targeting families living in high poverty neighborhoods to disperse with voucher assistance and mobility counseling. Unlike Gautreaux program, where poor families should relocate to low-minority neighborhood, MTO only emphasized on the low-poverty rate.

neighborhoods by offering attractive housing options. HOPE VI, the flagship program of this endeavor, was approved in 1992 by the Department of Veterans Affairs and HUD through the Independent Agencies Appropriations Act (P.L. 102-389).[35,36] It was designed using the elements of both project-based and tenant-based assistance. Unlike MTO, this program enforced an involuntary dispersal of families from public housing projects. As Schwartz (2021) noted, the initial promise of producing one new affordable unit for each demolished public housing unit produced a supply shortage in the housing market due to the lack of proposed new affordable unit construction. He also argued that, although HOPE VI developments were much better (in a physical and structural sense) than the existing stressed public housing, it "does not necessarily improve the lives of all the residents of the original public housing" (Schwartz 2021, p. 145). Due to the devolution of HOPE VI, the Public Housing Authorities (PHAs) were greatly involved in the execution of this program, which thwarted the new construction of affordable units in response to varied regional, political, and economic conditions. For example, Chaskin and Joseph (2015) noted that the Transformation Plan[37] of Chicago, adopted in 2000, led to the demolition of 25,000 units, yet only 67% had been replaced with new developments so far.

LIHTC and Poverty Concentration

Ironically, the largest affordable housing program in the US—Low-Income Housing Tax Credit (LIHTC)—has received serious criticism for concentrating projects in low-income, high-minority, high-poverty neighborhoods (Freeman, 2004; Oakley, 2008; O'Neill, 2008). Although

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[35] Followed by the recommendations of National Commission on Severely Distressed Public Housing, Congress authorized HOPE VI (originally known as the Urban Revitalization Demonstration) program to redevelop the sites of public housing projects into mixed income housing to avoid concentration of poverty. For details, see HUD Website.

[36] See details https://www.congress.gov/bill/102nd-congress/house-bill/5679.

[37] This plan was introduced by the Chicago Housing Authority drawing funds from HOPE VI, public housing, capital grant, and various other public and private sources. For details, see Chaskin & Joseph (2015).

poverty deconcentration was never a stated policy goal for this program, scholars have often indicated the tremendous potential this program has since states have substantial autonomy in deciding the allocation criteria which is key to determining the spatial arrangement of projects and the neighborhoods where projects get built. States are required to develop QAPs—a guiding policy document that lays out the necessary conditions and a competitive scoring system to award tax credits.

For years, LIHTC developments were strategically placed in high-poverty areas. During the 1990s, for the 100 major U.S. metropolitan areas, LIHTC projects were located in high-poverty areas with lower median incomes, lower median home values, and housed a disproportionate share of black residents compared to typical metropolitan neighborhoods (Freeman, 2004). Similarly, Jewell (2005) found that 54 out of 59 LIHTC projects were located in low-income areas designated as QCTs in Austin, Texas, and also noticed similar trends for Cincinnati, St. Louis, Chicago, Seattle, Miami, Baltimore, Cleveland, and Washington, DC. Nationally, a large share of LIHTC developments is located in central cities as Freeman (2004) computed the regional patterns in the location of LIHTC projects, in which the Northeast states had 62.7% of units in the central city, compared to 47.7% in the West; 47.1% in the Midwest; and 44.7% in the South.

In the United States, LIHTC developments are clustered in more densely developed central cities with high poverty rates and lower shares of non-Hispanic whites for the 10 largest metropolitan areas. Moreover, these clusters are located in QCTs and DDAs in most metropolitan areas (Dawkins, 2013). The LIHTC program was also criticized for not providing increased access to affordable units in high-opportunity neighborhoods (Khadduri, 2013;

Khadduri et al., 2006). Furthermore, incentives provided in the QAPs for locating LIHTC development in QCTs or DDAs often induce locational disadvantages since high-poverty areas lack quality neighborhood resources (Williamson et al., 2009).

In its early years, LIHTCs were disproportionally located in low-income, high-poverty, and minority neighborhoods (Dawkins, 2013; Oakley, 2008; O'Neill, 2008), and induced clustering that was instrumental in increasing poverty concentration (Baum-Snow & Marion, 2009; Dawkins, 2013; Ellen et al., 2016; Muralidhara, 2006; Williamson et al., 2009), thereby constricting low-income families from accessing opportunity-rich, high-income, low-poverty, integrated neighborhoods which may organically induce poverty deconcentration (unlike some other affordable housing policies that mandated specific neighborhood socio-economic conditions). McClure et al. (2020) find, in a national study of U.S. metropolitan areas, that about 15% of all LIHTC units and 14% of all projects are placed in HUD-designated Racially/Ethnically Concentrated Areas of Poverty (R/E CAPs) that themselves account for only 4% of all census tracts and house only 8.7% of the population living in poverty. However, McClure & Johnson (2015) argue that LIHTCs are more effective in moving households into low-poverty areas compared to other programs (especially HCVs) and entering high-opportunity neighborhoods, especially in suburban housing markets (McClure, 2006).

Other federal programs aimed at poverty deconcentration, particularly the HCV program which currently assists about 2.5 million households, are often symbiotically dependent on LIHTC projects. As a result, the desired performance of these programs is severely affected when LIHTC units are clustered around high-poverty neighborhoods (McClure et al., 2020; Williamson et al., 2009). It is important to note that a report by HUD on tenant characteristics revealed that

"62 percent of LIHTC households earn 40 percent of AMGI or less, yet federal maximum unit rents are established to be affordable at 50 or 60 percent of AMGI. Various types of rental assistance … partially fill this gap" (HUD, 2019, p. 24). The report also mentioned that a major contributing source for rental assistance in LIHTC units was HCVs, which alone accounted for 29% of rental assistance. The Congressional Budget Office report mentioned that about 40% of households residing in LIHTC units also received some form of direct housing assistance (Congressional Budget Office, 2015). Hence, several housing-assistance programs, and particularly the HCV program—that currently assists about 2.2 million households[38]—can be seen as complementary policies that offer further assistance to the LIHTC program as it alone is unable to address the issues of affordability and cost burden. Since state HFAs create QAPs, Johnson (2015) concluded that often the question of socio-spatial equity is overlooked in the policy design at the regional level. Some recent evidence suggested that QAPs can influence LIHTC siting—and, by extension, poverty deconcentration—in opportunity-rich areas (Ellen et al., 2015; Ellen & Horn, 2018; Johnson, 2013; Walter et al., 2018). It is, thus, imperative that these rental and tenant assistance programs (and LIHTC itself) succeed in breaking the poverty cycle, and more affordable housing is needed in low-poverty, high-opportunity areas, and QAPs can be instrumental in attaining such outcomes.

Research Gaps

Although the LIHTC program has been in operation for the past 30 years, most research examined either the spatial aspect of LIHTC development or associated neighborhood conditions and outcomes. One area of scholarly interest—which I call "the Spatial School"—

[38] See Center for Budget and Policy Priorities Fact Sheets for details.

focused on the spatial pattern of LIHTC development and observed strong clustering of LIHTC units (Dawkins, 2013; Oakley, 2008; O'Neill, 2008), and, furthermore, explored how this clustered location pattern was instrumental in increasing poverty concentration (Baum-Snow & Marion, 2009; Ellen et al., 2009, 2016, 2018; Muralidhara, 2006; Williamson et al., 2009). Another cluster of research—which I term "the Evaluation School"—examined the changes in the neighborhood outcomes, largely in terms of school performance, property value, neighborhood integration, and some socioeconomic indicators (Deng, 2009, 2011; Di & Murdoch, 2013; Shah, 2006). Recently the focus shifted to understanding and operationalizing "neighborhood opportunity" provisions in state QAPs (Ellen & Horn, 2018; Johnson, 2015; Walter et al., 2018) that may enable us to understand the spatial dynamics of opportunities tied to LIHTC developments.

In several ways, this research critically builds on prior research (Ellen et al., 2015; Ellen & Horn, 2018; Johnson, 2013, 2015; Walter et al., 2018) investigating the role of QAPs in poverty deconcentration. These studies provided a strong foundation that helped explore the thematic of poverty deconcentration embedded in QAPs; however, the main objectives of these studies were significantly different. For example, Ellen and colleagues (2015, 2018) explored "location incentives" that influenced LIHTC siting, whereas Johnson (2013) explored "socio-spatial scoring criteria" that encouraged poverty deconcentration. There are at least two essential limitations of these prior studies. First, there is an absence of a comprehensive understanding of changes in QAPs across all criteria (that may influence poverty (de)concentration), as Ellen and Horn (2018) used five incentives whereas Johnson (2013) used seven criteria aimed at their respective objectives. Second, these studies analyzed only a handful of states where Ellen and colleagues (2015, 2018) used 21 states and Johnson (2013) used 50 large MSAs that corresponded to 32 states. On the other hand, in this study, I used 38 (or 79% of contiguous U.S.) states and I employed a hybrid approach that incorporated the data and theory-driven inductive approach (established by the Spatial and the Evaluation schools) and the deductive a priori template of codes used in previous studies. Researchers posited that such a hybrid method is rigorous and crucial in thematic analysis as it allows one to "identify clearly how themes were generated from the raw data to uncover meanings in relation" to the objective of the study (Fereday & Muir-Cochrane, 2006, p. 91). This approach allowed me to derive three themes—*density reduction, disinvestment from low-income areas*, and *access to opportunity areas*—by using 15 QAP criteria, which extended beyond just location incentives in placing LIHTC units in opportunity-areas and socio-spatial criteria of poverty deconcentration.

Additionally, as mentioned above, this research incorporated a larger sample size compared to previous studies. Ellen and Horn (2018) used 21 states and Johnson (2013) used 50 randomly selected large metropolitan areas (corresponding to 32 states) as compared to 38 states (corresponding to 295 metropolitan areas and close to 80% of U.S. contiguous states) in this study. A combination of a larger sample and QAP criteria would significantly increase the reliability and generalizability of the research findings.

Lastly, this study improvised on the methodological aspects of estimating the changes in QAP criteria. Ellen and colleagues (2015, 2018) proposed a framework that did not address the direction of change in QAPs as there was no comparability of scores between the two years (2002 and 2010) in their study. It only suggested a net magnitude of change with a mean level of change near zero. On the other hand, Johnson (2013) developed a scoring method based on comparing percentage values for two themes for the years 2000 and 2010 and used only the scoring-criteria section of QAPs. Contrarily, this study calculated the poverty deconcentration scores for 2005 and 2015 separately, by modifying Ellen and Horn's (2018) framework, which allowed the development of an aggregate index value that measured the degree and direction of change in QAPs toward poverty deconcentration. Ultimately, it allowed me to compare the poverty deconcentration priorities for each state for the two years and to compare the performance thereafter, which further allowed me to design a quasi-experimental analysis that was absent in previous research.

CHAPTER 3
Poverty (De)concentration in QAPs

For low-income people, living in concentrated poverty neighborhoods presents additional structural barriers to accessing opportunities and attaining social and economic upward mobility. Concentrated poverty is often strongly associated with negative neighborhood effects that limit an individual's chances of accessing resources and attaining upward mobility (Sampson, 2008; Sampson et al., 2002). While the effectiveness of people vs. place-based strategies of poverty deconcentration is still debated (Galster, 2017), some evidence suggests that deconcentration efforts yield better education and economic outcomes (Chetty et al., 2016; Ludwig et al., 2012). For poverty deconcentration strategies to perform effectively, it is critical for low-income individuals to have access to affordable housing in desirable neighborhoods (McClure, 2008).

Since the location of a proposed LIHTC development is crucial in determining its potential to be awarded tax credits, Qualified Allocation Plans (QAPs) can be expected to shape the extent to which LIHTC developments concentrate in low-poverty, high-income, and opportunity-rich areas as opposed to those characterized by concentrated poverty. QAPs are state-developed documents mandated by the federal government, which use criteria and point systems to award tax credits to competing projects. In this research, I examine both whether and how states shifted the criteria elaborated in QAPs toward prioritizing poverty (de)concentration between 2005 and 2015.

This study is, in part, an extension of an earlier study of changes only in location incentives for QAPS by Ellen and Horn (2018) as I examine, further, the changes specific to poverty deconcentration priorities. More importantly, this study is a novel attempt to 1) identify and thematically organize QAP criteria for poverty deconcentration; 2) create an index for poverty deconcentration measures, and 3) detect patterns that states have adopted for poverty (de)concentration and classify states based on these patterns.

Previous research by Ellen and colleagues (2015, 2018) shed light on the role of only five QAP criteria (high opportunity areas, access to amenities, community approval, investment in blighted areas, and avoidance of affordable-housing concentration) in promoting LIHTC siting in opportunity-rich neighborhoods. Moreover, previous studies fell short of revealing the overall direction in which state QAPs and, consequently, state affordable housing policy priorities were changing. In particular, the "Aggregate Change Index" (Ellen & Horn, 2018) that measured the provision of opportunity areas in QAPs took on an average value across 21 states that was very close to zero (.85), suggesting that states are roughly equally likely to incentivize opportunity areas as they were to not discourage the same. Although previous research focuses on the shifting of locational opportunity priorities in QAPs, they only tangentially inform scholars and policy makers how QAPs can promote poverty deconcentration. Thus, in this research, using a larger sample of 38 U.S. states and a more in-depth analysis of 15 QAP criteria, I aim to 1) thematically organize QAP criteria to understand the ways poverty deconcentration is promoted in QAPs; 2) create an index for poverty deconcentration that allows us to identify the shift in the directions states have adopted towards the deconcentration effort, and 3) detect the patterns of deconcentration (using the poverty deconcentration index) and classify states to understand their performance in deconcentrating poverty by prioritizing certain QAP criteria.

For this research, first, I employed content analysis for QAPs for 38 states and identified three themes—*density reduction, disinvestment from low-income areas, and access to opportunity areas*—based on 12 score-based QAP criteria intended for poverty deconcentration. The thematic scheme not only allows us to identify which set of criteria dominated the inner workings of poverty deconcentration goals, but it also informs us about the institutional shift in achieving these goals. By using a coding process, I developed a poverty deconcentration index that measures the aggregate-level change in deconcentration criteria along with the degree and direction of change (for example, from concentration to deconcentration between 2005 and 2015). The index also allows the classification of states into three categories: *advancing poverty deconcentration (APD)*, *prioritizing poverty deconcentration (PPD)*, and *deprioritizing poverty deconcentration (DPD),* based on the patterns (degree and direction of change) of (de)prioritizing poverty deconcentration criteria. This exploratory analysis finds that there were significant variations among states in terms of the degree and direction to which deconcentration efforts were prioritized and the patterns associated with these efforts.

Qualified Allocation Plan and its Components

A Qualified Allocation Plan (QAP) is a federally mandated document that a state develops to guide the LIHTC award process. The 26 USC § 42 (m)(1)(B) of 1986[39] defines QAP as–

(i) which sets forth selection criteria to be used to determine housing priorities of the housing credit agency, which are appropriate to local conditions,

[39] The electronic version of the U.S. Code was accessed from Legal Information Institute at Cornell Law School. For the specific code referenced above, see the webpage here.

(ii) which also gives preference in allocating housing credit dollar amounts among selected projects to—

(I) projects serving the lowest income tenants,

(II) projects obligated to serve qualified tenants for the longest periods, and

(III) projects which are located in qualified census tracts (as defined in subsection (d)(5)(B)(ii)) and the development of which contributes to a concerted community revitalization plan, and

(iii) which provides a procedure that the agency (or an agent or other private contractor of such agency) will follow in monitoring for noncompliance with the provisions of this section and in notifying the Internal Revenue Service of such noncompliance which such agency becomes aware of and in monitoring for noncompliance with habitability standards through regular site visits.

These are considered the minimum requirements and often states establish detailed QAPs based on local housing needs. Although QAPs vary from state to state, certain components of QAPs (besides the mandated ones) remain static. Most states use set-aside, threshold, and selection criteria as part of the evaluation process for competing projects in addition to legal, financial, and award cycle-related information. States sometimes explicitly mention their housing priorities which normally get reflected in the selection criteria.

Set Aside Criteria

Among the major components, a set-aside is a tool for sorting comparable applications that may be in the form of a percent to a state's per-capita ceiling, any specific dollar amount, or capping the number of awards for different types of developments. Most states use a combination of geographic (e.g., rural, large metro, tribal land), development type (e.g., preservation, elderly, supportive housing), and community type (e.g., HUD Choice Neighborhood) set-aside along with a minimum of 10% or equivalent designated to Non-Profit developers.

Threshold Criteria

The threshold criteria are the minimum eligibility benchmark established by the 26 USC § 42 (m)(1)(A) where a) LIHTC must be allocated pursuant to a QAP prepared by an HFA and approved by the state government; b) a notification to the local jurisdiction about the development of a project with a reasonable opportunity to comment; and c) a comprehensive market study conducted by a disinterested third party at the developer's expense of housing needs of low-income individuals in the area to be served by the project. In many cases, states implement additional threshold requirements such as design features, site control by developers, zoning approval, maximum development cost, etc., to ensure and enforce a basic standard for all developments.

Selection Criteria

The third component, i.e., selection criteria, is perhaps the most important section of a QAP in deciding the award allocation as it is established with a numerical scoring system for most states. The 26 USC § 42 (m)(1)(C) requires a QAP to must include ten selection criteria: (1) project location; (2) housing needs characteristics; (3) project characteristics, including whether a project includes the use of existing housing as part of a community revitalization plan; (4) sponsor characteristics; (5) tenant characteristics with special housing needs; (6) public housing waiting list; (7) tenant populations of individuals with children; (8) projects intended for eventual tenant ownership; (9) energy efficiency; and (10) historic nature. While the Code dictates simply to include these ten items in the QAP, HFAs have the authority to add more criteria and provide incentives to those that align with the stated housing priorities and/or the market needs. Often states configure criteria to advance certain objectives in such a way that requires incentivizing a state-devised criterion while directly disincentivizing one or more federally required criteria. For example, federal incentives for locating projects in QCTs have been under scrutiny for concentrating projects in low-income areas. This study finds that almost all states have disincentivized this criterion to promote deconcentration of projects.

Similar to incentivizing LIHTC developments in QCTs and DDAs, other components—some are the U.S. Code mandated, some are state required—too may have contributed to the concentration of projects in low-income areas that exacerbated the geographic concentration of LIHTC units in low-income, high-poverty areas. Since HFAs create QAPs, Johnson (2015) concluded that often the question of socio-spatial equity is overlooked in the policy design at the regional level. QAPs are, therefore, considered an essential policy tool according to Ellen and Horn (2018, p. 739) as they maintain that:

> allocation plans matter. We find statistically significant relationships between changes in state allocation plans and the locations of privately owned housing developments allocated tax credits, despite our small sample size. In general, states that increased the priority given to developments in higher opportunity areas in their allocation plans saw increases in the share of tax credits allocated for projects in low-poverty areas and decreases in the share of tax credits allocated for projects in largely minority areas.

Therefore, this research is a timely update and exploration of the state of poverty deconcentration priorities in state QAPs and examines the progress and effectiveness of the shifting priorities on the siting of LIHTC units.

Methodology

Sample Selection of States and QAPs

The sampling of states, for which QAPs are analyzed, followed a three-stage process. The first stage involved examining whether a state developed QAPs for 2005 and 2015 and whether these documents were made available publicly (or upon request). The second stage assessed whether QAPs were available for a state that has more than one agency for allocating tax credits and all of which made changes in their QAPs. The third stage involved checking whether QAPs of a particular state have consistently used a point-based scoring system for the allocation criteria (for example, South Carolina did not use a point-based system to evaluate applications).

Table 1: *Regional Distribution of the 38 Selected States*

Region	States	Percent of Sampled States in the Region
Northeast	Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania	67
Midwest	Indiana, Iowa, Kansas, Michigan, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin	75
West	Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Washington, Wyoming	77
South	Alabama, Arkansas, Delaware, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Oklahoma, Tennessee, Texas, Virginia, West Virginia	76
All		79

Source: Author's tabulation

Finally, 38 states were included in this study that broadly represents the entire contiguous U.S. Per the selection criteria, 10 states were excluded from this research. From the first stage of sampling, Oregon, Rhode Island, and Vermont were excluded as QAPs for these states could not be obtained from the respective HFAs upon request. Illinois, Minnesota, and New York were excluded in the second stage as these states have more than one HFAs that administer QAPs (for example, City of Chicago creates QAPs to award LIHTC within the city's jurisdiction) and QAPs could not be obtained from at least one of these HFAs, state or local.

Finally, Florida, Missouri, North, and South Carolina were excluded on the non-comparability grounds. Florida introduced different development types and county-specific QAPs since 2011 that were not comparable with the 2005 QAP. Missouri and South Carolina did not use any point system in their 2005 QAPs. For North Carolina, omission or non-comparable criteria induced inconsistency in the evaluation process (see Appendix B).

Data Source for QAPs

The Affordable Housing Resource Center of Novogradac hosts an online database of state QAPs. This database was the primary source of QAPs for the sampled states for 2005 and 2015. In cases where QAPs were missing, state HFAs were contacted (with two follow-ups) to provide these documents. As mentioned earlier, states were excluded from the sample if they did not make their QAPs available to the public or on Novogradac's website or did not respond to the request for the document.

Content Analysis

Following the process of sampling, QAPs for each state for the years 2005 and 2015 were then analyzed using MaxQDA software. By employing content analysis, themes for poverty deconcentration were derived— both inductively and deductively. Content analysis seems befitting as a tool for this study since Policy Design Theory posits that a systemic evaluation of policy content allows the unfolding of the multidimensional nature of policy (Schneider &

Sidney, 2009). Furthermore, content analysis is considered a rich and meaningful technique for "its reliance on coding and categorizing of the data" (Stemler, 2000, p. 2) that helps thematically organize policy documents. Content analysis allowed for a more in-depth examination of 12 score-based criteria and three non-score-based criteria in relation to the changes in the poverty deconcentration goals in QAPs (see Appendix C for the codebook).

Coding the QAP Changes

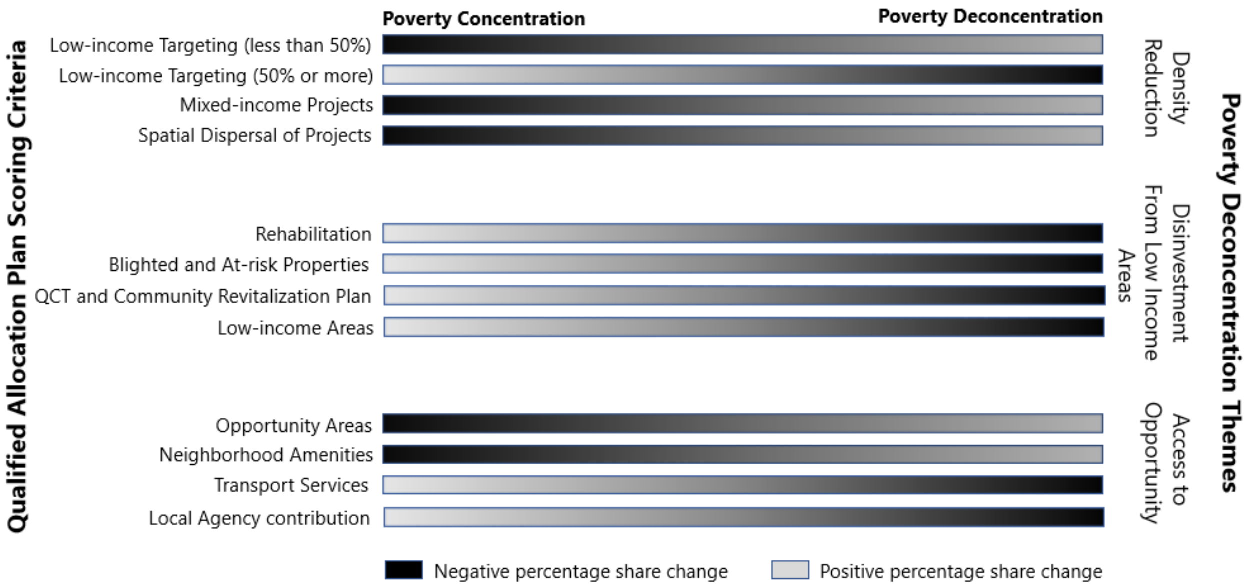
Modifying the coding framework developed by Ellen and colleagues (2015, 2018), I calculated the Aggregate Poverty Deconcentration Index (APDI) for each state that measured the overall prioritization of poverty deconcentration. First, for the score-based section, I calculated the percentage share of each of the 12 criteria to the respective total points available in the QAPs for both 2005 and 2015. Further, the percentage share for each criterion was coded based on the same framework where minimal positive changes (less than 10%) equal to 1; moderate changes (10.1-20%) to 2; significant changes (20.1-30%) to 3; and, major changes (more than 30%) to 4, while negative changes corresponded to negative values (i.e., -1, -3 etc.).[40] Figure 3 represents the association between the percentage share difference and the expected outcome in terms of poverty (de)concentration.

For example, if there is a positive percentage share difference observed for the Spatial Dispersal of Projects criterion, it is expected to lead to poverty deconcentration whereas, a positive difference for Low-income Areas would expectedly lead to poverty concentration. Wisconsin, for instance, awarded 15 points (3.41% to total points) toward the QCT criterion in

[40] I also conducted a sensitivity analysis by using 0-5% as 1, 5.1-10% as 2 and >10% as 3, and the results remained largely unchanged.

2005, and 5 points (1.22%) in 2015 which amounts to a -2.19 percentage-points difference and coded as -1 which is expected to lead to poverty deconcentration.

Figure 3: *Themes and Scoring Criteria in QAPs*



Source: Author

For the non-score-based section of a QAP, I calculated any set-aside condition with +/-1 depending on whether these conditions were expected to lead to deconcentration or concentration to determine the criterion—Set Aside. For 2005 QAPs, this is only applicable when states have used any set-aside conditions that were not mandated by the IRS. For example, Michigan used a distress area set-aside in 2005, which led to a -1 point reduction for the state due to its expected effect on discouraging poverty deconcentration. In 2015, Wisconsin reduced the percentage set-aside in preservation projects and included high-impact project criteria in the set-aside section, leading to 2 additional points in this category as these changes were deemed as potential poverty deconcentration efforts. The Basis Boost criterion was coded only for 2015 (since in 2005 every state used basis boost to promote LIHTC developments in

QCT/DDA), where states were coded as 1 for awarding basis boost to non-QCT areas, or 0 for not awarding. Similarly, Item Change criterion, too, was codable only for 2015 where +/-1 was used for each addition or removal of a score-based criterion that was intended to lead to poverty deconcentration or otherwise. For instance, Wisconsin received 1 point for providing the basis boost to non-QCT/DDA developments in 2015, and for item change, only the neighborhood services criterion was dropped in 2015 and this resulted in -1 in this category which corresponds to poverty concentration. Ultimately, I have 13 and 15 coded values for each state for the years 2005 and 2015 (see Appendix D and E).

Aggregate Poverty Deconcentration Index

With these coded values I created the Poverty Deconcentration Score (PDS) and Poverty Concentration Score (PCS) for 2005 for each state.

$$PDS_{i05} = LT_{05} + MP_{05} + SD_{05} + OA_{05} + NA_{05} + SA_{05} \qquad [1]$$

where, PDS_{i05} is the Poverty Deconcentration Score for state *i* for the year 2005; LT_{05} is the coded value for less than 50% of units set aside for low-income families; MP_{05} is the coded value for mixed-income projects; SD_{05} is the coded value for spatial dispersal of projects; OA_{05} is the coded value for opportunity area; NA_{05} is the coded value for neighborhood amenities; and SA_{05} is the coded value for set-asides.

$$PCS_{i05} = LTm_{05} + RH_{05} + BP_{05} + QCT_{05} + LA_{05} + TS_{05} + LC_{05} \qquad [2]$$

where, PCS_{i05} is the Poverty Concentration Score for state *i* for the year 2005; LTm_{05} is the coded value for more than 50% of units set aside for low-income families; RH_{05} is the coded value for rehabilitation projects, BP_{05} is the coded value for blighted and at-risk properties; QCT_{05} is the coded value for Qualified Census Tracts and community revitalization plan; LA_{05} is the coded value for low-income areas; TS_{05} is the coded value for transit services; and LC_{05} is the coded value for local government or community contribution or engagement.

For 2015, similar processes were followed and shown in the following equations.

$$PDS_{i15} = LT_{15} + MP_{15} + SD_{15} + OA_{15} + NA_{15} + SA_{15} + BB_{15} + IC_{15} \quad [3]$$

where, PDS_{i15} is the Poverty Deconcentration Score for state *i* for the year 2015; BB_{15} is the coded value for basis boost and IC_{15} is the coded value for Item Change.

$$PCS_{i15} = LTm_{15} + RH_{15} + DP_{15} + QCT_{15} + LA_{15} + TS_{15} + LC_{15} \quad [4]$$

where, PCS_{i15} is the Poverty Deconcentration Score for state *i* for the year 2015. Furthermore, two measures were created to calculate the changes in the net poverty deconcentration.

$$NPDS_{i05} = PDS_{i05} - PCS_{i05} \quad [5]$$
$$NPDS_{i15} = PDS_{i15} - PCS_{i15} \quad [6]$$

where, $NPDS_{i05}$ is the Net Poverty Deconcentration Score for state *i,* and for the year 2005 $NPDS_{i15}$ is the Net Poverty Deconcentration Score for state *i* for the year 2015. Finally, by subtracting the two net scores, I calculated the Aggregate Poverty Deconcentration Index (APDI).

$$APDI_{i} = NPDS_{i15} - NPDS_{i05} \quad [7]$$

where, $APDI_i$ is the aggregate poverty deconcentration index for state i that measures the overall shift in prioritizing poverty deconcentration for any state between 2005 and 2015 where a positive APDI score indicates prioritization of poverty deconcentration and vice-versa. Table 2 presents the NPDS and the APDI scores.

Table 2: *Aggregate Poverty Deconcentration Index*

State	$NPDS_{05}$	$NPDS_{15}$	APDI	State	$NPDS_{05}$	$NPDS_{15}$	APDI
Alabama	-3	6	9	Montana	-6	0	6
Arizona	-4	2	6	Nebraska	-2	4	6
Arkansas	-2	-2	0	Nevada	-3	2	5
California	2	-7	-9	New Hampshire	-3	1	4
Colorado	-7	-4	3	New Jersey	-1	-1	0
Connecticut	0	-5	-5	New Mexico	1	-2	-3
Delaware	-3	3	6	North Dakota	-8	-3	5
Georgia	0	3	3	Ohio	-9	3	12
Idaho	0	6	6	Oklahoma	-4	4	8
Indiana	-2	1	3	Pennsylvania	-2	-4	-2
Iowa	-4	6	10	South Dakota	0	-1	-1
Kansas	-1	-6	-5	Tennessee	-5	-2	3
Kentucky	-3	-1	2	Texas	-6	0	6
Louisiana	-2	1	3	Utah	-1	1	2
Maine	-7	3	10	Virginia	-4	1	5
Maryland	1	1	0	Washington	-6	3	9
Massachusetts	-3	1	4	West Virginia	-2	2	4
Michigan	-5	3	8	Wisconsin	-3	0	3
Mississippi	-3	-3	0	Wyoming	0	7	7

Source: Author's calculation

Note: $NPDS_{15}$=Net Poverty Deconcentration Score for 2015.

$NPDS_{05}$=Net Poverty Deconcentration Score for 2005.

APDI= Aggregate Poverty Deconcentration Index.

Index Validation

It is imperative to consider two important aspects of the entire process of constructing the APDI. The first concern is the qualitative coding of QAP criteria to develop the three themes. Since QAPs do not follow any standard policy language format, there may be possibilities of disagreement in terms of determining and identifying the criteria. Moreover, content analysis has been subject to criticism pertaining to the reliability aspect. To address both issues, I performed Inter-Rater Reliability (IRR) test—a statistical measure for reliability (Hallgren, 2012) where the aim is to test the degree of agreement in coding between two or more coders. Two independent coders, well-versed in policy research, were provided with a codebook (containing the meaning of each criterion) and nine randomly selected QAP documents each for coding on MaxQDA to test the degree of agreement on the meaning of the criterion. I combined these two sets of documents from the two coders to compute the Kappa value of 0.94 for 18 documents comprising 671 coded segments (see Appendix F and G), which is considered an excellent level of agreement (Gisev et al., 2013).

The second is the measurement issue of the index for the internal consistency of the indicators (the QAP criteria) to effectively capture the construct or the latent variable. The APDI can be interpreted as a construct and PDS and PCS are the two latent variables that directly measure the construct. Hence, I used confirmatory factor analysis (CFA) as it is "an indispensable analytic tool for construct validation" (Brown, 2015) on the latent variables which together constitute the APDI. CFA is commonly used in quantitative research, but recent studies have demonstrated its effectiveness in qualitative research as well. CFA can be applied to confirm the fit of a hypothesized model to the data, which can be useful in validating themes and codes identified in a qualitative analysis. According to Byrne (2016), CFA can be used in qualitative research to assess the validity of a conceptual model, such as themes and sub-themes identified in a qualitative analysis.

The results from the CFA suggest (see Appendix H) that the internal consistency of indicators holds true as it reported the Comparative Fit Index (CFI) as 0.981; Tucker-Lewis Index (TLI) as 0.978; and 0.014 is the Root Mean Square Error of Approximation (RMSEA) value. These values suggest that the model is a good fit since all the values satisfy the standard threshold guidelines. Studies reported CFI and TLI greater than 0.95 and RMSEA smaller than 0.06 as standard thresholds (Brown, 2015; Hu & Bentler, 1999).

Typology of States

Based on the APDI, and other components ($NPDS_{15}$ and $NPDS_{05}$) that led to the calculation of the APDI, I developed a typology of states which captures the trajectory of changes in poverty (de)concentration priorities in state QAPs. Developing this typology not only enabled a refined understanding of which direction states have moved concerning poverty deconcentration, but it also allowed us to explore the degree to which states have prioritized poverty (de)concentration. Additionally, this classification scheme was informed by the changes in the QAP criteria between 2005 and 2015, which further helped in identifying which criterion or set of criteria are instrumental in promoting poverty (de)concentration. Furthermore, a significant contribution of this typology was to inform a strategic change in the policy regime where around 75% of sampled states (or 56% of all states, and 59 of all states in contiguous U.S.) prioritized poverty deconcentration—a major departure from the prevailing policy regime during the first two decades of LIHTC's existence.

Typology Validation: K-means Clustering

As mentioned above, the typology of states was derived based on manual scrutiny of the APDI and the NPDS values from 2005 and 2015. As an alternative, I employed K-means clustering, an unsupervised machine-learning algorithm, to classify states into clusters, based on the index values. The algorithm starts by randomly selecting K centroids (representative points) from the dataset. Then, each data point is assigned to the nearest centroid based on the distance between them. After assigning all data points to their nearest centroid, the centroids are recalculated as the mean of all the data points assigned to it. This process is repeated until convergence (i.e., until the centroids stop moving significantly or a maximum number of iterations) is reached. The main objective of the K-means algorithm is to minimize the sum of the squared distances between the data points and their assigned centroid. The algorithm aims to find the optimal centroids that result in the lowest within-cluster sum of squares (WCSS) and the highest between-cluster sum of squares (BCSS) (Wu, 2012). The main purpose of using this clustering method was to ascertain the validity of the manual classification, or in other words, how well the latter identified the cluster of states vis-à-vis a machine learning algorithm.

Results and Discussion

Previous studies that have used content analysis to identify location incentives and socio-spatial criteria in QAPs (Ellen et al., 2015; Ellen & Horn, 2018; Johnson, 2013, 2015), informed the current research regarding the selecting criteria in QAPs. However, since the focus of this research is different from the previous ones—as it specifically explores the poverty deconcentration themes—an inductive approach was also used while developing the themes for poverty deconcentration.

Previous studies, that have used content analysis, examined a narrow range of categories and QAP criteria with problematic operationalization of certain criteria. However, as pioneering research on QAPs, these studies lay the foundation for a potential deductive approach that involves pre-existing theoretical and conceptual frameworks to guide creating codes and themes (Hsieh & Shannon, 2005). This study builds on previous research by incorporating an inductive approach which allowed finding additional criteria, patterns, and theme that emerged through the coding process (Elo & Kyngäs, 2008; Fereday & Muir-Cochrane, 2006b; Thomas, 2006). Since the research question is exploratory in nature, using a combination of deductive and inductive approaches allowed for a data-driven, as well as theory-informed, systematic identification of QAP criteria that revealed themes hitherto unexplored (Braun & Clarke, 2006; Nowell et al., 2017).

Poverty Deconcentration Themes: Content Analysis for QAPs

There were two main sections in a QAP where poverty deconcentration priorities were laid out: score-based (i.e., have a point system) and non-score-based. The score-based section was associated with the selection criteria with a certain point system for evaluating tax-credit awards. The non-score-based section did not have any point system associated. Following Ellen and Horn (2018), I separately coded the non-score-based section to generate quantifiable data to calculate the APDI. For the score-based portion of each QAP, I analyzed each criterion and note the points allocated for 2005 and 2015. A total of 76 QAP documents for the selected states for 2005 and 2015 were coded for 12 criteria that—positively or negatively—relate to poverty deconcentration. Furthermore, a systematic evaluation of these criteria unfolded three salient themes contributing to poverty deconcentration: *density reduction, disinvestment in low-income areas,* and *access to opportunity*. The following section elaborates on these three themes, which I refer to as poverty deconcentration themes.

Density Reduction

Density reduction is often approached as either reduction in the concentration of low-income people in a project or a reduction in the spatial concentration of projects. By establishing a maximum percentage of set-aside units for families below the 50% AMGI (low-income targeting), or by encouraging mixed-income development, QAPs encouraged a controlled distribution of low-income families within a project. For example, Louisiana adopted a penalty system where beyond a maximum of 40% of units set aside for low-income renters, one point will be deducted for each additional 10 percent increase in set aside units.

The other process involved spatially dispersing projects, especially concerning other affordable housing projects. The 2015 Idaho QAP awarded two points for developments "located in a municipality that has not received a Low-Income Housing Tax Credit ("LIHTC") award for the creation of new rental units in the past six (6) LIHTC application rounds" (Idaho Housing and Finance Association, 2015). Since the LIHTC siting pattern has been criticized for clustering in high-poverty, high-minority neighborhoods (Oakley, 2008), a dispersal effort would alter that trend by incentivizing developments in low-poverty areas (Ellen et al., 2015; Ellen & Horn, 2018).

In the QAPs, I found four criteria (Low-income targeting (less than 50%), Low-income targeting (50% or more), Mixed-income projects, and Spatial dispersal of projects) that are closely associated with the density reduction theme. Except for the second criterion, prioritizing the other three is expected to have a positive relationship with poverty deconcentration. Therefore, in-situ or geographic density reduction strategies may closely be associated with encouraging poverty deconcentration. Table 3 presents the changes in using all these criteria between the two years.

Disinvestment from Low-Income Areas

QAP scoring criteria for many states in 2005 put a higher emphasis on investing in low-income areas by allotting points for QCTs, community revitalization plans, and rehabilitation projects. As Ellen and colleagues (2015, 2018) noted, prioritizing such criteria may incentivize more LIHTC production in high-poverty areas. In 2015, however, a trend in prioritizing disinvestment from low-income areas has been observed. Iowa, for example, in 2005 awarded 20 points for developments located in QCTs, which was omitted from the 2015 scoring system, allowing only the IRS-mandated basis boost to incentivize developments in QCTs. Similar to reducing the importance of QCTs, states have also discouraged developments in other low-income areas, rehabilitation projects, and revitalization of distressed properties by reducing points in the scoring criteria.

Table 3: *Changes in using QAP criteria between 2005 and 2015*

Themes and Criteria in QAPs	Number of States			Percent of States		
	2005	2015	Change	2005	2015	Change
Density Reduction						
Low-income Targeting (less than 50%) [a]	9	17	8	23.68	44.74	21.05
Low-income Targeting (50% or more)	16	6	-10	42.11	15.79	-26.32
Mixed-income Projects [a]	21	17	-4	55.26	44.74	-10.53
Spatial Dispersal of Projects [a]	11	14	3	28.95	36.84	7.89
Disinvestment from Low-income Areas						
Rehabilitation	30	23	-7	78.95	60.53	-18.42
Blighted and At-risk Properties	9	14	5	23.68	36.84	13.16
QCT and Community Revitalization Plan	37	30	-7	97.37	78.95	-18.42
Low-income Areas	15	10	-5	39.47	26.32	-13.16
Access to Opportunity Areas						
Opportunity Areas [a]	17	30	13	44.74	78.95	34.21
Neighborhood Amenities [a]	20	24	4	52.63	63.16	10.53
Transport Services	10	23	13	26.32	60.53	34.21
Local Agency Contribution	23	26	3	60.53	68.42	7.89

Source: Author's calculation

Note. [a] Indicates QAP criteria that are expected to be positively associated with poverty deconcentration.

Besides QCTs, low-income area was used as another criterion under this theme. States have operationalized this criterion in myriad ways. However, all these measures generally indicated areas of economic distress. Montana's 2005 QAP allotted seven points for this criterion and operationalized low-income areas as:

> Developments located in a community identified as distressed or hard-to-develop areas. Please note this is not the same as IRS or HUD identified areas. To receive credit for this, the city, county, or local PHA must have identified within its "housing plan" that a specific areas [*sic*] has been deemed a "distressed" or "hard-to-develop" area. (Montana Board of Housing, 2005, p. 20)

Other indications of low-income areas constituted income levels lower than the state average or specification of counties (low-income counties as per the State Consolidated Plan for Arkansas in 2015), other designated areas (Colonia for Texas in 2005), or certain socioeconomic conditions (percent of rent-burdened households for West Virginia in 2015). This study assessed four criteria (Rehabilitation, Blighted and At-risk properties, QCT and Community Revitalization Plan, and Low-income Areas) that were expected to be negatively associated with poverty deconcentration, if prioritized.

Access to Opportunity

Between 2005 and 2015, many states incorporated strong measures for increasing LIHTC development in opportunity-rich areas. While states have diversely operationalized the concept of opportunity, the overarching notion has been to enable access to low-poverty, high-income areas, and/or deliver a set of resources to residents that would encourage socio-economic mobility. Delaware, in 2015, introduced a new criterion with 10 points to encourage developments in opportunity areas as their QAP document noted:

> In order to balance housing investments and encourage the creation of affordable housing opportunities within the State of Delaware in areas that contain little or no affordable housing, but which may offer economic opportunity, proximity to the workplace, additional school choices, or supportive infrastructure, ten (10) points will be awarded to developments that are in Areas of Opportunity. (Delaware State Housing Authority, 2015, p. 40)

Similarly, other states have used economic growth (Maryland), job opportunities (Indiana, Maine, and Wisconsin), quality education and school performance (Indiana and Georgia), lower poverty rates (Georgia, Massachusetts, and Virginia), high-income neighborhoods (Ohio and Texas) or high owner-occupied neighborhoods (West Virginia) as indicators of opportunity.

This theme also includes neighborhood services as a criterion for poverty deconcentration. States have prioritized neighborhood services such as access to several amenities including parks, libraries, retail and grocery stores, medical services, pharmacy, financial institutions, civic or community centers, elementary schools, etc. to be within a close proximity to a project. This list of services includes many items beyond the bare minimum necessities and indicates, at times, the quality and standard of the services. Especially in relation to schools, levels (K-12 etc.,) and performance are often considered. Kentucky, for instance, awarded 20 points in this newly introduced criterion in 2015 and stated that:

> *Projects eligible for points in this category are located in an area that is within close proximity to destinations that are* ***important to the course of daily living****, which includes a grocery store, public school (if a family project), pharmacy, bank or credit union, post office, retail store, general health care practitioner's office (not specialist), public library, a*

hospital or significant places of employment. (Kentucky Housing Corporation, 2015, p. 9, italics and bold in original)

Furthermore, for urban areas, many QAPs require these amenities to be within a half-mile distance for projects to receive points under this category. Amenities are factored in for home price determination (Yinger, 2014), therefore, greater access to these amenities is observed in higher-income areas (Black & Machin, 2011) and hence, prioritizing this criterion is expected to encourage poverty deconcentration by enabling access to amenities associated with areas of opportunity.

Contrarily, access to transit has a positive relationship with poverty (Glaeser et al., 2008; Kramer, 2018; Wang & Woo, 2017), such that emphasizing transit would attract more LIHTC development in high-poverty and minority areas. As Wang & Woo (2017) noted, for Atlanta, "poverty was a significant factor associated with high transit ridership" (p. 194) and other studies have also documented that access to transit is often associated with greater density and lower incomes. Although Ellen and Horn (2018) maintained that the transit access criterion may encourage LIHTC development in low-income areas, the association between their aggregate opportunity index measure and the location outcomes of LIHTCs remained unchanged with or without this criterion, thereby leading to an ambiguity in determining the impact of this criterion on the index. To resolve this issue, based on previous findings (see Glaeser et al., 2008; Wang & Woo, 2017), I coded transit access as a criterion that is negatively associated with poverty deconcentration, when prioritized. This study finds that a significant number of states (including the ones with high APDI value) have prioritized this criterion between 2005 and 2015, but the degree of change remained small (less than 5% increase).

The final criterion in this theme includes the willingness of local government agencies and communities to host LIHTC developments. As per the federal statute requirement, applicants are obligated to notify the local government about a proposed project. Often, HFAs incentivized developers who can obtain local government and community support for a project, financially or otherwise. Ohio, in 2015, awarded 10 points for a comprehensive community outreach plan in addition to the existing local governmental support and contribution. In many cases, direct financial contribution from local governments was prioritized. Scholars have noted that multifamily rental development proposals generally face pushback from high-income areas (Payton Scally, 2012; Schuetz, 2009; Trounstine, 2021), and therefore, these areas are not conducive to LIHTC developments. On the other hand, local governments of low-income areas may see LIHTC development as a potential economic development strategy (Wardrip et al., 2011) and fulfill the necessary financial preconditions for hosting a development. Thus, this criterion is expected to have a negative association with poverty deconcentration efforts.

In short, this study found that in 2015 more states used QAP criteria that are positively associated with poverty deconcentration. Four out of five criteria that are positively related to poverty deconcentration have seen an increase in terms of the number of states using those in their 2015 QAPs (see Table 3 above). More importantly, compared to the 2005 QAPs there was a decline in the number of states using criteria that are negatively associated with poverty deconcentration. This suggests that states have disincentivized the score-based criteria that were expected to be negatively associated with poverty deconcentration between 2005 and 2015.

The other part of a QAP—the non-score-based section—was not factored directly into developing the poverty deconcentration themes as these do not have a points system to track changes in prioritizing deconcentration. The non-score-based section includes three criteria: set-aside, basis boost, and item change (derived from the score-based section). Set-aside criterion allows reservation of allocation amount directed towards specific types of construction (preservation, new construction), agencies (private developers or non-profits), or geographies (rural, small city). I documented changes in set-aside that may lead to poverty deconcentration or concentration. For instance, Tennessee added a QCT set-aside in 2015 that was expected to encourage LIHTC development in high-poverty areas, whereas Wisconsin introduced a high-impact project reservation criterion that may encourage building LIHTCs in opportunity-rich areas.

Similarly, the basis boost criterion allows developers to gain additional financial incentives for developing in areas that are otherwise not financially feasible. Basis boost is an IRS-mandated criterion that allows an additional 30% increase in tax-credits if a developer proposes LIHTC development in QCTs or DDA. However, following the 2008 Housing and Economic Recovery Act, states became eligible to provide a 30% basis boost to projects that are not located in QCT/DDA areas. Most states have allowed this basis boost to be integral to project development in areas that are opportunity-rich, yet not penetrable due to high development costs. Hence, using this criterion may encourage LIHTC developments in high-income areas, thereby deconcentrating poverty.

The 12 score-based criteria were not consistently used for both years. By tracking the changes (addition or deletion of a criterion) a third non-score-based criterion—item change—

was created. This study noted that many states dropped criteria leading to poverty concentration between 2005 and 2015 while adding new criteria that potentially led to poverty deconcentration. Oklahoma, for example, added low-income targeting (<50%) and opportunity area and dropped local government contribution in the 2015 QAP and it, thus, received 3 points in this category.

Changes in Poverty Deconcentration Criteria

The key focus of this study is to understand whether states have adopted strategies toward deconcentrating LIHTC projects, thereby enabling poverty deconcentration. The content analysis revealed 12 score-based criteria classified under three themes and three non-score-based criteria that, together, can assess the degree of prioritization of poverty deconcentration. Nearly 75% of sample states (i.e., 28 out of 38) have prioritized poverty deconcentration where the APDI records a positive value. Using the MaxQDA 2022 software, I created code clouds for the years 2005 and 2015 (see Figure 4) with the 12 criteria for a visual understanding of the frequency of those criteria as appeared in the QAPs.

Figure 4: *Code Clouds for 2005 and 2015*

Source: MaxQDA Software

Clearly, the poverty deconcentration criteria (in light grey) have less visual significance for the 2005 code cloud as opposed to the poverty concentration criteria (in dark grey). In 2015, poverty deconcentration criteria rose to significance, whereas some poverty concentration criteria declined, thereby implying a shift towards prioritizing poverty deconcentration goals. With a larger sample size and significantly more QAP criteria, this study found that states have made significant leaps towards prioritizing poverty deconcentration. This, in part, also supports Ellen and Horn's (2018) findings that states have prioritized LIHTC developments in opportunity-rich areas as seen in the figure where all positive indicators from the access to opportunity theme have greater visibility (in other words, higher frequency of occurrence).

Moreover, this pictorial depiction allows visualizing the changes in the QAP criteria over 10 years which reveals that density reduction and access to opportunity areas were prioritized while investment in low-income areas was deprioritized. Specifically, it allows us to see that there has been a pronounced shift in the prevailing ideology and policy goals in the affordable housing sector.

Typology of States

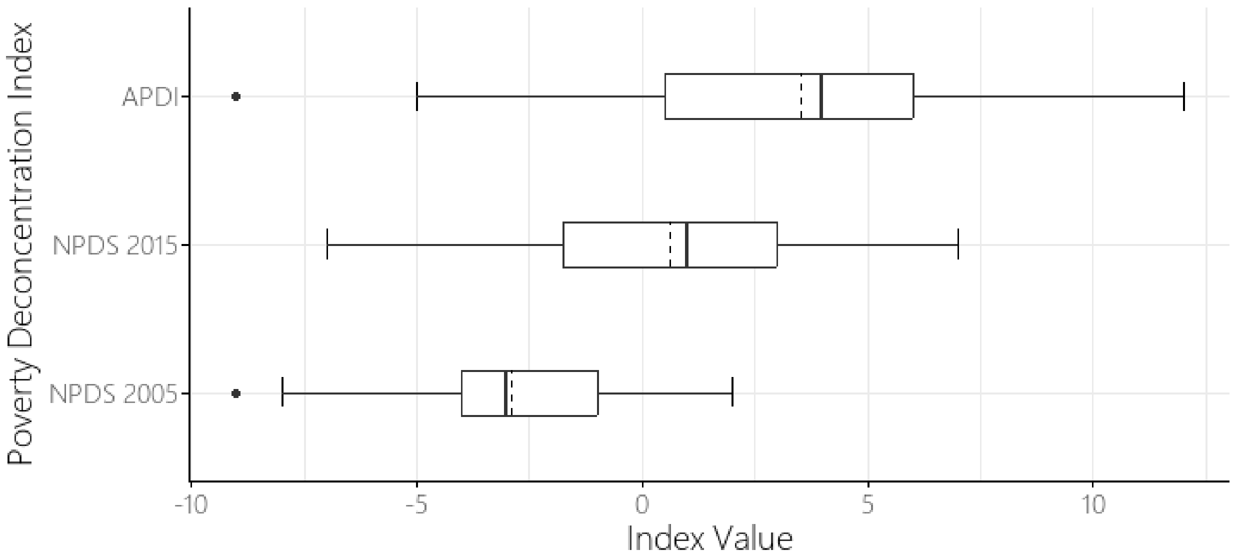
Together, the APDI and the NPDS for 2005 and 2015 illuminated clustering of states into three distinct groups. Further examination of these index values revealed salient features about each of these clusters in terms of the varying degree and direction to which states have adopted poverty deconcentration priorities in their QAPs. Thus, the following typology of states was developed to capture the shift in poverty deconcentration priorities in QAPs. On average, states that recorded the lowest NPDS value in 2005 and the highest NPDS in 2015 were classified as the *Advancing Poverty Deconcentration* (APD) group as their efforts to prioritize poverty deconcentration exceptionally surpassed the negative efforts during 2005. The other group, namely *Prioritizing Poverty Deconcentration* (PPD), on average, marginally prioritized poverty deconcentration in 2015 compared to the previous group. Although states in this group followed a similar direction in terms of moving from prioritizing concentration in 2005 to prioritizing deconcentration in 2015, the degree of prioritization of poverty deconcentration criteria was less pronounced compared to the previous group (see Table 4). The last cluster of states, in fact, amplified their effort in prioritizing poverty concentration criteria in their 2015 QAPs and hence labeled as *Deprioritizing Poverty Deconcentration* (DPD) group. With the mean values of APDI and NPDS being negative, this group progressively deprioritized poverty deconcentration within a decade (see Appendix I).

Table 4*: Typology of States and the mean Values for the Deconcentration Measures*

Groups	Number of States	Percent of States	Mean Value		
			$NPDS_{05}$	$NPDS_{15}$	APDI
Advancing Poverty Deconcentration	14	36.84	-4.21	3.57	7.79
Prioritizing Poverty Deconcentration	14	36.84	-3.29	0.25	3.50
Deprioritizing Poverty Deconcentration	10	26.32	-0.50	-3.00	-2.50
All	38	100.00	-2.90	0.63	3.53

Source: Author’s tabulation

Figure 5: *Boxplot for Poverty Deconcentration Measures*

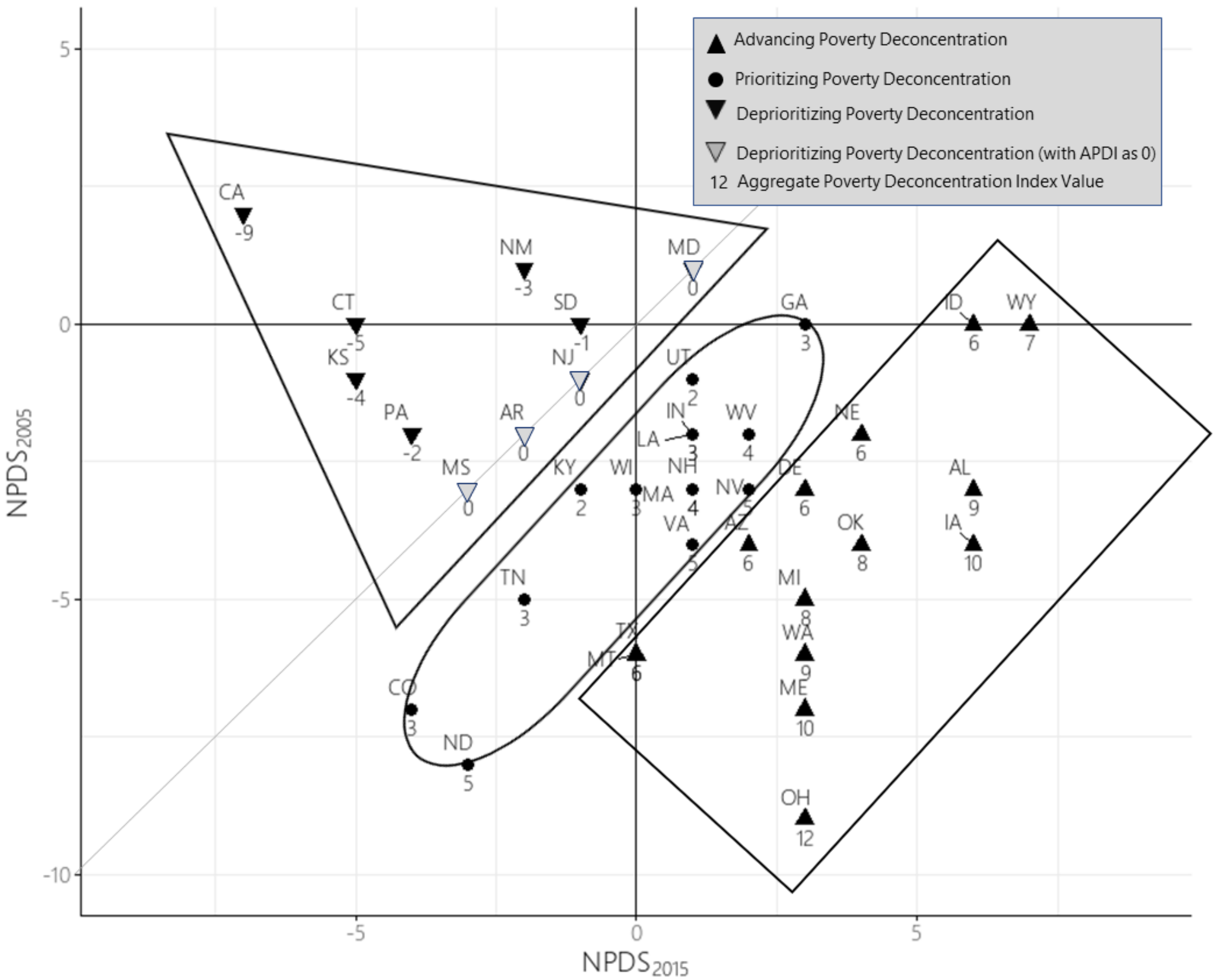


Source: Author's calculation

To illustrate further, Figure 5 displays the distribution of APDI and NPDS values; Figure 6 depicts, based on the APDI and the NPDS values, a clustered pattern emerged which I further examine in the following section (Patterns of Change); Figure 7 presents a spatial visualization of the typology, and finally Figure 8 documents the direction of change for each state. There are seven pathways that are documented in the data and presented in the thematic map.

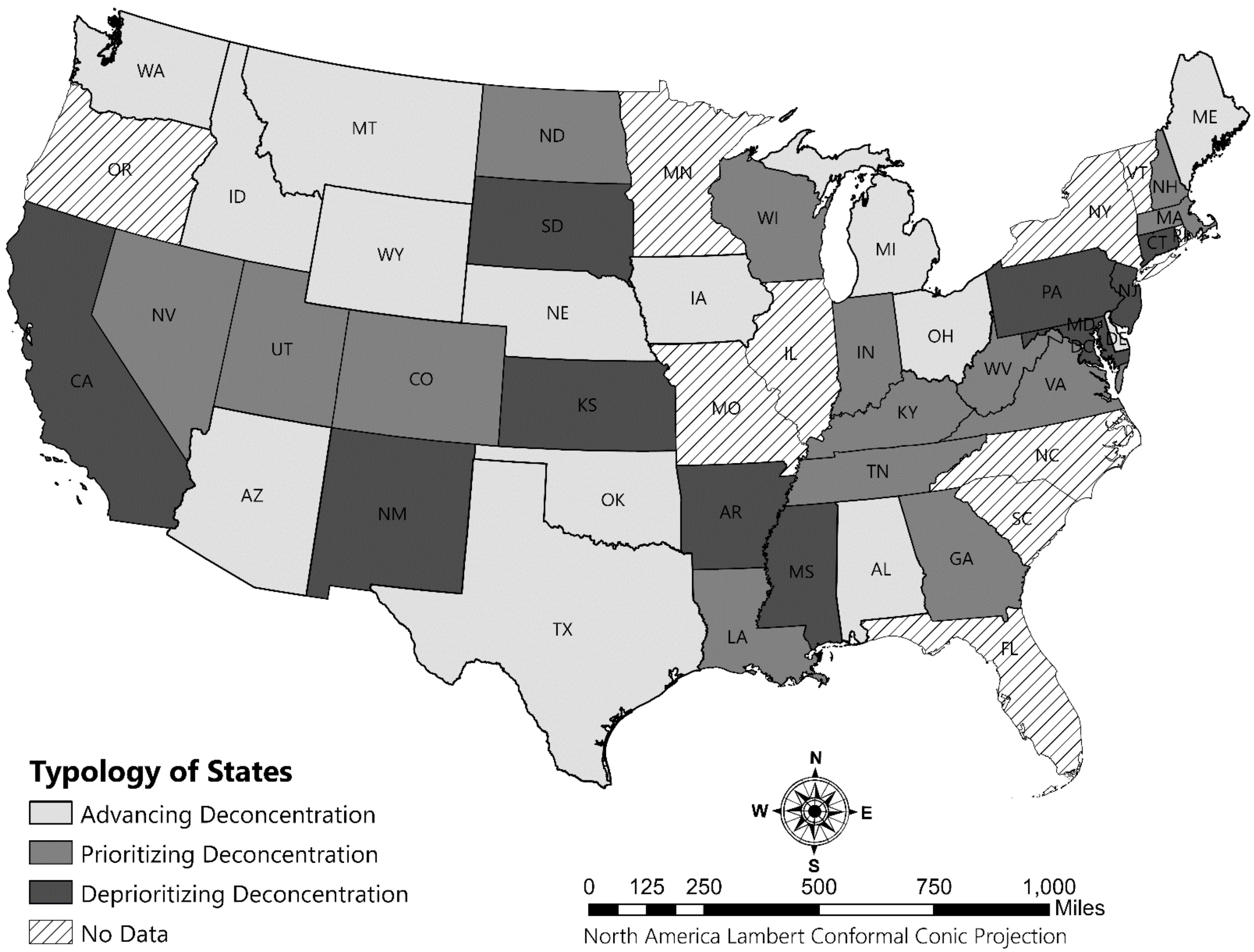
What this classification revealed is not only what policy directions (advancing vs. deprioritizing) states have pursued, but also to what degree (advancing vs. prioritizing) states have (de)prioritized poverty deconcentration goals. While this is not within the scope of this research to provide any comprehensive explanation on why policy goals have shifted disparately with varying degrees, it is worthwhile to explore this angle in future research. Interesting to note that this study did not reveal any bearing of political affiliation on the prospect of poverty deconcentration priorities in state's affordable housing policy design.

Figure 6: *APDI and NPDS Values*



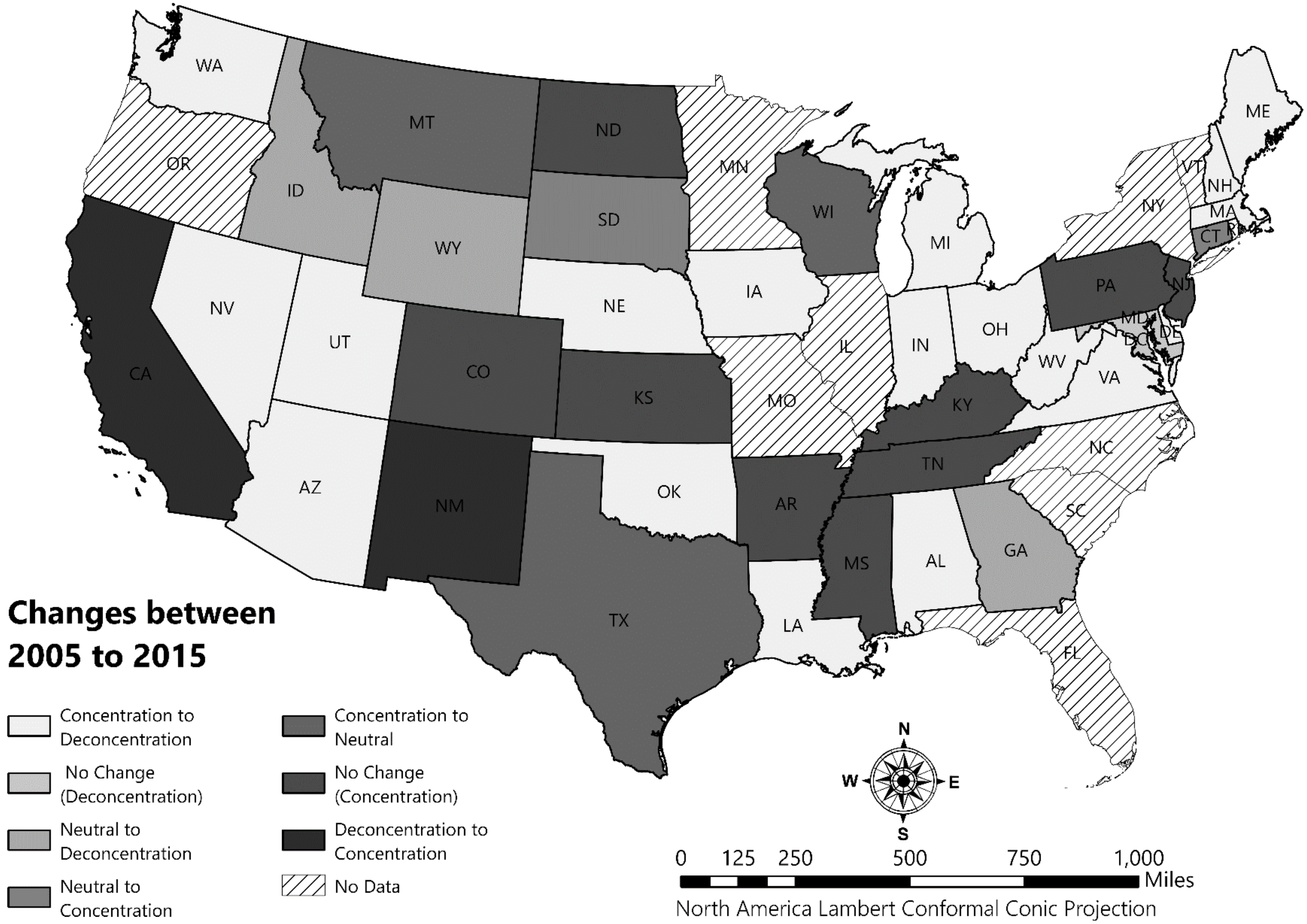
Source: Author's calculation

Figure 7: *Classification of States Based on the Typology*



Source: Author's calculation

Figure 8: *Pathway to (De)Concentration*



Source: Author's calculation

Patterns of Change toward Poverty (De)concentration

As noted earlier, a typology is developed based on the observed clustering pattern of states. The clusters are the manifestation of the APDI and NPDS values that captured the direction and degree of change pursued by states in their QAPs regarding prioritizing poverty deconcentration criteria. As portrayed in Figure 8, some states moved from prioritizing concentration to deconcentration within a decade, while others headed towards the opposite direction. I offer further clarification on the typology, not only using the APDI and NPDS scores, but also incorporating QAP criteria that were influential in instrumenting changes in poverty (de)concentration.

Advancing Poverty Deconcentration (APD)

States belonging to this group recorded a positive APDI value of 6 and above by emphasizing poverty deconcentration in 2015 more than in the earlier period. The mean APDI for all states that have recorded a positive APDI score was 5.64 and hence this suggested using 6 (i.e., values above the mean rounded to the nearest integer value) as the cutoff score for this group. In total, 14 states were classified under this category and the APDI value ranged between 6 and 12 and 7.79 was the group mean. All of these states have recorded positive $NPDS_{15}$ and negative or zero $NPDS_{05}$ values (see Table 3 for the $NPDS_{05}$, $NDPS_{15,}$ and APDI values). Michigan for example, in 2005 prioritized poverty concentration as it recorded -5 for its $NPDS_{05}$. In ten years, Michigan shifted to aggressively promoting poverty deconcentration, which resulted in increasing the $NPDS_{15}$ to 3 thereby receiving 8 as the APDI value which translates into the state advancing poverty deconcentration in the 2015 QAP. Specifically, for the poverty concentration indicators, Michigan disincentivized development in low-income areas (13% to 0%) and low-income targeting for more than 50% (20% to 0%). Moreover, for the poverty deconcentration indicators, opportunity areas (2% to 7%) and neighborhood amenities (2% to 11%) were highly incentivized by 2015.

Table 5: *Typology and Patterns*

Groups and Definition	Mean APDI	Patterns	States
Advancing Poverty Deconcentration			
High prioritization of poverty deconcentration incentives between 2005 and 2015	7.79	$APDI > 5$; $NPDS_{15} > 0$; $NPDS_{05} < 0$	Alabama, Arizona, Delaware, Iowa, Maine, Michigan, Nebraska, Ohio, Oklahoma, Washington
		$APDI > 5$; $NPDS_{15} > 0$; $NPDS_{05} = 0$	Idaho, Wyoming
		$APDI > 5$; $NPDS_{15} = 0$; $NPDS_{05} < 0$	Montana, Texas
Prioritizing Poverty Deconcentration			
Moderate prioritization of poverty deconcentration incentives between 2005 and 2015	3.50	$APDI = 0\text{-}5$; $NPDS_{15} > 0$; $NPDS_{05} < 0$	Indiana, Louisiana, Massachusetts, Nevada, New Hampshire, Utah, Virginia, West Virginia
		$APDI = 0\text{-}5$; $NPDS_{15} > 0$; $NPDS_{05} = 0$	Georgia
		$APDI = 0\text{-}5$; $NPDS_{15} = 0$; $NPDS_{05} < 0$	Wisconsin
		$APDI = 0\text{-}5$; $NPDS_{15} < 0$; $NPDS_{05} < 0$; $\lvert NPDS_{05} \rvert > \lvert NPDS_{15} \rvert$	Colorado, Kentucky, North Dakota, Tennessee
Deprioritizing Poverty Deconcentration			
Deprioritization of poverty deconcentration incentives between 2005 and 2015	-2.50	$APDI = 0$; $NPDS_{15} > 0$; $NPDS_{05} > 0$; $\lvert NPDS_{05} \rvert = \lvert NPDS_{15} \rvert$	Maryland
		$APDI = 0$; $NPDS_{15} < 0$; $NPDS_{05} < 0$; $\lvert NPDS_{05} \rvert = \lvert NPDS_{15} \rvert$	Arkansas, Mississippi, New Jersey
		$APDI < 0$; $NPDS_{15} < 0$; $NPDS_{05} = 0$;	Connecticut, South Dakota
		$APDI < 0$; $NPDS_{15} < 0$; $NPDS_{05} < 0$; $\lvert NPDS_{05} \rvert < \lvert NPDS_{15} \rvert$	Kansas, Pennsylvania
		$APDI < 0$; $NPDS_{15} < 0$; $NPDS_{05} > 0$; $\lvert NPDS_{05} \rvert < \lvert NPDS_{15} \rvert$	California, New Mexico

Source: Author's calculation

Note: $NPDS_{15}$=Net Poverty Deconcentration Score for 2015. $NPDS_{05}$=Net Poverty Deconcentration Score for 2005.

APDI= Aggregate Poverty Deconcentration Index.

For this group, three distinct patterns (see Table 5) of change have been observed. There were 10 states that did not incentivize poverty deconcentration in 2005 (negative $NPDS_{05}$), however, they made significant changes in their 2015 QAP in incentivizing poverty deconcentration (positive $NPDS_{15}$) to receive positive APDI values. The second pattern involved two states that neither disincentivized nor incentivized poverty deconcentration in 2005 ($NPDS_{05} = 0$) while incentivized it in 2015 ($NPDS_{15} > 0$). In the third scenario, two states did not incentivize poverty deconcentration in 2005 ($NPDS_{05} < 0$), however, they neither incentivize nor disincentivize poverty deconcentration in 2015 ($NPDS_{15} = 0$).

Prioritizing Poverty Deconcentration (PPD)

This group of states moderately promoted poverty deconcentration compared to the previous group. Specifically, the 14 states in this group either did not deprioritize poverty concentration or did not aggressively promote poverty deconcentration to the same extent as states in the APD group, as the APDI value ranged between 2 to 5 with 3.50 as the group mean. Besides recording positive APDI values, most states recorded positive $NPDS_{15}$ and negative or zero $NPDS_{05}$ values. Louisiana, for instance, promoted poverty deconcentration by incentivizing spatial dispersal, neighborhood services, and opportunity area criteria by increasing the percentage share of these items to the total score in 2015. The state recorded 5.32, 4.90, and 8 percentage-points increases in these three criteria, respectively, between 2005 and 2015. Moreover, the state also reduced the percentage share for criteria that are expected to lead to poverty concentration, specifically QCT, transit services, and local contribution, each by close to negative 2 percentage-points between the two years. Hence, Louisiana recorded a small positive NPDS value of 1 in 2015 as compared to a -2 for its NPDS in 2005 which resulted in a net positive score of 3 for its APDI.

Within this group, four salient patterns can be found where the first three were the same as the previous group. First, there are eight states that did not incentivize poverty deconcentration in 2005 (negative $NPDS_{05}$); however, they made significant changes in their 2015 QAP in incentivizing poverty deconcentration (positive $NPDS_{15}$) to receive positive APDI values. The second pattern involved only Georgia which neither disincentivized nor incentivized poverty deconcentration in 2005 ($NPDS_{05} = 0$) while incentivizing it in 2015 ($NPDS_{15} > 0$). Wisconsin, as the third scenario, did not incentivize poverty deconcentration in 2005 ($NPDS_{05} < 0$), however, it neither incentivized nor disincentivized poverty deconcentration in 2015 ($NPDS_{15} = 0$). The fourth pattern, involving four states (Colorado, Kentucky, North Dakota, and Tennessee), was unique as these states disincentivized poverty deconcentration ($NPDS_{15} < 0$) in their 2015 QAPs, however, at a lesser magnitude compared to their 2005 QAPs, thus, resulting in positive APDI values.

Deprioritizing Poverty Deconcentration (DPD)

The last group consisted of 10 states, all of which recorded either 0 or negative APDI values which indicated that these states did not prioritize poverty deconcentration. The APDI value ranged between 0 to -9 with a mean of -2.5 where four states (Arkansas, Maryland, Mississippi, and New Jersey) received 0 in their APDI. Among these four, only Maryland recorded the same positive scores for its $NPDS_{05}$ and $NPDS_{15}$ and the other three states recorded similar negative values for both years. The remaining six states recorded negative APDI scores and negative $NPDS_{15}$ scores. Only South Dakota and Connecticut out of these six recorded positive $NPDS_{05}$ value, meaning they shifted from a balanced QAP (neither disincentivizing nor incentivizing poverty deconcentration) in 2005 to disincentivizing poverty deconcentration in 2015. Pennsylvania, for instance, incentivized low-income targeting (7.7% to 15.4%) and QCT (1.3% to 15.4%) criteria, while disincentivizing local contribution (5.1% to 0%). On the other hand, although the state incentivized the opportunity areas criterion by 15 percentage-points, it disincentivized mixed-income projects and neighborhood amenities criteria by 7 and 4 percentage-points by removing these two criteria from the 2015 QAP. In essence, the $NPDS_{15}$ became twice the negative $NPDS_{05}$ score.

For this group, five distinct patterns were observed. Maryland, as the first case, incentivized poverty deconcentration at the same low magnitude ($NDPS_{05}$ and $NPDS_{15}$ values being 1), and thus, recorded 0 for its APDI. The second case involved three states (Arkansas, Mississippi, and New Jersey) that disincentivized the poverty deconcentration criteria equally for both years, thereby receiving 0 for their APDI. Connecticut and South Dakota exercised the third pattern where their 2005 QAPs were balanced ($NPDS_{05} = 0$), but poverty deconcentration was deprioritized in 2015 ($NPDS_{15} < 0$). Kansas and Pennsylvania unfolded a fourth pattern where both states deprioritized poverty deconcentration for both years, however, the 2015 QAPs deprioritized poverty deconcentration at a much greater magnitude than the 2005 QAPs. Finally, California and New Mexico observed the fifth pattern where both states prioritized poverty deconcentration in 2005 ($NPDS_{05} > 0$), but the 2015 QAP disincentivized it heavily ($NPDS_{15} < 0$). This last pattern is unique as no other states have moved from prioritizing poverty deconcentration to massively deprioritizing within 10 years.

The three typologies based on the 12 patterns presented above were derived from an objective measure of the changes in poverty deconcentration criteria in the QAPs. To test the validity of the typology, I used the K-means clustering—an unsupervised machine learning model—which is a widely used technique of classification across various disciplines (Wu, 2012). Table 6 table demonstrates the comparability between the two classification methods based on the membership and group mean values (see Appendix J).

Table 6: *Comparison of Classification Models*

Groups	Classification Methods	
	APDI	K-means Clustering
Membership of States		
Advancing Poverty Deconcentration	14	9
Prioritizing Poverty Deconcentration	14	19
Deprioritizing Poverty Deconcentration	10	10
Mean Values		
Advancing Poverty Deconcentration	7.79	8.67
Prioritizing Poverty Deconcentration	3.50	4.21
Deprioritizing Poverty Deconcentration	-2.50	-2.50

Source: Author's calculation

The classification method using the k-means clustering closely resembles the typology presented in this research based on the measure of accuracy (86.84%) and the Kappa value (0.8). Moreover, the group membership and the group means for these two methods are aligned closely. Hence, the classification of states using the typology described in this research appears to be valid.

Conclusion

In this chapter I presented an exploratory analysis of changes in QAPs between 2005 and 2015 with regards to poverty (de)concentration. The main objective of this analysis was to understand if states have prioritized QAP criteria that are expected to lead to poverty deconcentration within a decade's time. Using content analysis method, this study thematically classified the QAP criteria used for poverty deconcentration. Moreover, I modified an existing framework to develop the novel Aggregate Poverty Deconcentration Index (APDI) which allowed for further examination of states in terms of the degree and direction of change. In short, this study found that nearly 75% of all sample states have incentivized poverty deconcentration in their QAPs between 2005 and 2015. Based on the 12 identified patterns and the APDI values, a typology was developed that classified states into three distinct groups: Advancing Poverty Deconcentration (APD), Prioritizing Poverty Deconcentration (PPD), and Deprioritizing Poverty Deconcentration (DPD). The essential finding of this study, using a larger sample of states and a greater number of QAP criteria compared to previous research, pointed towards a significant change in policy regime in state affordable housing in ways that would encourage socio-spatial equity for low-income renters.

The above analysis suggests that states devised QAPs that prioritized poverty deconcentration to varying degrees. While some states took an aggressive approach toward promoting deconcentration, others have encouraged the opposite. The qualitative analysis of QAPs has opened up avenues to quantitatively assess the effects of changes in QAPs on LIHTC siting in the subsequent chapter. The essential contribution of this analysis, i.e., identifying the themes and the patterns of poverty deconcentration, allows us to understand the different trajectories states have gone over a span of 10 years. It also gives us a brief idea of which criteria were profusely used by states towards promoting poverty deconcentration (or otherwise). While further analysis is needed to effectively test the effects of QAP changes on LIHTC siting, the following section offers some evidence of a positive relationship existing between changes in QAP criteria leading to the deconcentration of LIHTC developments.

CHAPTER 4
Effects of QAP Change on LIHTC Siting

The scope and expectations of the federal housing programs have evolved significantly over the past few decades. From housing the working poor (through public housing) to providing affordable units (through HCVs), to addressing poverty concentration (through MTO and HOPE VI), federal housing policy moved from project-based supply-based programs to a combination of the former along with tenant-based demand-side programs (McClure, 2019). Amid this quantum leap, questions of racial and socio-spatial justice were largely ignored in the policy framework (Goetz, 2018; Rothstein, 2017; Soja, 2010; Wilson, 1987, 2009). Some tenant-based demand-side programs reported limited success in deconcentrating poverty, but most failed to promote racial integration or provide access to opportunity-rich areas for low-income renters (Briggs, Popkin, et al., 2010; McClure, 2019; Newman & Schnare, 1997; Pendall, 2000).

As the largest affordable housing program, LIHTC has produced over 3 million units within a span of 30 odd years. Contrary to the anticipations of policy scholars, this project-based supply-side based program has not adequately penetrated opportunity-rich areas and is often criticized for siting rent-restricted units in high-poverty and minority areas (McClure et al., 2020; McClure & Johnson, 2015; Oakley, 2008; Schwartz & McClure, 2023). Since state HFAs influence the siting of LIHTC units, scholars opined that QAPs—as the guiding policy document—should play a central role in achieving the desired outcomes of LIHTC policy intervention (Ellen et al., 2015; Ellen & Horn, 2018; Johnson, 2013, 2015; McClure & Schwartz, 2021).

Building on the conclusions of the preceding chapter, this chapter investigates whether the emphasis on poverty deconcentration was implemented in practice, rather than merely serving as policy rhetoric, by examining the extent to which LIHTC siting was altered. In general, this study found that states that prioritized poverty deconcentration housed more LIHTC units in very-low poverty census tracts, on average. This indicates that the criteria prioritized in QAPs significantly predict the spatial arrangement of affordable units (although the effect of such policy is small, at least in the short term), and address racial, spatial, and social justice issues at local as well as state level, however, marginally.

LIHTC and the Issue of Concentration

Several studies concluded that LIHTC properties were disproportionally concentrated in neighborhoods with low median incomes, high-poverty levels, and high-minority concentrations. Cummings and DiPasquale (1999) found that LIHTC units are disproportionately located in central-city areas. Between 1980s and early 2000s, LIHTC units were three times more likely to be located in high-poverty (40% or more) census tracts compared to other housing units (Ellen et al., 2009). An Abt Associate report found that less than a quarter of all LITHC family units in large U.S. metropolitan areas were located in low-poverty census tracts (Khadduri et al., 2006). Moreover, studies showed LIHTC units being clustered in QCTs (Dawkins, 2013; Oakley, 2008) and located in neighborhoods with poverty rates higher than the metropolitan average (Freeman, 2004).

In addition to the spatial and poverty concentration documented in these prior studies, other studies noted that LIHTCs were more likely to be placed in neighborhoods with high minority concentrations (Horn & O’Regan, 2011; Rohe & Freeman, 2001) and lower household incomes (Van Zandt & Mhatre, 2009). Moreover, LIHTC properties were more commonly situated in high-crime neighborhoods (11.3%) than the overall household rate (3.1%) or the low-income renter household rate (6%) and even for any other types of housing programs such as HCVs and public housing (Lens et al., 2011). While the siting of LIHTC properties has historically challenged the possibility of poverty deconcentration and access to high-opportunity neighborhoods, recent evidence suggested that the performance of this policy has improved (McClure & Schwartz, 2021; Shamsuddin & Cross, 2020; Walter et al., 2018). The content and thematic analysis of QAPs in the previous chapter also suggested a significant emphasis on poverty deconcentration through the dispersal of projects and incorporation of various measures of opportunity in LIHTC siting.

Data and Methodology

This chapter draws on the HUD LIHTC database and the ACS 5-year estimate for the years 2005-2009 and 2015-2019 along with the APDI values from the previous chapter to examine the association between QAP change on LIHTC siting.

LIHTC Data

Property-level data for LIHTC developments were obtained from the HUD LIHTC database[41]. This study only considered new developments (9% credit) for investigating the changes in siting pattern of LIHTC properties as the location of these developments was a direct result of the changes incorporated by any state QAPs. Additionally, this study only focused on LIHTC properties in metro areas as the rural LIHTC properties were deemed outside the scope of

[41] HUD LIHTC database is the only comprehensive database available at the national level. There are concerns regarding the quality of data available from HUD. Followed by personal correspondence with HUD Senior Economist Dr. Michael Hollar (personnel responsible for LIHTC data), I chose this dataset as the primary source and only contacted state HFAs when there is a serious issue with the data. Many prior studies on LIHTC also heavily rely on this dataset (see Ellen & Horn (2018), Schwartz & McClure, (2023)). The HUD LIHTC data is available at https://www.huduser.gov/portal/datasets/lihtc/property.html

this research, since the set-aside of funding pool and socioeconomic environment of these properties are significantly different from the mainstream metropolitan LIHTC developments. For instance, only 4.67% of all new units were placed in rural areas between 1987–2020, as compared to 3.97% and 2.74% during 2005-07 and 2015-17, respectively. Furthermore, an assessment of year-wise QAP documents revealed that many states introduced small and incremental changes in their QAPs and revised them every alternate year. Hence, this study used a two-year span of LIHTC allocation (2005-2007 and 2015-2017). Another reason for choosing the two-years span was due to the fact that often LIHTCs are placed in service (or become operational) at least a year after they were approved. Hence, to accurately understand the effects of LIHTC siting, the two-year span became important as it incorporates the time-lag effect of project development.

To account for the missing data[42] in the HUD LIHTC database this study supplemented information from state HFAs on LIHTC awards for several states whenever necessary. Overall, there were 28 cases (out of 30,360 observations between 1987 and 2021, and 3,056 properties for the sample years) for which location and project information were missing. Respective HFAs were contacted and finally I removed 16 cases for which no data could be obtained. The specific attributes of interest for this study were the location information (address, census tract, metropolitan status, and QCTs), allocation year, type of construction (new or existing), and units (total and low-income). Finally, 1952 properties (134,297 units) in 2005-07 and 1098 properties (84,192 units) in 2015-17 were included in this study.

[42] See an account of year and variable-wise missing data in the HUD LIHTC database.

Socioeconomic Indicators

State and census tract-level data on several socioeconomic indicators for each property were obtained from the ACS 5-year estimates for the years 2005-2009 and 2015-2019. Furthermore, census data were joined spatially to obtain the corresponding missing census tract information for any project, if any. Since there have been changes in the census tract boundaries (between 2000 and 2010 census), a geographic crosswalk was performed using the Longitudinal Tract Data Base.[43]

All ACS data were obtained from the IPMUS NHGIS[44] at the University of Minnesota. As one of the main focuses of this study is to understand poverty deconcentration, the census tract-level poverty rate is therefore an obvious choice. Additional socioeconomic variables such as percent of minority (which includes all but Non-Hispanic Whites)[45], rental vacancy rate, and median home price were also used in this study to assess the relationship between changes in QAP criteria and LIHTC siting and to control for both fixed and random effects.

Data Analysis

Following the data collection, I first provide a descriptive analysis of changes in LIHTC siting between the years 2005-07 and 2015-17, focusing specifically on the neighborhood income levels and neighborhood poverty rate in census tracts that attracted new LIHTC developments in each period. Then, I examine the correlation between three QAP criteria—

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[43] Longitudinal Tract Data Base (LTDB) is a Brown University platform that allows census data estimation for geographic inconsistency between two decennial census years. More details can be found at https://s4.ad.brown.edu/projects/diversity/researcher/bridging.htm

[44] For details see https://www.nhgis.org/

[45] The motivation behind using minority as a whole, rather that examining each Race separately, comes from the works of Ellen and colleagues (2015, 2018). This allows for a direct comparison between the previous works and this research.

Mixed-Income Project, Location in QCTs, and Opportunity Areas (using census tract poverty rate as a proxy)—and the siting of LIHTC properties. In what follows are a series of regressions to assess whether changes in QAP criteria were associated with the siting pattern of LIHTC developments. Lastly, I employ a quasi-experimental design using the Difference-in-Differences (also known as DiD or diff-in-diffs) method to assess the relationship between QAPs changes and LIHTC siting.

Linear Regression

To assess the effects of QAP change on LIHTC siting, OLS linear regression models were used. These models captured the effects of QAP change (measured in terms of APDI) on the percentage change in LIHTC units at the state level while controlling for other socio-economic indicators.

$$\Delta LI_{S_{VLP}} = \alpha + \beta_1 APDI_S + \beta_2 M_S + \beta_3 P_S + \beta_4 R_S + \beta_5 APDI_S * M_S + \beta_6 APDI_S * P_S + \beta_7 APDI_S * R_S + \varepsilon_S \quad [8]$$

$$\Delta LI_{S_{HP}} = \alpha + \beta_1 APDI_S + \beta_2 M_S + \beta_3 P_S + \beta_4 R_S + \beta_5 APDI_S * M_S + \beta_6 APDI_S * P_S + \beta_7 APDI_S * R_S + \varepsilon_S \quad [9]$$

Where, $\Delta LI_{S_{VLP}}$ and $\Delta LI_{S_{HP}}$ are the dependent variables representing changes in percentage of new LIHTC units developed between 2005-2007 and 2015-2017 in very-low (<10%) and high (>30%) poverty census tracts, respectively, for state *s.* APDI is the measure of QAP changes toward poverty deconcentration, M, P and R are the control variables at the state level representing difference in share of minority population, poverty rate, and rental vacancy. Also included in the regression are the interaction terms between APDI and state level controls. The interaction terms were included in the model to investigate how the relationship between change in poverty and change in LIHTC units varies in states with different levels of APDI values. The rationale for including these terms is based on the hypothesis that the relationship between these variables should be weaker in states that prioritize poverty deconcentration. While the statistical justification for the interaction terms may be weak due to the sample size, their inclusion is still important for interpreting the results and providing a more nuanced understanding of the relationship between the variables.

For statistical rigor and robustness check, I estimated the effects of change in QAPs at the census tract level using the following models:

$$\Delta LI_{CT} = \alpha + \beta_1 APDI_S + \beta_2 M_{CT} + \beta_3 P_{CT} + \beta_4 R_{CT} + \\ + \beta_5 APDI_S * M_S + \beta_6 APDI_S * P_{CT} + \beta_7 APDI_S * R_S + + \varepsilon_{CT} \quad [10]$$

$$\Delta LI_{CT_{VLP}} = \alpha + \beta_1 APDI_S + \beta_2 M_{CT} + \beta_3 P_{CT} + \beta_4 R_{CT} + \\ + \beta_5 APDI_S * M_S + \beta_6 APDI_S * P_{CT} + \beta_7 APDI_S * R_S + \varepsilon_{CT} \quad [11]$$

$$\Delta LI_{CT_{HP}} = \alpha + \beta_1 APDI_S + \beta_2 M_{CT} + \beta_3 P_{CT} + \beta_4 R_{CT} + \\ + \beta_5 APDI_S * M_S + \beta_6 APDI_S * P_{CT} + \beta_7 APDI_S * R_S + \varepsilon_{CT} \quad [12]$$

Where, ΔLI_{CT}, $\Delta LI_{CT_{VLP}}$ and $\Delta LI_{CT_{HP}}$ are the dependent variables representing changes in the number of LIHTC units developed in all, very-low (<10%), and high (>30%) poverty census tracts, respectively. APDI is the measure of QAP changes in poverty deconcentration at the state level which corresponds to each census tract. All other control variables are similar to the previous models at the state level. Including interaction terms in the model is important because it helps us understand how changes in QAPs affect the relationship between poverty and LIHTC location. The main effect of APDI alone is not enough to explain this relationship at the tract level. Hypothetically, having negative interaction terms would suggest that QAP changes discourage building new LIHTC developments in high-poverty and predominantly minority neighborhoods. Therefore, including interaction terms is necessary to gain a better understanding of the variables and draw meaningful conclusions from the analysis.

Difference-in-Differences (DiD)

This study also included an analysis of any time-invariant relationship between QAP changes and the concomitant changes in LIHTC siting by using Difference-in-Differences (DiD)—a popular econometric technique used heavily in policy studies, among other social science disciplines. DiD is a quasi-experimental design, often used in absence of a Randomized Control Trial method and panel data, to estimate the causal effect (Angrist & Pischke, 2009). Although the method was first conceptualized in 1855 by John Snow (Cunningham, 2021) while studying the spatial differences in Cholera outbreak in England, the first scientific application of this method on policy evaluation was conducted by Card and Krueger (1994) to study the impact of minimum wage as a policy change on employment in New Jersey and Pennsylvania. To understand the effect on the outcome variable, DiD model includes a two-groups (treatment and control) and two-time period (post and pre-treatment) matrix for the outcome variable and a group-time interaction. A treatment group is the entity that receives a policy intervention whereas a control group (with a strong assumption that this group is similar to the treatment group) is one without the same policy intervention. A simple DiD model can be expressed as:

$$\delta = \left(\bar{Y}_{T,t_1} - \bar{Y}_{C,t_1}\right) - \left(\bar{Y}_{T,t_0} - \bar{Y}_{C,t_0}\right) \qquad [13]$$

Where, δ is the effect of the policy intervention on the outcome variable between pre-treatment (t_0) and the post-treatment (t_1) period, $\bar{Y}$ is the mean of the outcome variable, T is treatment group, C is control group, t_1 and t_0 are post- and pre-treatment time.

Table 7: *Tabular Representation of Difference-in-Differences Matrix*

	Pre-treatment (t_0) Mean	Post-treatment (t_1) Mean	$\Delta(t_1 - t_0)$ Mean*
Control Group (C)	$\bar{Y}_{C,t_0} = \boldsymbol{\alpha}$	$\bar{Y}_{C,t_1} = \boldsymbol{\alpha} + \boldsymbol{\gamma}$	$\bar{Y}_{C,t_1} - \bar{Y}_{C,t_0} = \boldsymbol{\gamma}$
Treatment Group (T)	$\bar{Y}_{T,t_0} = \boldsymbol{\alpha} + \boldsymbol{\beta}$	$\bar{Y}_{T,t_1} = \boldsymbol{\alpha} + \boldsymbol{\beta} + \boldsymbol{\gamma} + \boldsymbol{\delta}$	$\bar{Y}_{T,t_1} - \bar{Y}_{T,t_0} = \boldsymbol{\gamma} + \boldsymbol{\delta}$
Δ(T– C) Mean**	$\bar{Y}_{T,t_0} - \bar{Y}_{C,t_0} = \boldsymbol{\beta}$	$\bar{Y}_{T,t_1} - \bar{Y}_{C,t_1} = \boldsymbol{\beta} + \boldsymbol{\delta}$	$(\bar{Y}_{T,t_1} - \bar{Y}_{T,t_0}) - (\bar{Y}_{C,1} - \bar{Y}_{C,t_0}) = \boldsymbol{\delta}$ ***

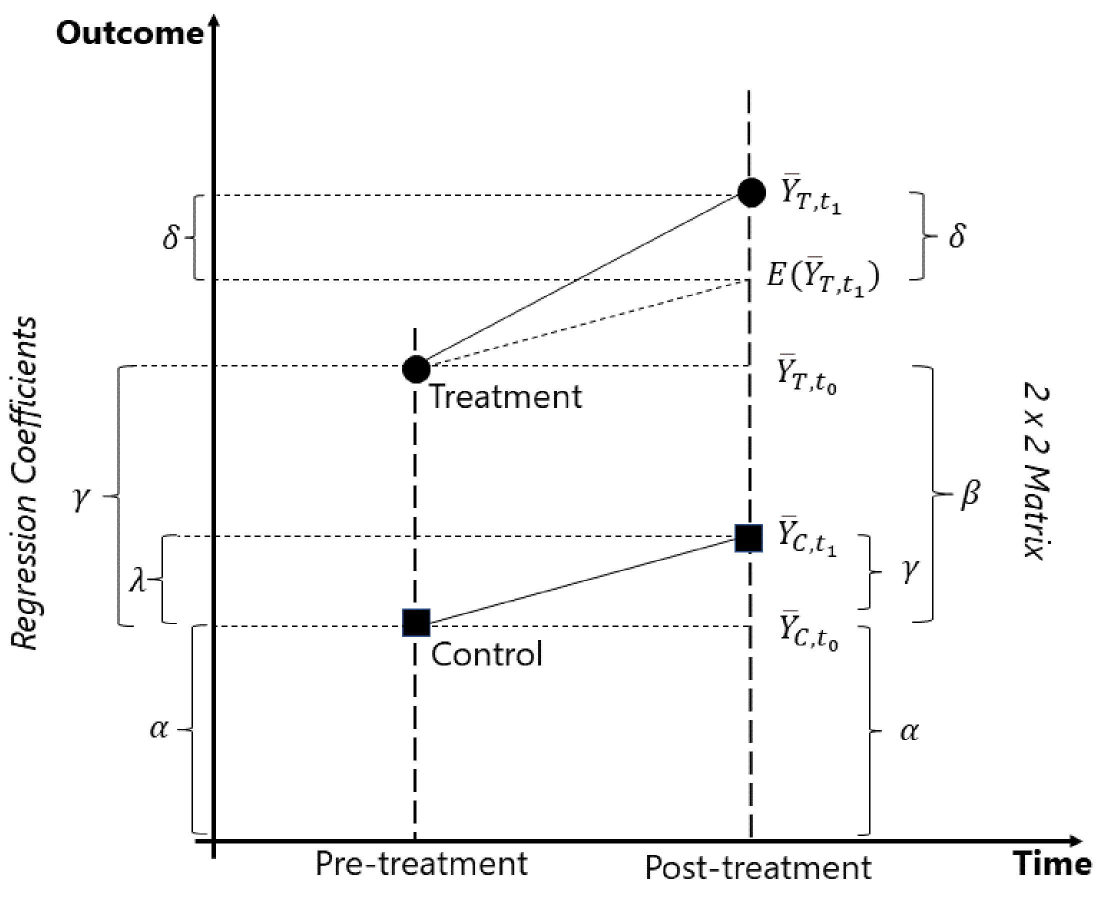
Source: Author's tabulation

Note: *Within-group variation (time-varying effect)

** Between-group variation (treatment effect)

*** Average Treatment Effect (ATE) or causal effect

Figure 9: *Conceptual Representation of Difference-in-Differences*



Source: Author

Figure 9 represents the conceptual understanding of the DiD model. On the right-hand side, it represents the notations from the 2 by 2 matrix presented in Table 7 and on the left-hand side the coefficients for a linear regression model are presented. The identification of DiD is a common fixed-effects strategy, which necessitates a data structure where both treatment and control groups are observed in multiple treatment environments.

The DiD identification strategy relies on the assumption that there are no time-varying differences in unobservable variables that are correlated with the treatment (Baum-Snow & Ferreira, 2014). Implementing the DiD identification strategy includes calculating the coefficient of interest as the interaction between the treatment group and a post-treatment dummy or as the difference in mean outcomes between the treatment and control groups in the posttreatment versus the pretreatment period.

For this study, and in general for any DiD estimation, dummy variables were used for treatment (= 1) and control (= 0) groups as well as post-(= 1) and pre-treatment (= 0) period. The pre- and post-treatment periods represented 2005 and 2015, respectively, for which the QAPs were assessed. The control group corresponded to the DPD states that did not prioritize poverty deconcentration. The treatment group, on the other hand, were the APD and PPD states that incorporated some measures to *at least* prioritize poverty deconcentration. To examine the effects, I estimated two linear models, each for a different poverty level:

$$Y_{it_{VLP}} = \alpha + \gamma \mathrm{Treatment}_{i_{VLP}} + \lambda \mathrm{Post}_t + \delta\left(\mathrm{Treatment}_{i_{VLP}} * \mathrm{Post}_t\right) + \varepsilon_{it} \quad [14]$$

$$Y_{it_{HP}} = \alpha + \gamma \mathrm{Treatment}_{i_{HP}} + \lambda \mathrm{Post}_t + \delta\left(\mathrm{Treatment}_{i_{HP}} * \mathrm{Post}_t\right) + \varepsilon_{it} \quad [15]$$

In these equations, $Y_{it_{VLP}}$ and $Y_{it_{HP}}$ represent the outcome variable for each unit *i* at time *t* for very-low and high poverty census tracts. The variable $\mathrm{Treatment}_i$ is a binary variable that equals

1 if the unit i received the treatment (QAP was at least prioritized for poverty deconcentration), and 0 otherwise. The variable Post_t is a binary variable that equals 1 after the treatment is applied (i.e., in the post-treatment period, 2015), and 0 otherwise. The coefficient α is the intercept, which is the expected value of the outcome when the treatment and post periods are both zero and γ represents the average difference in the outcome variable between the treatment and control groups before the treatment is applied. The coefficient λ represents the average difference over time in the control group (i.e., the counterfactual trend, or the time trend) and the coefficient δ represents the difference-in-differences (or the causal estimate), which is the average treatment effect on the treated (ATE), or the difference in the outcome variable between the treatment and control groups after the treatment was applied, net of any pre-existing differences in the outcome variable. Finally, the error term ε_{it} represents the random error, or the difference between the observed outcome and the predicted outcome based on the model.

Overall, the DiD model allows us to estimate the effect of a treatment or in this case policy intervention by comparing the change in the outcome variable between the treatment and control groups over time. It may be argued that one significant limitation of this model is that it assumes all observations (i.e., census tracts), are independent. As such, there is likely to be dependence between the observations nested within the same larger geographic unit (a county, a metropolitan area, or even at state-level). To counter that, I present the robust standard errors clustered at the metropolitan level.

Indicators to Test the Relationship Between QAP Changes and LIHTC Siting

The previous chapter found twelve score-based criteria to evaluate the shift in the QAPs, when analyzing the siting pattern, however, not all of them can be statistically tested to assess the role of prioritization due to the lack of data on individual LIHTC projects. The HUD LIHTC database is one comprehensive source of data for any LIHTC project with sufficient information focusing on the project characteristics and location. However, it does not report certain information such as transit or neighborhood amenities. Similarly, state HFAs also provide data on LIHTC, yet there is no standardized set of information available, and thus, apart from location, the number of units and project types, and developer information, other project attributes are not available in general.

To understand the effects of QAP changes on the LIHTC siting, this study considered information on three project attributes—percent of low-income units in a project, location of a project in QCTs, and census tract poverty rate for LIHTC projects. These three attributes are closely associated with the three QAP criteria—mixed-income projects, QCT, and opportunity areas. I argue that these three project attributes (and their corresponding QAP criteria) are crucial in examining the effects of changes in QAPs, especially towards poverty deconcentration, since these three criteria directly correspond to the three themes for poverty deconcentration, developed using content analysis, constituting the APDI.

Mixed-income Projects

The mixed-income project criterion allowed tracking whether the density of low-income renters in a project was controlled in situ. There was an expected positive relationship between this criterion and the prioritization of poverty deconcentration, i.e., states with high APDI values should observe a higher percentage of units being offered at the fair market rate in 2015-17, compared to 2005-07, thereby enabling projects to be mixed income and encouraging poverty deconcentration by reducing the density of low-income renters in situ. The HUD LIHTC database provides information on the total and the set-aside units where only six projects (0.75%) had missing information (for 2015) and the respective HFAs were contacted to obtain the said information.

Projects in QCTs

The second criterion, i.e., projects developed in QCTs informed whether states have disincentivized LIHTC developments in high-poverty areas. States with high APDI value were expected to have lowered the production of LIHTC units in QCTs in 2015, compared to 2005. The HUD LIHTC database reports whether a project is located in QCT and there, too, a total of 46 projects (2.53%) did not have information on the QCT for both years. The census tract information for project location was used in each of these 46 cases and matched against the HUD-designated Qualified Census Tract and Difficult Development Areas database[46] to account for the missing data.

Opportunity Area

Finally, the opportunity area criterion revealed whether states with high APDI values have increased the share of LIHTC developments in very-low poverty (used as a proxy for opportunity indicator) census tracts in 2015-17, compared to 2005-07. There, again, the census tract information for project location was missing for 28 cases (1.54%) for the 2005-07 projects. Using

[46] HUD publishes and maintains record of QCT/DDA designation for each year. The file is available on the HUD website at https://www.huduser.gov/portal/datasets/qct.html

the crosswalk method (Logan et al., 2014, 2021) from the Longitudinal Tract Data Base, these projects were assigned their 2000 census tract information based on the 2010 information provided in the HUD LIHTC database. Furthermore, census tracts were classified based on the poverty rate as less than 10% being very-low poverty; 10-20% being low poverty; 20-30% being medium poverty; more than 30% as high poverty; and more than 40% as very-high poverty. I calculated the distribution of LIHTC projects at the state-level for different census tract poverty rates for both years to measure the change in LIHTC siting. Finally, differences in the percentage share (or percentage-point change) were calculated for these three attributes for the years 2005-07 and 2015-17 at the state-level since the APDI represents an index of change between these two years.

Results and Discussion

In the previous chapter, I noted that majority of the states (28 out of 38) have implemented changes in QAP criteria that should, theoretically speaking, disincentivize LIHTC developments in high-poverty, high-minority areas and promote poverty deconcentration as evident from the APDI values. Therefore, a comparison of LIHTC awards for 2005-07 and 2015-17 shall illuminate whether prioritizing poverty deconcentration in QAPs produced any measurable deconcentration effects.

Changes in LIHTC siting

Overall, states received 50105 fewer LIHTC units in 2015-17, compared to the 2005-07 period where 25 states recorded a loss and 13 states gained new units. While states, such as Mississippi saw a 97% decline in new units, Colorado recorded a 220% increase in housing new units in 2015-17. Even though these were the two extreme cases, close to half of the states in the study sample recorded severe loss or gain (over 50%) in new units. Moreover, when states were arranged by their group affiliation in terms of the APDI value, the DPD group accounted for about 65% of the total loss of new units. While the APD group saw a 16 percentage-points increase in share of new units, the DPD group saw about 18 percentage-points decline (See Appendix K and L).

Table 8: *Changes in LIHTC Siting*

LIHTC Projects and Units	2005-07	2015-17	Change	Prior [a]
Income Mix (Set-Aside Unit)				
Average percent of low-income set-aside units	94.41	93.76	-0.65	--
Qualified Census Tracts				
% LIHTC projects	39.10	35.89	-3.21	--
% LIHTC units	39.88	34.83	-5.05	--
Poverty Level and Projects				
% in very-low poverty area (<10%)	20.75	31.51	10.76	--
% in low-poverty area (10.1-20%)	27.12	32.51	5.39	--
% in medium-poverty area (20.1-30%)	21.37	17.26	-4.11	--
% in high-poverty area and above (>30%)	30.76	18.73	-12.03	--
% in very-high poverty area and above (>40%)	14.84	7.95	-6.89	--
Poverty Level and Units				
% in very-low poverty area (<10%)	21.88	34.76	12.88	3.50
% in low-poverty area (10.1-20%)	27.76	32.50	4.74	--
% in medium-poverty area (20.1-30%)	19.50	16.43	-3.07	--
% in high-poverty area and above (>30%)	30.86	16.31	-14.55	-8.5
% in very-high poverty area and above (>40%)	14.93	6.63	-8.3	--
Average census tract poverty rate for projects	23.70	18.54	-5.16	-2.3

Source: HUD LIHTC database 2020, ACS 5-year Estimates, 2005-2009 and 2015-2019.

Note. All values are in percentage.

[a]Ellen and Horn (2018) reported these percentage-points changes in their study of 20 states between 2002 and 2010.

Analyzing the LIHTC data at the property-level revealed that at least some considerable changes have been observed in the siting pattern between the two years (see Table 8). A very small decline was observed for LIHTC properties offering a mix of rent-restricted and market-rent units. Since developers are likely to maximize the tax credit, therefore, by allowing all units as rent-restricted they increase the applicable fraction,[47] thereby earning the maximum qualified basis.[48]

Although 28 states disincentivized project development in QCTs in 2015, there was still a significant percentage of projects being placed in QCTs in 2015-17. The percentage share of LIHTC properties placed in QCTs has declined over time (-3.21 percentage-points change); however, yet more than one-third of all LIHTC properties being placed in QCTs implies that the IRS-mandated QCT incentive still might have a significant influence on LIHTC developments in QCTs.

Importantly, positive percentage-point changes were recorded in projects development in very-low poverty (<10%) neighborhoods indicating steady but slow growth (10.76% in 10 years span, or an annual average of 1.08% increase). Negative percentage-point changes were recorded for LIHTC developments in high (more than 30%) and very high (more than 40%) poverty census tracts indicating a decline in siting of projects in these areas with about a 5.16 percentage-points decline in the average census tract poverty rate for all states. Especially, close to 20% and less than 8% of all projects were located in high and very high-poverty areas in 2015-17—a 12.03 and 6.89 percentage-points decline from the previous period—which is a promising indication of a gradual shift toward deconcentrating projects in these areas. Similarly, siting of LIHTC units in very-low poverty (less than 10%) has increased by about 13 percentage-points, thereby indicating a shift in placing LIHTCs in opportunity-rich areas.

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[47] Applicable fraction is the percentage of a building that is rent-restricted or allotted only to low-income renters. For details on the LIHTC tax-credit calculation, please see footnote 7 on pp. 7-8.

[48] It is the base value (by multiplying applicable fraction and eligible basis) that is multiplied by credit percentage to determine the annual credit. For details, see the LIHTC Lexicon at Novogradac's Affordable Housing Resource Center.

These changes are closely consistent with the findings of Ellen and Horn (2018)[49] who also noted a positive increase in LIHTC developments in neighborhoods with less than 10% poverty rate. A recent study of affordable housing in 50 largest metropolitan areas in the U.S. also noted a decline in of LIHTC units in census tracts with over 20% poverty rate between 2006-2010 and 2015-2019 (Eriksen, 2021).

When analyzed per group and by year, the APD group recorded an increase in units placed in very-low poverty tracts and the reverse for high poverty tracts (see Figure 10). Conversely, the DPD group recorded a small decline in placing units in very-low poverty tracts between the two years while noting a significant decrease in placing units in high poverty tracts. It is important to note that the DPD states accounted for about two-thirds of the overall decline in new units. One possible explanation is that the DPD states already had a significant share of units in low-poverty tracts; however, in 2015, the emphasis was on deconcentrating projects from high-poverty areas rather than placing new units in low-poverty areas. This does support why DPD groups did not directly incentivize new unit production in high-opportunity areas.

Most notable increase was observed for the PPD group which increased percent of units in very-low poverty tracts as well as decreased those units in high poverty tracts. Thus, it confirms that LIHTC siting has changed over time, contributing toward poverty deconcentration,

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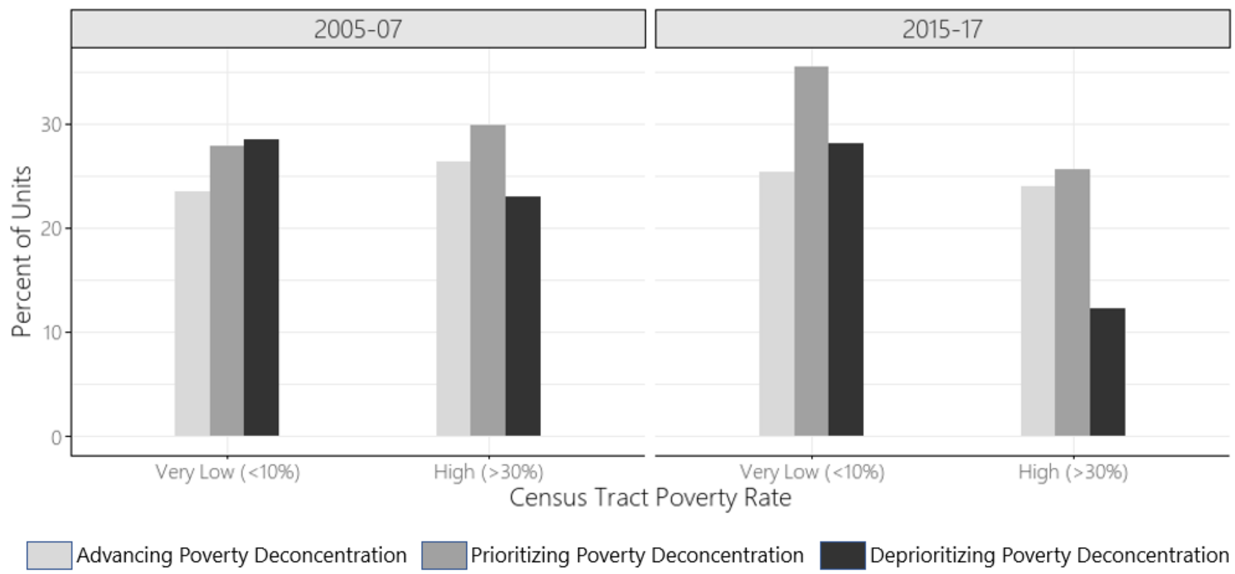
[49] Ellen and Horn (2018) conducted an analysis of changes in location incentives for 20 states by examining their QAPs for the years 2000 and 2010 to understand the changes in the priority of locational choices. They concluded that QAPs are instrumental in determining the locational attributes for LIHTC developments and more significantly, states that prioritized Opportunity Areas in their QAPs consequently saw an increase in tax credits allocation in low-poverty and low-minority areas. Although the sample size is significantly different with three of the states absent from the current study, Ellen and Horn's research (2018) is crucial as the time period of their analysis is closely aligned with the midpoint for the current analysis.

either by increasing units in very-low poverty (by APD and PPD states) or by decreasing concentration in high poverty areas (by PPD and DPD states).

Figure 10*: Changes in Percent of Units by Year by Groups*



Source: Author's calculation from HUD LIHTC database and ACS 2005-2009, and 2015-2019 5-Years estimates

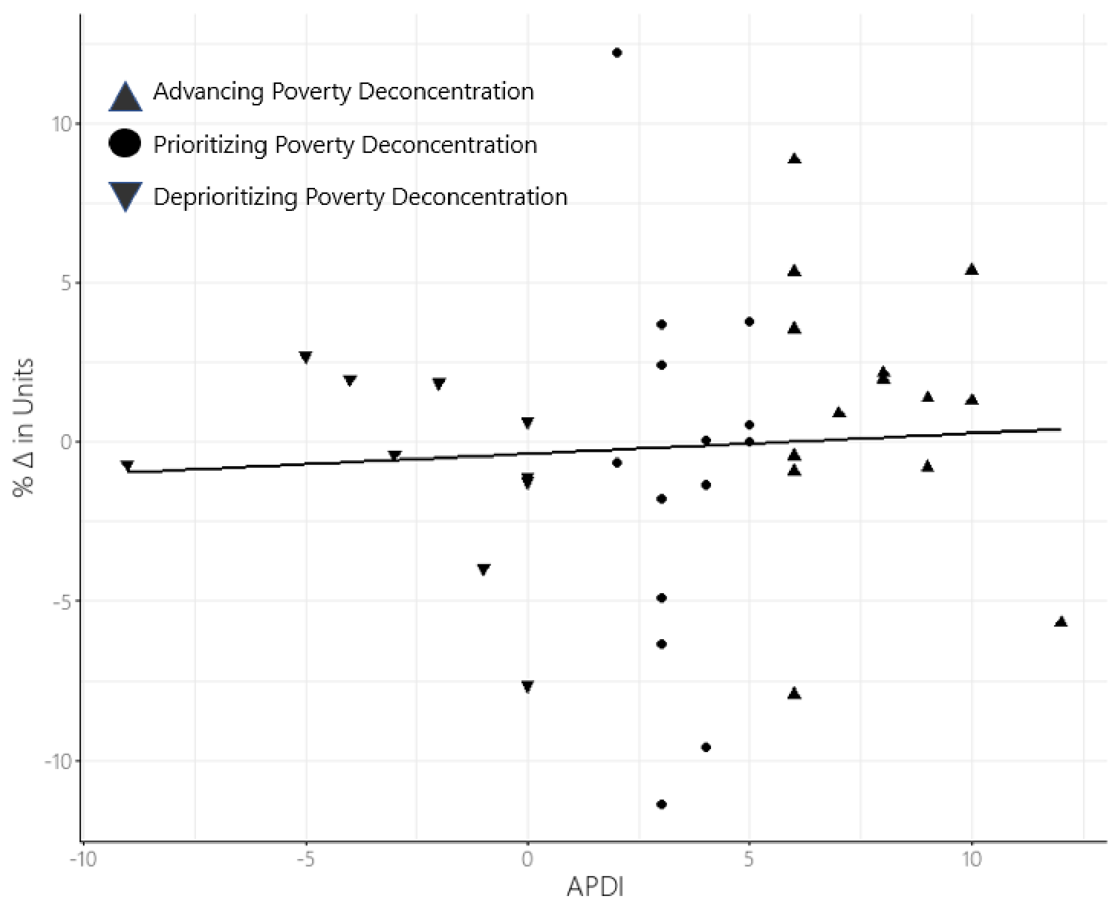
Changes recorded in this analysis (see Table 8 above) are closely consistent with previous research where Ellen and Horn (2018) noted an increase of units in the very-low-poverty census tracts (<10%) from 20% to 23.5%; a decrease in high-poverty census tracts from 35% to 26.5%; and a decrease in the average poverty rate from 24.3% to 22% where LIHTCs were developed between 2003-05 and 2011-13. Similarly, Ellen and Horn (2018) reported the average poverty rate being 22% in 2011-13, which fell to 18.54% for the end year of the current analysis. Evidently, a slow but steady improvement can be noticed as a generic trend. To further understand the changes, I examine the correlation between APDI values and the three selected indicators for poverty deconcentration.

QAP Change and the effects on Mixed Income Projects

The mixed-income development strategy is one of the most sought-after policy instruments to address poverty concentration and has been proven to be useful to some extent (Fraser et al., 2013; Levy et al., 2013). The underlying assumption of mixed-income development has been that reinvestment, increased intergroup contact, and expansion of social networks through socio-spatial proximity will result in poverty reduction and deconcentration. Therefore, the logical pathway for QAPs to encourage poverty deconcentration is to allow a considerable percentage of units available at fair market rent. It is important to note that developers would ideally prefer to earn the highest qualified basis to maximize the tax credits, and therefore, increasing the share of fair market units within a LIHTC project may not be in their best financial interests. Thus, the average percentage of low-income units is significantly high (about 95%) for both years and only a very small decline has been noted.

There is an overall slight positive correlation between the APDI value and the change in QAP incentives (between 2005-07 and 2015-17) for mixed-income projects (r = 0.13), meaning that states which incentivized this criterion recorded a positive increase in the APDI value. Not surprisingly, 10 states recorded increases in the share of mixed-income units between 2005-07 and 2015-17of at least by 2percantage-points. Of these states, only Iowa, Idaho, and Louisiana disincentivized this criterion in 2015. Interestingly, six states recorded more than 5 percentage-points decrease in mixed-income units in 2015-17, which is commensurate with the trend of disincentivizing this criterion. Among these states, two (Arizona and Ohio) were classified as APD. Figure 11 shows the overall relationship between changes in mixed-income units and the APDI. The correlation coefficients are presented in Table 9 below. This highlights the challenges faced by state HFAs in incentivizing mixed-income developments due to federal policy incentives for eligible basis. Even if state HFAs try to encourage mixed-income development through their QAPs, these efforts may not be enough to counteract the dominant influence of federal policy. This can, effectively, perpetuating income segregation within a project, as well as a neighborhood.

Figure 11: *Percentage Change in Mixed-income Units and APDI*



Source: Author' calculation

QAP Change and the effects on Siting in Qualified Census Tracts

One of the IRS preferences, scholars argue, that may have produced a disproportionate share of LIHTC developments in high-poverty areas is the Qualified Census Tract or QCTs

(Dawkins, 2013; Lang, 2012; Oakley, 2008). In general, the term “qualified census tract” means any census tract—designated by the Secretary of HUD—for the most recent year for which census data are available on household incomes in a such tract, either in which 50% or more of the households have an income which is less than 60% of the area median gross income for such year or which has a poverty rate of at least 25% (26 USC § 42d5). The motivation behind using the QCT incentive is to attract developments in low-income, high-poverty areas (Lang, 2012), which has perpetuated concentrated poverty (Oakley, 2008; Williamson et al., 2009). Therefore, poverty deconcentration should, theoretically, have an inverse relationship with QCTs.

Table 9: *Correlation between APDI and Poverty Deconcentration Indicators*

	Mixed-income Projects	Qualified Census Tracts	Opportunity Areas	High Poverty Areas
APDI Value and QAP Incentive	0.13	0.02	0.14	--
APDI Value and QAP Incentive (by group)				--
Advancing Poverty Deconcentration	-0.05	0.28	-0.43	--
Prioritizing Poverty Deconcentration	0.28	0.35	0.11	--
Deprioritizing Poverty Deconcentration	0.03	-0.12	0.18	--
APDI Value and Change in Units	-0.15	0.08	-0.21	-0.03
APDI Value and Change in Units (by group)				
Advancing Poverty Deconcentration	-0.26	-0.21	0.28	-0.22
Prioritizing Poverty Deconcentration	-0.17	0.12	-0.15	0.33
Deprioritizing Poverty Deconcentration	-0.25	0.02	-0.14	0.09

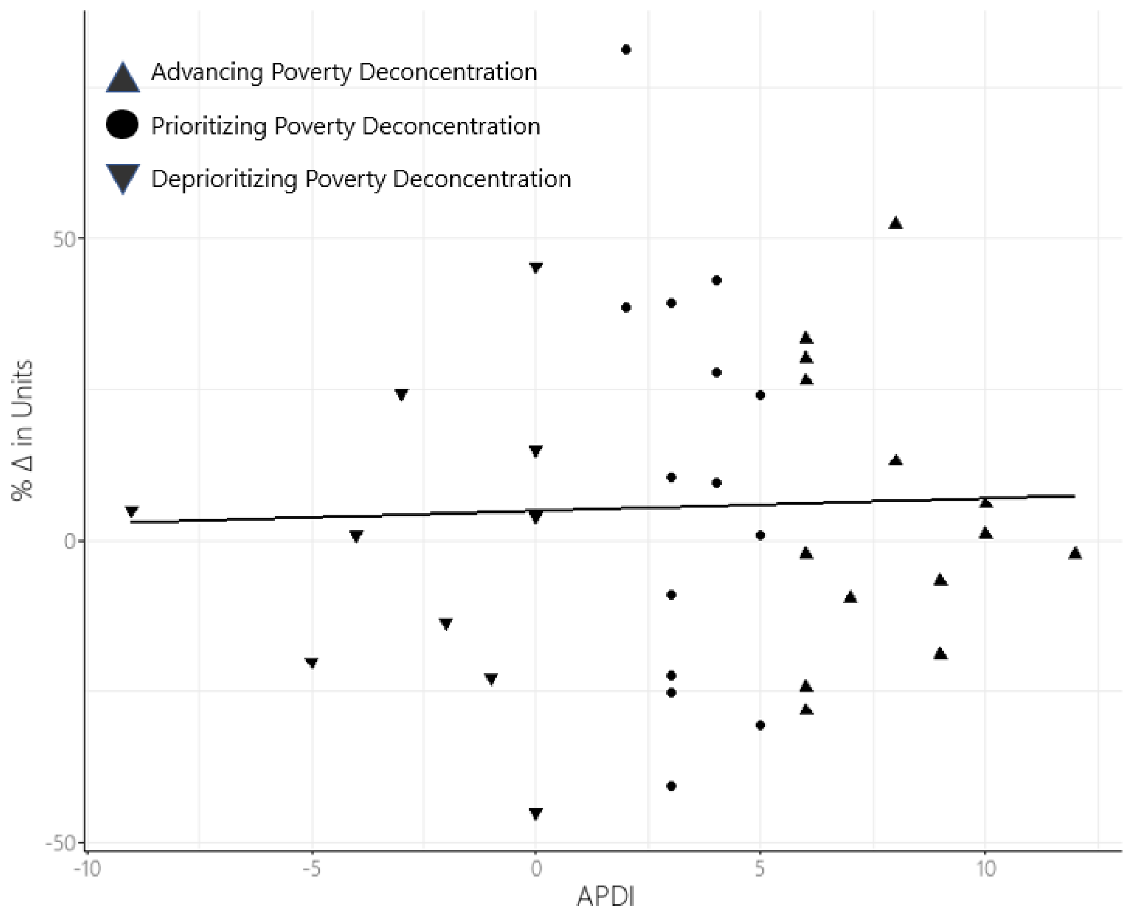
Source: Author’s calculation

About 75% of all states (28 states) disincentivized this criterion in 2015 with eight states recording over five percentage-points decrease. Overall, the correlation between APDI, incentivization of the criterion, and units placed in QCTs were weak as noted in Figure 12 (r = 0.02). However, when explored further, both APD and PPD groups recorded a positive relationship contrary to the assumption that higher APDI value is partially influenced by disincentivizing this criterion. Moreover, analogous to the theoretical assumption in this research, APD recorded a negative correlation between APDI and percentage changes in units in

QCTs, unlike the other groups, which is indicative of the efforts toward poverty deconcentration for these groups.

The majority of states in the APD group disincentivized this criterion with the exception of Maine (0.91 percentage-point increase in QAP incentive), Michigan (1.62), and Ohio (1.42). Half of the 14 states in the APD group recorded a decline in percent of units in QCTs where Texas saw the most notable changes of close to 30% decline, while Michigan saw about a 50% increase in units in QCTs.

Figure 12: *Percentage Change in Units in QCTs and APDI*



Source: Author' calculation

For the PPD group, ten out of 14 states disincentivized LIHTCs in QCTs. Surprisingly, despite disincentivizing this criterion, West Virginia, Indiana, and Utah recorded 43.08, 39.39, and 38.64 percentage-points increase in LIHTC units in QCTs. On the other spectrum, Georgia, Louisiana, and Wisconsin saw a -25.22, -22.34, and -40.65 percentage-points change.

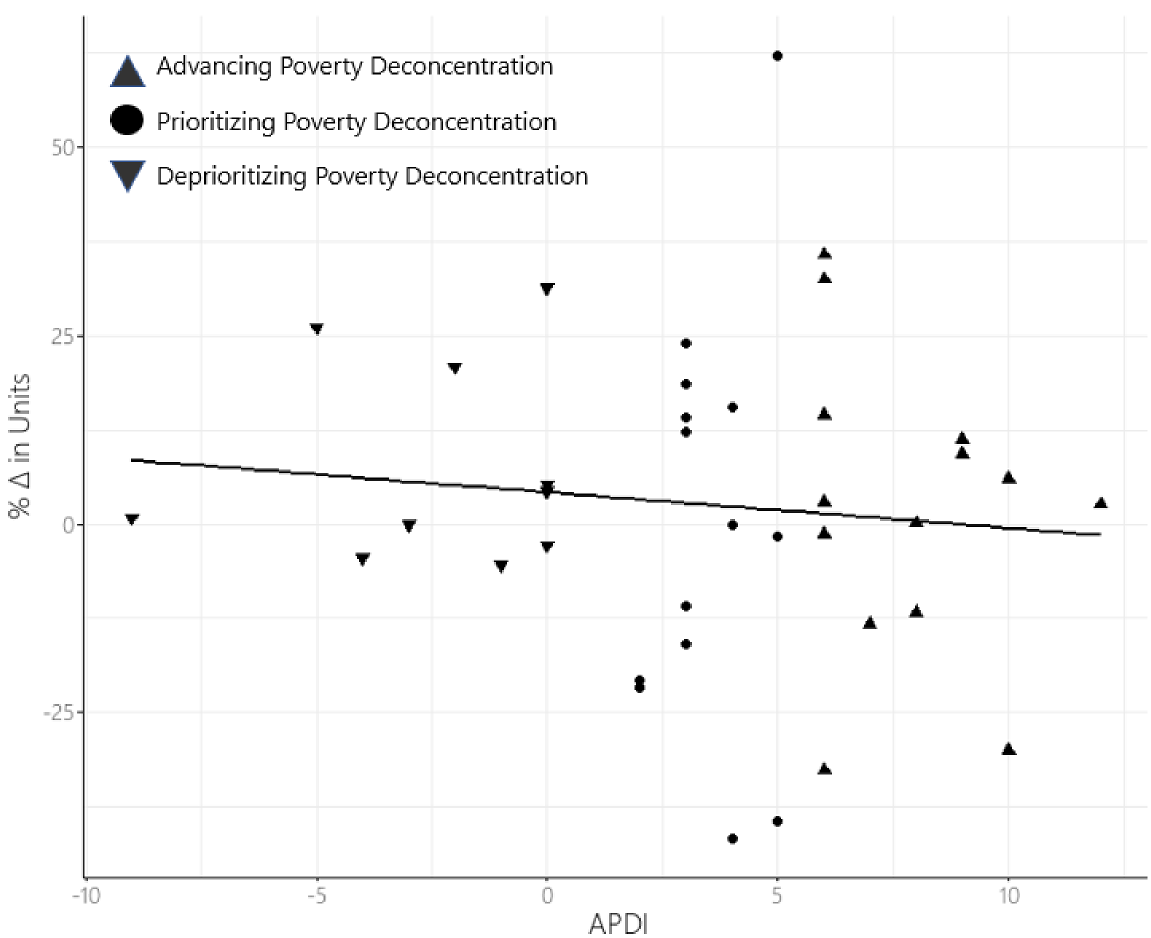
Lastly, seven out of 10 states from the DPD group disincentivized this criterion whereas only four states recorded a decline in percent of LIHTC units in QCTs. Notably, New Jersey placed no new project in QCTs during 2015-17 which led to a massive 45 percentage-points decline in the units placed in QCTs between the two years. Despite low disincentivizing (3.41) of this criterion, Mississippi placed about 83% of LIHTC units in QCTs in 2015-17 which led to a 45 percentage-points increase. Pennsylvania incentivized this criterion by 14 percentage-points, however, recorded a 13 percentage-points decline in units placed in QCTs.

The above discussion alludes to the issue that enforcing a criterion may not necessarily assure measurable outcomes. The QCT incentive is a federally mandated one, that had significant impact in placing units in high-poverty areas. Although states creatively crafted this criterion to disincentivize units in QCTs, it may still be a combination of market force (for example low land acquisition cost) and market need (for example, high demand for rental units) that drive developers to propose units in QCTs.

QAP Change and the effects on Siting LIHTCs in Opportunity Area

A substantial body of research documented the negative effects place has on individuals and families, typically for those living in high-poverty, distressed neighborhoods (Chetty et al., 2016; Jencks & Mayer, 1990; Mayer & Jencks, 1989; Wodtke et al., 2011). In the realm of housing policy, emphasis on access to opportunity-rich areas became evident after the measurable success of the MTO program which provided access to opportunity-rich areas and demonstrated positive outcomes for low-income individuals and families. It is then imperative that QAPs should also promote LIHTC developments in opportunity areas and a positive relationship should exist between incentivizing the Access to Opportunity Areas theme and APDI. States have operationalized "Opportunity Areas" in various ways, as discussed before, but the underlying economic logic remained constant for each of these operationalizations. Hence, to access this criterion, this study uses the very-low-poverty rate (<10%) as a proxy for opportunity.

Figure 13: *Percentage Change in Units in Opportunity Areas (<10% poverty rate) and APDI*



Source: Author's calculation

In total, 27 states incentivized this criterion where 13, 9, and 5 states were from APD, PPD and DPD groups, respectively. Pennsylvania (in DPD group) incorporated the most incentivization (15 percentage-points increase), whereas Iowa, with one of the highest APDI values, incentivized this criterion by only one percentage-point. Despite being the only state in the APD group that disincentivized this criterion, Washington recorded over 10 percentage-points increase by placing more than one-third of all new units in very-low poverty tracts in 2015-17. Delaware incentivized opportunity area (by 13 percentage-points), however, saw a 30 percentage-points decline in units placed in very-low poverty census tracts along with Iowa. Montana and Texas recorded more than 30 percentage-points increase by placing over 40% of their new units in opportunity areas.

Only two states (Kentucky and New Hampshire) in the PDP group disincentivized this criterion and recorded close to 22 and 41 percentage-points decline in placing new projects in very-low poverty tracts, respectively. Despite prioritizing opportunity areas, Indiana and Louisiana placed fewer units in very-low poverty areas resulting in more than 10 and 15 percentage-points decline between 2005-07 and 2015-17.

Similarly, California and New Jersey from the DPD group deprioritized this criterion, yet, noted positive percentage-point change in placing units in very-low poverty areas. Particularly, New Jersey disincentivized the opportunity area criterion by 9 percentage-points, however, noted a 31 percentage-points increase in placing new units very-low poverty tracts. Only Kansas and South Dakota placed fewer units in very-low poverty areas in 2015-17, although Kansas prioritized the opportunity area criterion by 5 percentage-points.

The positive correlation between APDI and prioritization of opportunity area satisfied the assumption of this study, however, the group-level correlation showed that for the APD group observed a negative correlation. The overall correlation between APDI and the percentage change in units developed in very-low poverty census tracts was negative and in particular, for the APD group this result (-0.20) is surprising (see Figure 13). However, the state level analysis suggests that suboptimal performance by four APD states (Delaware, Iowa, Michigan, and Wyoming) in placing units in very-low poverty areas may have heavily influenced the magnitude of the overall correlation.

These correlation-based analyses of three measurable indicators provide a complex understanding of states' efforts toward poverty deconcentration through policy and the actual outcomes in terms of placing LIHTC units. The first case of mixed-income projects suggests that, although there is a small increase in overall income-mixing, developer's financial interest (as in leveraging the eligible basis to the maximum) may have impacted gaining a substantial change in income integration. For the second case, placing units in QCTs, both IRS incentives (in the form of basis boost, another financial interest for developers) and the local housing market are likely to be strong influencing factors that encourage low-cost developments in QCTs. Lastly, the opportunity area (<10% poverty rate census tracts) case informs that encouraging opportunity areas in the QAPs areas does not directly imply easy access to opportunity-rich areas. There are several reasons why encouraging opportunity areas may not necessarily translate into gaining more units in very-low poverty areas when local and state politics are considered among other potential reasons, such as high development cost, zoning limitations, and local housing market needs. In essence, despite sincere efforts in policy design, substantial promotion of poverty deconcentration by allowing access to opportunity-rich areas is still a problematic issue partly due to the nature and scope of policy (QAP being a state-level policy instrument) and partly due to several economic reasons mentioned above.

Effects of QAP Change

One of the focal interests of this study was to understand the effects of QAP change on LIHTC siting. To understand the effects, I estimated ordinary least square regression models at the state level to examine whether higher values of APDI were associated with increases in percentage of units being built in very-low poverty (<10%) areas between 2005-07 and 2015-17.

Table 10 presents the coefficients for the independent variable (APDI) and the control variables for very-low and high-poverty census tracts, at the state-level average (see Appendix M for the descriptive statistics at the state level). All control variables are matched with their respective census tract type.

Table 10: *State-level Analysis of Effects of QAP on LIHTC Siting*

Dependent variable:	OLS Model	
Percentage change in LIHTC units	Very-Low Poverty (<10%) Tracts	High Poverty (>30%) Tracts
(Intercept)	-73.811.	26.424
	(41.274)	(31.989)
APDI	4.664.	-4.194.
	(2.518)	(4.122)
Δ%Minority	9.365	-8.923.
	(6.103)	(5.385)
Δ%Poverty Rate	-1.939	17.819.
	(6.252)	(15.704)
Δ%Rental Vacancy	-1.380	0.922
	(1.742)	(2.298)
APDI * Δ%Minority	-0.918	0.802
	(0.567)	(0.720)
APDI * Δ%Poverty Rate	-0.066	-2.318
	(1.167)	(2.524)
APDI * Δ%Rental Vacancy	0.102	-0.179
	(0.146)	(0.283)
Observations	38	38
R^2	0.239	0.203

Note: Standard errors are heteroskedasticity robust. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

To illustrate, the first model includes a dependent variable that captures the change in the share of rental housing units located in neighborhoods with less than 10% poverty in the regression model that examines the change in the share of units allocated tax credits in very-low poverty neighborhoods. With only 38 observations, the coefficients were not statistically significant, however, they confirm expected signs for the coefficients that are conceptually, theoretically, and economically meaningful. In essence, changes in QAPs toward poverty deconcentration led to an increase in LIHTC units in very-low poverty areas.

Although the magnitude of this effect is low, this analysis found QAPs to be instrumental in placing LIHTC units in opportunity-rich areas. While the coefficients for APDI in both types of tracts suggest that overall, there may be a similar effect of QAPs in siting new LIHTC units in these tracts, a further analysis of the interaction terms reveals a more nuanced scenario (see Table 11).

Table 11: *Effects of QAPs at the State Level by Groups by Census Tract Poverty*

Groups	Mean APDI	Increase in Poverty Rate by		
		10%	20%	30%
Very-low (<10%) Poverty rate				
DPD	-2.50	-17.65	-35.30	-52.95
NULLPD	0.00	-19.40	-38.80	-58.20
PPD	3.50	-21.85	-43.70	-65.55
APD	7.79	-24.85	-49.71	-74.56
High (>30%) Poverty Rate				
DPD	-2.50	236.90	473.80	710.70
NULLPD	0.00	178.90	357.80	536.70
PPD	3.50	97.70	195.40	293.10
APD	7.79	-1.83	-3.66	-5.49

Source: Author’s calculation

For illustration purposes, let us assume the effects of QAP changes on each group (APD, PPD, DPD) at their mean APDI values, and for context I created a NULLPD (with mean value of

APDI = 0). I estimate the total effect of change on every 10% increase for both types of tracts (see Appendix N for a detailed calculation).

The second column represents the mean values for each group (see Table 4 in Chapter 3) and the rest of the columns present for each group (including the NULLPD) the changes in percent of units being produced. As such, with 10% increase in poverty rate for very-low (<10%) census tracts, an average state in the APD group loses close to 25% new units in high opportunity areas as compared to close to 18% new units for an average state in the DPD group. Similarly, with 10% increase in poverty rate in high (>30%) poverty tracts, an average state in the DPD group gains close to 240% new units, while the APD group loses close to 2% new units. This highlights that the impact of QAPs varies depending on the state and the poverty rate of the census tract. In other words, the effects of QAPs are not uniformly distributed across different locations and socioeconomic conditions.

To add statistical rigor and test for the robustness, the same models were estimated at the census tract level for all metropolitan tracts in the sample states. Results are presented in Table 11, in which the first column accounts for all tracts, second column accounts for all very-low poverty (<10%) tracts in 2005-2009 ACS and the third column includes all high-poverty (>30%) tracts for the same year, respectively (see Appendix O for the descriptive statistics at the census tract level). Control variables are similar to the state-level model. Important to note here that a market study of the proposed location is required for every LIHTC application, and hence, the rental vacancy variable at the census tract level (a tract being the market) is considered for these models.

In most cases, the coefficients at the census tract level (Table 12) are smaller than the state level which can be explained as the state-level coefficients are capturing the aggregate effect of change. It is important to note that the difference between tract and state models is not only about the unit of analysis but also about the type of outcome being measured. The poverty rate of a census tract has a small effect on the number of LIHTC units built there, while a change in the poverty of an entire state can be expected to have a larger effect on the share of LIHTC units built in a particular type of census tract. The difference in the magnitudes of the coefficients is due to the difference in how the dependent variable is defined and measured in each set of models. Moreover, there may be significant variations in the relationship between the independent variable and the dependent variable across census tracts within a state. In other words, the effect of the independent variable on the dependent variable is not consistent across all census tracts within and across states.

The dependent variable for the census tract models is the change in the number of new units between the years 2005-07 and 2015-17, for all metropolitan tracts in the sampled states and I estimated the standard errors (presented in the parenthesis) at the metropolitan level.

The results of this analysis are closely consistent with the state-level models. In the first model (representing all metropolitan census tracts), the interaction term “APDI * %Poverty” has a negative coefficient estimate of -0.002 with a p-value less than 0.05, indicating a statistically significant interaction effect. This suggests that the relationship between the change in LIHTC units and APDI varies depending on the level of poverty. Specifically, for a given increase in APDI, the change in LIHTC units decreases by 0.002 more for each percentage-point increase in poverty.

Table 12: *Linear Models Capturing the Effects of QAP Change at Census Tract-Level*

Dependent variable: Change in LIHTC Units	All Metropolitan Tracts	Very-low Poverty Tracts	High Poverty Tracts
(Intercept)	1.728 ***	0.371**	-1.63*
	(0.329)	(0.422)	(4.13)
APDI	-0.065	0.900*	0.403
	(0.054)	(0.076)	(0.659)
%Poverty	-0.110 ***	-0.100*	0.009
	(0.026)	(0.067)	(0.081)
%Minority	-0.039 ***	0.014	-0.062 *
	(0.009)	(0.013)	(0.029)
%Rental Vacancy	-0.012	-0.003	-0.046
	(0.009)	(0.008)	(0.044)
APDI * %Poverty	0.002	-0.228*	-0.060
	(0.004)	(0.012)	(0.012)
APDI * %Minority	0.005 ***	0.006 **	0.001
	(0.001)	(0.002)	(0.004)
APDI * %Rental Vacancy	-0.001	-0.000	0.004
	(0.001)	(0.002)	(0.007)
Observations	39845	18362	4901
R^2	0.030	0.020	0.060

Note: Standard errors in parenthesis are clustered at the metropolitan level.

Standard errors are heteroskedasticity robust. *** p < 0.001; ** p < 0.01; * p < 0.05.

To illustrate, let's examine the effects of QAPs on each group based on 1, 3, and 5% increase in poverty rate (I adopted a smaller change at the census tract level since Appendix M notes that the maximum change in poverty rate is close to 2%, and it is unlikely that many individual tracts experience over 5% change within a decade) Similar to the state-level analysis of interaction terms, Table 13 presents the estimated effects of QAPs on average states in different groups and by poverty rate in influencing LIHTC siting.

Table 13: *Effects of QAPs at the Census Tract Level by Groups by Census Tract Poverty*

Groups	Mean APDI	Increase in Poverty Rate by		
		1%	3%	5%
All MSA Census Tracts				
DPD	-2.50	-1.05	-2.10	-3.15
NULLPD	0.00	-1.10	-2.20	-3.30
PPD	3.50	-1.17	-2.34	-3.51
APD	7.79	-1.26	-2.51	-3.77
Very-low (<10%) Poverty rate				
DPD	-2.50	0.47	1.41	2.35
NULLPD	0.00	-0.10	-0.30	-0.50
PPD	3.50	-0.90	-2.69	-4.49
APD	7.79	-1.88	-5.63	-9.38
High (>30%) Poverty rate				
DPD	-2.50	-0.24	-0.72	-1.20
NULLPD	0.00	-0.09	-0.27	-0.45
PPD	3.50	0.12	0.36	0.60
APD	7.79	0.38	1.13	1.90

Source: Author's calculation

The results of the interaction term are similar to that of the state-level analysis except the unit of analysis is different (change in number of new units in each tract). For instance, with 5% increase in poverty rate for any very-low (<10%) poverty census tracts, states in the APD group noted, on average, a loss of close to 9 new units, whereas DPD state gained close to 2.5 units. The effects of QAPs are significantly greater on the very-low poverty tracts (compared to the PPD and DPD groups, as well as compared to the high-poverty tracts), likely due to the fact that LIHTC units are typically less likely to be built in such tracts.

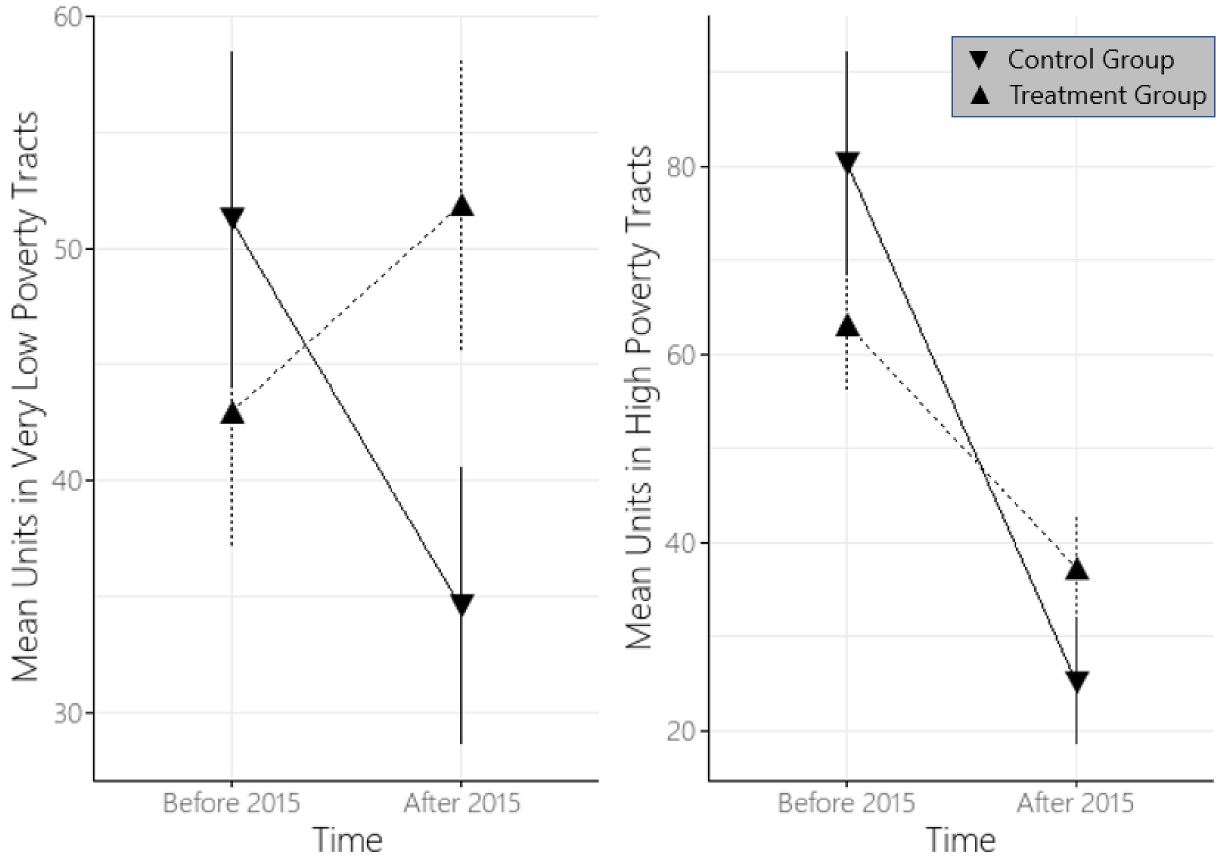
Overall, the results suggest that the impact of APDI on the changes in siting LIHTC units varies depending on the level of poverty, with a slightly stronger negative effect in all metropolitan tracts as poverty levels increase—and a substantially stronger negative effect in very low poverty tracts. In conclusion the above regression models and the interpretation of the interaction terms relating to poverty rates suggest that there is a is a noticeable shift away from building affordable housing in neighborhoods with higher poverty rates. This is indicated by a negative trend in the coefficient for changes in poverty rates in the first column of data. This trend is particularly evident in states that are trying to promote more economic integration and deconcentrate poverty through their QAPs.

Additionally, the trend is most prominent in "high opportunity" areas, which are neighborhoods with poverty rates below 10%. This means that developers are more likely to build affordable housing in areas that offer better economic and social opportunities, such as good schools, low crime rates, and access to jobs and amenities. This has important implications for low-income families who may benefit from increased access to these opportunities through living in these areas.

Understanding the Spatial Effects of QAP Change on New LIHTC Units

To examine the potential effect of QAP change on LIHTC siting, I utilized a quasi-experimental design called Difference-in-Differences (DiD) to analyze the impact of policy change over time. The study evaluated the impact of a change in QAP priorities before and after 2015-17 (coded as 0 and 1, respectively) on a treatment group that prioritized poverty deconcentration (APD and PPD = 1). This model, however, includes census tracts that at least received one LIHTC unit in either time-period.

Figure 14: *Difference in Differences Estimation*



Source: Author's calculation

Figure 15 has two panels that show the effects of changes in QAP on the location of LIHTC units. The left-hand panel shows the effects on areas with very low poverty rates, where the treatment group (those prioritized poverty deconcentration in their QAPs) has significantly increased, on the average, siting of new units in very-low poverty areas than the control group. This suggests that states are encouraging the development of affordable housing in areas with more opportunities. The right-hand panel, on the other hand, shows less significant effects on areas with high poverty rates. The control group, in particular, has been more successful in reducing the concentration of LIHTC units in areas with poverty rates above 30%, indicating a shift in policy towards prioritizing poverty deconcentration by limiting the spatial concentration of projects in high-poverty areas. reducing concentrated poverty. The findings align with the patterns observed in Figure 10, where the control group (DPD states) showed a significant decrease in the number of LIHTC units built in high poverty areas. The results are in line with the descriptive findings and do not include any control variables. However, the results provide a useful summary of the descriptives, particularly in combination with Figure 15. It should be noted that these findings do not allow for making strong causal conclusions about the impact of QAP changes, as an explicit modeling of the state selection process into the treatment group (APD or PPD) would be required for that. In addition to the graphical representation presented above, the regression estimation of DiD was performed.

Table 14: *Regression Estimation for Difference-in-Differences*

Dependent Variable: Change in Mean Units	Very-low Poverty Tracts	High Poverty Tracts
(Intercept)	51.2455 ***	80.3532 ***
	(3.7017)	(6.0025)
Treatment	-8.2945*	-17.1131 **
	(2.2297)	(5.1739)
Post	16.6891 **	-55.2642 ***
	(3.1402)	(6.3247)
Treatment * Post	25.6190 ***	29.2338 ***
	(6.3642)	(5.7288)
Observations	1892	1738
R^2	0.0075	0.0525

Note: Standard errors in parenthesis are clustered at the metropolitan level.

Standard errors are heteroskedasticity robust. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

The first column in Table 14 estimates the effect of QAP intervention that occurred in 2015 on the outcome variable mean units in very-low poverty census tracts. The intervention was implemented for the Treatment variable that includes APD and PPD groups. The results show that the intercept of the model is 51.245, which means that before the intervention, the average number of units was 51.245 for the control group. The coefficient of the Treatment variable is -8.294, indicating that the groups (APD and PPD) that received the intervention had, on average, fewer units than the control group (DPD) before the intervention (2005-07). The coefficient for the Post variable is 16.689, indicating that after the intervention, the average number of units increased by 16.689 units in both groups. Finally, the coefficient of the interaction term Treatment * Post is positive (25.619), meaning that the difference between the treatment and control group has increased by 25.619 units on average after the intervention in the post-treatment period, compared to the pre-treatment period, holding the other variables constant.

On the other hand, the right-hand side panel estimated the effect of policy change on average units produced in high poverty census tracts. On average, the control group had higher mean (17 more) units in high poverty tracts, compared to the treatment group in 2005-07 period. The coefficient for Post is -55.264, indicating that the treatment is associated with a decrease of 55.264 units in high poverty tracts on average, all else being equal. However, the coefficient for the interaction term is 29.234, indicated that after the policy change the treatment group housed, on an average, 29.234 more units in high poverty tracts compared to the control group. This highlights, again, that while the APD and PPD groups prioritized siting new units in very-low poverty areas, the DPD group prioritized reducing the concentration of new units in high-poverty areas.

Conclusion

A significant change in the policy direction (demonstrated in the previous chapter) has potentially changed the spatial pattern of low-income rental units across states in the U.S. This chapter found that between 2005-07 and 2015-17, many states have decreased the share of LIHTC units in high poverty areas, thereby encouraging poverty concentration. Concurrently, these states have been successful in placing units in very-low poverty areas, which assumably is instrumental in enabling low-income families to access quality resources and social capital. Moreover, these changes are not at random, as this study found that changes in QAP criteria in prioritizing poverty deconcentration significantly influenced siting of LIHTCs, especially in the opportunity rich areas. Additionally, this study concluded that there exists a statistically significant relationship between changes in QAP criteria and the consequent changes in LIHTC siting and these changes are not by chance, or arbitrary (see Table 14).

However, two important aspects surfaced during the analysis. First, the degree to which QAPs can influence LIHTC siting is not similar across states. For example, despite taking a middle ground in prioritizing deconcentration, the PPD states observed the most notable increase LIHTC units in very-low poverty areas (see Figure 10). On the other hand, states in the DPD group significantly limited LIHTC developments in high poverty areas, contrary to the expectations. Second, the rate of change in placing LIHTC units in opportunity areas is considerably slow (with an annual increase of close to one percentage-point). There may be other macro-economic issues (for example the structural stress of the 2008 Great Depression) and exogenous shocks that affected the production of LIHTC (Joint Center for Housing Studies, 2009; Rohe, 2017) for its dependency on private investors. Despite the renewed effort of poverty deconcentration, a loss of more than 50,000 new units in ten years may have deterred the scope of such effects to be translated into action. Lastly, it appears that tackling poverty deconcentration comes from two eminent strategies—increasing units in opportunity areas and decreasing concentration in high poverty areas—and seldom a combination of both. For instance, on average, most states in APD and PPD groups emphasized increasing production of new units in very-low poverty areas, whereas the DPD states focused on decreasing concentration. Understanding why states have not combined both strategies (partially, except for the PPD group), or favored one over the other, is beyond the scope of this research. However, it would be an interesting avenue of research which may allow states to learn from one another and excel in honoring the anticipated deliverables of the largest subsidized affordable rental housing program in the U.S.

CHAPTER 5
Conclusion and Policy Consideration

A historical legally of racism produced uneven geographies of opportunity across the U.S. where majority Blacks and Hispanics were systematically segregated and enclaved in certain areas of metropolitan America with little or no access to quality resources. Such spatial confinements exert immense pressure on available resources in those areas, such as, public schools—that are routinely underfunded and segregated (Jordan, 2014). The quality of education, among other constrictions, significantly affects quality of life and well-being for individuals and families that were purposely housed in high-poverty areas. The U.S. housing policies played an undeniably crucial role in creating, sustaining, and exacerbating concentrated poverty, by systemically barring low-income populations from accessing geographies of opportunity. There are, however, untapped potentials, as scholars and policymakers have frequently alluded to, for some of these policies (especially LIHTC) to reverse the trend. A 'dispersal consensus', therefore, dominated the policy framework (Imbroscio, 2016) as numerous studies concluded that deconcentration indeed ameliorated barriers to improving the life-chances and outcomes experienced by poor Americans.

This dissertation presents an investigation into the extent to which state governments incorporated deconcentration criteria into their Qualified Allocation Plans (QAPs), which in turn had a direct impact on the location of Low-Income Housing Tax Credit (LIHTC) projects. The research findings provide evidence that a majority of states in the U.S. incorporated and prioritized poverty deconcentration criteria into their QAPs, with the intention of limiting the concentration of LIHTC projects in high-poverty areas. Furthermore, it was found that many states included measures that would promote the siting of LIHTC projects in areas of opportunity, using census tract poverty rates of less than 10% as a guiding principle.

By examining the measurable impact of these policy changes, this research found that states that prioritized deconcentration criteria experienced an increase in the share of LIHTC projects in opportunity-rich areas. Conversely, certain states demonstrated success in controlling concentrations of LIHTCs in high-poverty areas (as referenced in Figure 10 and the right-hand panel of the DiD model). Overall, this research found that QAPs played a crucial role in shaping the distribution of low-income housing units.

Major Findings

The previous two analytical chapters reveal that there are some important shifts that took place in terms of 1) prioritizing poverty deconcentration criteria in state QAPs, and 2) significant and measurable changes in siting LIHTC units based on the changes in QAPs. This research found evidence that the changes in the QAPs predicted a significant shift in the poverty levels of low-poverty neighborhoods where new LIHTC units were built. Although it cannot be claimed that QAP changes caused this shift, my analysis shows that this shift *did* occur, which is consistent with the descriptive results in Figure 10. Furthermore, my research provides clear evidence that the siting of new LIHTC units in very-low poverty areas was not associated with rising poverty rates. This finding is important, for the concern that the areas of opportunity that attracted new LIHTC developments during this period were inner-ring suburbs with low but increasing poverty rates. The findings presented in Table 12 refute this hypothesis. The findings shed valuable insights into the process of prioritization and the effectiveness of the changes adopted in QAPs. It also helps inform policymakers about the importance of several criteria (nested under the main three themes) in designing policy towards attainable goals.

A potential shift in Policy Design and Regime

The third chapter in this dissertation provides a clear picture of changes in QAPs regarding the poverty deconcentration agenda. Not only does it provide a fuller account of criteria used in QAPs to promote poverty deconcentration, but it also presents a thematic organization of criteria to promote deconcentration in three salient, and perhaps interdependent, ways. The thematic organization provides an essential understanding of different emphases in policy design by states to achieve the same goal of deconcentration. The three themes-density reduction, disinvestment from low-income areas, and access to opportunities-are essential to establish the pathways (and different interests) state took in promoting deconcentration. As such, it allows me to argue, in connection to the typology of states, how differently states approached these strategies and what were the outcomes.

The second major finding is developing the typology of states in terms of prioritizing poverty deconcentration goals. This also includes a refining of an established framework of analysis by Ellen and colleagues (2015, 2018) that did not directly account for the direction in which states moved towards prioritizing poverty deconcentration. The prior limited research only examined, through a single index measurement, the degree to which QAPs changed their priorities towards locating LIHTC in opportunity areas using location incentives. This research builds onto this approach and provides a rather extensive account of QAP criteria that were instrumental in crafting QAPs to the desired outcomes. Moreover, by creating two indexes for the two sample years, I provide a trajectory *and* degree of changes incorporated in state QAPs.

The findings of this research indicate a strong shift at the institutional level relating to prioritizing poverty deconcentration.

The primary aim of this study was to investigate whether states incorporated poverty deconcentration criteria in their QAPs. However, the findings of this research have allowed us to delve further into the question of how states prioritize poverty deconcentration. For instance, I observed that the APD group shifted their focus from promoting concentration in 2005 to advancing poverty deconcentration in 2015, primarily by prioritizing the access to opportunity theme. Meanwhile, the DPD group placed greater emphasis on limiting density and producing LIHTCs in low-income, high-poverty areas.

Notably, the PPD group, which balanced their priorities equally towards poverty concentration and deconcentration in 2005, placed a greater emphasis on poverty deconcentration in 2015. This was achieved by emphasizing access to opportunities and limiting density and concentration of units in high-poverty areas, simultaneously, resulting in significant changes in the siting of LIHTCs in very-low poverty areas. In summary, while the initial objective of this study was to explore whether states promoted poverty deconcentration criteria in their QAPs, the findings have provided a more nuanced understanding of the extent, direction and more importantly, how states prioritize poverty deconcentration, with some groups emphasizing access to opportunities and others focusing on density and location of LIHTCs.

Changes in the Spatial Arrangements of LIHTCs

The findings (from Chapter Three) indicate that the majority of states (28 out of 38) implemented changes in QAP criteria that should, theoretically and expectedly, disincentivize LIHTC developments in high-poverty, high-minority areas and promote poverty deconcentration through accessing areas of opportunity. Although, the results show that the percentage share of LIHTC properties placed in QCTs has declined over time (-3.21 percentage-point change) as 28 states disincentivized project development in QCTs in 2015, there was still a significant percentage of projects being placed in QCTs in 2015-17. This implies that the IRS-mandated QCT incentive still might have a significant influence on LIHTC developments in QCTs. When analyzing the LIHTC data at the property-level, the study found that a very small decline was observed for LIHTC properties offering a mix of rent-restricted and market-rent units. Since developers are financially incentivized to maximize the percentage of rent-restricted units, it came as no surprise that income mix was not a stated policy goal, as many high-performing states (meaning states with high APDI, i.e., APD and PPD groups) disincentivized this criterion in their QAPs.

The study also revealed some considerable changes in the siting pattern of LIHTC properties between the two years. Overall, positive percentage-point changes were recorded in project development in very-low poverty (<10%) neighborhoods, indicating steady but slow growth (10.76% in a 10-year span, or an annual average of 1.08% increase). Negative percentage-point changes were recorded for LIHTC developments in high (more than 30%) and very high (more than 40%) poverty census tracts, indicating a decline in siting of projects in these areas with about a 5.16 percentage-point decline in the average census tract poverty rate for all states. It is important to note that the high-performing states gained more new units while the remainder of states lost a large sum, compared to their numbers in 2005 may explain, in part, why the APD and PPD groups placed more new units in very-low poverty tracts compared to the DPD group.

Effects of Changes in QAP Priorities on LIHTC Siting

The correlation analysis presents a complex understanding of QAP criteria and the expected outcomes in terms of LIHTC siting. While the Mixed-income projects criteria recorded a positive correlation, the actual change remained small. QCTs, as a federally mandated criterion, recorded a weak positive correlation, despite many states disincentivizing this criterion in their QAPs. The plausible explanation could be that the 130% basis boost as the financial incentive has a strong effect on the location decision for LIHTC developers. Surprisingly, while majority of the states incentivized access to opportunities, this did not translate into action. As such, some high-performing states (Delaware, Michigan, and Wyoming, for example) noted a decline in placing units in very-low poverty tracts used as proxy for opportunity areas. However, the study reports, as expected, a consistent decline in siting LIHTC units in high-poverty areas as an effort to deconcentration.

The estimation of the effects of QAP changes on LIHTC siting through regression (at state and census tract level) and DiD experimental design suggest that QAPs can influence the siting of LIHTC in very-low poverty areas. Specifically, at the census tract level models, the analysis of the interaction term for poverty rate and APDI support the notion that QAPs can be an effective tool in promoting the development of affordable housing in opportunity areas. However, the negative coefficients for the interaction terms between APDI and other independent variables indicate that the effectiveness of QAPs may vary depending on the characteristics of the census tract. For example, the negative coefficient for APDI * %Poverty suggests that the positive effect of QAP changes on LIHTC units may be attenuated in areas with higher levels of poverty.

With the help of the quasi-experimental design, this study finds that the effect of QAP change on LIHTC siting is significant in very-low poverty census tracts where the treatment group (APD and PPD) placed, on average, more new units in very-low poverty areas compared to the control group. This suggests that QAPs of high-performing states have been successful in influencing the development of low-income units in opportunity-rich areas. However, the estimation of the effect is less significant vis-à-vis the control group in deconcentrating LIHTC units from high poverty areas. States belonging to the control groups have performed better in reducing the concentration of units in census tracts with poverty rates higher than 30%, thereby, indicating a shift in the policy direction favorable toward poverty deconcentration by limiting the concentration effects for this group. It is important to note that the DiD design is subject to strong assumptions and limited control factors, and therefore, should be interpreted cautiously in terms of drawing any strong causal inferences.

Limitations

As a researcher, I am aware that any research study may face limitations that can impact the findings and conclusions. In this study, several limitations were present, which were unintentional and beyond my control.

One of the limitations of this study was the use of qualitative content analysis and thematic analysis, which are subjective in nature. To minimize subjectivity, I conducted an inter-rater reliability test with two independent coders, but it is possible that some level of subjectivity remained in the analysis. Another limitation was the use of the APDI index, which may have missed some criteria. I attempted to address this issue by using CFA to assess the validity of the index, but there may still be some limitations in its application. On the conceptualization of opportunity areas, this study perhaps oversimplified the measurement by using less than 10% poverty rate census tracts as a proxy. However, I mitigated this issue based on the analysis of the full range of neighborhood poverty rates in the models. The findings show that the effect of QAP changes on LIHTC units is consistent across all levels of poverty, including very low-poverty areas. The similarity between the all-metro-tract and very-low-poverty-tract analyses provides additional evidence that the results are robust and not dependent on any arbitrary thresholds. Important to note that opportunity has been operationalized in several different ways by various states, however, one core component that remained somewhat constant is the neighborhood poverty level. It is therefore important to acknowledge that while the proxy measure may seem reasonable, a more robust and inclusive measurement approach should provide more accurate understanding of opportunity.

Furthermore, the study faced limitations in quantitative analysis due to small sample sizes at the state level, which precluded getting any statistically significant result. Also, the scope of using control variables was limited since the state level analysis was conducted at the aggregate level. Similarly, the census tract level analysis may have suffered from not incorporating other control variables, that are confounding, and could impact the interpretation of the results. Therefore, it is important to exercise caution when interpreting the results.

In conclusion, I acknowledge these limitations and have attempted to address them as best I could to ensure the integrity and rigor of the research process. While some limitations were beyond my control, identifying and addressing these limitations is crucial for future research. By acknowledging these limitations, the methodology and design of subsequent studies could be improved.

Scope for Future Research

There are several important questions that remained beyond the scope of this research and further exploration would be useful in thoroughly comprehending several aspects of LIHTC and QAPs. One crucial area of investigation is the rationale behind states adopting different pathways to prioritize deconcentration, which this study only revealed the existence of, through the identification of varied themes and patterns. Understanding the larger trade-offs states weigh while crafting QAP policy guidelines would assist policymakers and researchers, and exploring the politico-economic angle of policy formulation concerning affordable housing could provide valuable insights.

In this study, opportunity was equated with very-low poverty census tracts. As stated before, states have conceptualized opportunity areas in several different ways. Therefore, further research is needed to explore the factors that have influenced the operationalization of opportunity areas in different states. This may involve examining the political, economic, and social factors that have shaped state-level policies and priorities around affordable housing and poverty alleviation. It may also involve analyzing the role of key stakeholders, such as developers, policymakers, and advocacy groups, in shaping the definitions of opportunity areas in different contexts.

There are two important avenues of research that I am interested in as an extension of this dissertation. The first avenue of research involves mapping the opportunity areas as per the QAP criteria specifically involving opportunity and exploring whether LIHTC developments follow the same geographies. This would reveal whether LIHTC projects targeting opportunity areas are based solely on the opportunity matrix or if other incentives are at play that encourage them to propose developments in areas outside of the identified opportunity zones. This line of research has been recently explored by Walter et al. (2018) in their study on Texas and replicating their methodology in other states could provide valuable insights into how LIHTC developments are being prioritized across different areas. Furthermore, a detailed analysis of the LIHTC award process using the HFA scoresheets could reveal whether incentives elsewhere are equally as competitive as those for developments in opportunity areas, which would have important implications for future policy design.

The second avenue of research involves conducting a longitudinal study to examine the impact of opportunity areas on the life chances of low-income renters. By analyzing changes in the socio-economic status of renters living in opportunity area LIHTCs compared to those in LIHTCs located in concentrated poverty areas, valuable insights into the program's efficiencies and limitations could be gained. Such research could inform future policy decisions and potentially lead to improvements in the program's effectiveness.

Policy Consideration

The objective of this study is to stimulate an informed dialogue between scholars and policymakers to reexamine the QAP policy design. Unlike the research by Ellen and Horn (2018), which identified a clear association between policy changes and the siting of LIHTC, this study demonstrates that such a correlation is not always straightforward. The research highlights the need for a more nuanced understanding of the complexities involved in the relationship between policy changes and LIHTC development. Given that QAP is a state-level policy instrument, its effectiveness in shaping the local market and political dynamics of affordable housing development may be limited. Therefore, the development of QAPs should take into account the unique local housing needs, and a one-size-fits-all approach may not produce the desired outcomes. In light of the variations within a state, from the local to the metropolitan level, a more targeted and context-specific approach in crafting QAPs may yield a better return on investment in terms of efficacy.

In the context of LIHTC policy, poverty deconcentration has been a key issue, albeit not an explicitly stated policy goal. In order to craft effective policy, it is critical to have a thorough understanding of the deconcentration process and its implications. While studies have demonstrated the efficiency of dispersal through deconcentration, scholars have also noted the challenges of executing dispersal programs (Goetz, 2003). As I noted before, some states in the DPD group have significantly limited LIHTC production in high-poverty areas, which could be seen as a departure from previous trends. However, policymakers should be cautious about rapid disinvestment in these areas, as people in these areas are affected by high rental demand, high cost burden, and limited availability of decent housing. It's crucial not to penalize people (by taking investments and housing stocks away from) who were historically and systematically placed in high-poverty areas as a result of structural and systemic racism. Additionally, research have found strong crowd-out and spillover effects of LIHTCs on local properties that deepens the affordability (Diamond & McQuade, 2019; Ellen et al., 2009; Erickson & Rosenthal, 2010; Won, 2022). As we seek to advance poverty deconcentration through LIHTC, we need to take a holistic approach that considers the unique needs and challenges of different areas and populations.

In considering the provision of access to opportunity areas for low-income individuals as a means of enhancing their life chances, it is important to note that such efforts may encounter certain barriers. Specifically, a significant proportion of low-income households rely on public transportation as their sole means of transportation for various day-to-day activities. This disparity is particularly pronounced when viewed through a racial lens, as individuals residing in economically affluent areas often have access to personal transportation, while public transit may be less readily available in such locales. Consequently, locating low-income renters in high-opportunity areas may not prove to be a successful strategy, given the limited mobility associated with race and income level.

Moreover, low-income households may encounter difficulties in meeting basic domestic expenses, such as purchasing groceries, due to budgetary constraints and the lack of economical businesses in predominantly white affluent neighborhoods. These areas may pose additional financial constraints in terms of cost of child-care and private-school education. In addition, high-opportunity areas may present a dearth of social support and networks, including adult training programs and skill training, as most residents in such areas may already be financially secure. Such areas may also have limited options for employment suitable for individuals with low levels of education and skills, which further compounds the challenges faced by low-income individuals.

In summary, this research has significantly contributed to our understanding of the complexities involved in the relationship between policy design, LIHTC siting, and poverty deconcentration. The findings of this study demonstrate that a nuanced understanding of the local market and political dynamics of affordable housing development is crucial to the effectiveness of QAPs in shaping LIHTC siting patterns. However, it is important to acknowledge that the effectiveness of QAPs varies considerably across states and regions, and a one-size-fits-all approach may not be the most effective way to achieve poverty deconcentration. Instead, policymakers should take into account the unique local housing needs and develop context-specific strategies to optimize the effectiveness of QAPs in achieving poverty deconcentration.

Furthermore, it is essential to approach poverty deconcentration holistically, with consideration of issues of racial and spatial equity and justice. By taking a comprehensive approach to poverty deconcentration, policymakers can better address the challenges faced by low-income individuals and promote a more equitable distribution of affordable housing in high-opportunity areas.

In conclusion, this research calls for policymakers to reexamine, rethink, reevaluate the design of QAPs and to adopt a more targeted and context-specific approach to achieve poverty deconcentration. It is my hope that this study will serve as a valuable resource for researchers, policymakers, and practitioners seeking to address the challenges of affordable housing development and promote equitable access to high-opportunity areas while being cognizant about racial and socio-spatial justice and equity.

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APPENDICES

Appendix A: Race and Census Tract Poverty

Total Population

Poverty Level	Percent of Population within Race				Percent of Race by Tract Type				Total
	White	Black	Hispanic	Other	White	Black	Hispanic	Other	
Very-low (<10%)	58.42	30.44	36.27	39.17	57.04	6.10	10.98	25.88	100.00
Low (10 – 19.9%)	28.85	30.24	34.32	31.41	43.09	9.27	15.89	31.75	100.00
Medium (20 – 29.9%)	8.75	20.53	18.06	16.92	29.15	14.03	18.66	38.15	100.00
High (30 – 39.9%)	2.57	11.23	7.88	8.00	20.20	18.10	19.19	42.51	100.00
Very-high (>40%)	1.42	7.56	3.47	4.50	20.00	21.88	15.19	42.93	100.00
Total	100.00	100.00	100.00	100.00	---	---	---	---	---

Source: ACS 2017-2021, 5-Year estimate

Below Income Level Population

Poverty Level	Percent of Population within Race			Percent of Race by Tract Type			Total
	White	Black	Hispanic	White	Black	Hispanic	
Very-low (<10%)	30.42	10.32	13.92	61.80	11.54	19.01	92.35
Low (10 – 19.9%)	37.92	25.88	33.07	48.91	18.01	28.11	95.03
Medium (20 – 29.9%)	18.64	27.11	27.77	35.32	27.36	34.24	96.92
High (30 – 39.9%)	7.39	19.45	16.09	25.64	35.89	36.27	97.81
Very-high (>40%)	5.64	17.24	9.15	24.35	43.19	28.00	95.53
Total	100.00	100.00	100.00	---	---	---	---

Source: ACS 2017-2021, 5-Year estimate

Appendix B: Sample of States

State	2005	2015	Sample	State	2005	2015	Sample
Alabama	x	x	Yes	Nebraska	x	x	Yes
Arizona	x	x	Yes	Nevada	x	x	Yes
Arkansas	x	x	Yes	New Hampshire	x	x	Yes
California	x	x	Yes	New Jersey	x	x	Yes
Colorado	x	x	Yes	New Mexico	x	x	Yes
Connecticut	x	x	Yes	New York [b]			No
Delaware	x	x	Yes	North Carolina [c]			No
Florida [c]	x	x	No	North Dakota	x	x	Yes
Georgia	x	x	Yes	Ohio	x	x	Yes
Idaho	x	x	Yes	Oklahoma	x	x	Yes
Illinois [b]			No	Oregon [a]			No
Indiana	x	x	Yes	Pennsylvania	x	x	Yes
Iowa	x	x	Yes	Rhode Island [a]			No
Kansas	x	x	Yes	South Carolina [c]			No
Kentucky	x	x	Yes	South Dakota	x	x	Yes
Louisiana	x	x	Yes	Tennessee	x	x	Yes
Maine	x	x	Yes	Texas	x	x	Yes
Maryland	x	x	Yes	Utah	x	x	Yes
Massachusetts	x	x	Yes	Vermont [a]			No
Michigan	x	x	Yes	Virginia	x	x	Yes
Minnesota [b]			No	Washington	x	x	Yes
Mississippi	x	x	Yes	West Virginia	x	x	Yes
Missouri [c]			No	Wisconsin	x	x	Yes
Montana	x	x	Yes	Wyoming	x	x	Yes

Source: Author's tabulation

Note: [a] Indicates states for which QAPs could not be obtained.

[b] Indicates states with sub-allocators and QAPs could not be obtained from at least one of the HFAs.

[c] Indicates states that created non-comparable QAP documents between the two years.

Appendix C: Codebook for Content Analysis

Code	Description	Example from QAPs
Score-based Criteria		
Density Reduction		
Low-income Targeting (less than 50%)	Percent of units set-aside for low-income people	No more than 10% of the project's total units may be targeted to units that are less than equal to 30% AMI. *Michigan, 2015*
Low-income Targeting (50% or more)	Percent of units set-aside for low-income people	Developments Serving the Lowest Income Tenants: Two to fifteen (2-15) points will be awarded to developments whose percentage of tax credit units are affordable to individuals and families whose incomes are at or below fifty percent (50%) of median income. 10% - 25% 2 26% - 50% 4 51% - 65% 6 66% - 80% 10 81% - 100% 15 *Delaware, 2005*
Mixed-income Projects	Projects that allow for a portion of the units set aside as market rate unit.	Mixed Income Projects 4 points: Projects designed for both low income and market-rate tenants are eligible to receive points based on the percentage of low income and market rate units in the total project. Greater than 10% but less than or equal to 20% market rate units 2 points Greater than 20% but less than or equal to 30% market rate units 3 points Greater than 30% 4 points *Georgia, 2005*
Spatial Dispersal of Projects	Efforts to spatially distribute projects by deducting or adding points. Locating outside an MSA, areas without other low-income housing/public housing projects or no recent development of LIHTC in past few years.	Developments located in a municipality that has not received a Low-Income Housing Tax Credit ("LIHTC") award for the creation of new rental units in the past six (6) LIHTC application rounds (2 points) *Idaho, 2015*

Continued on the next page.

Appendix C continued

Code	Description	Example from QAPs
Disinvestment from Low-income Areas		
Rehabilitation	Rehabilitation or preservation of existing structure/property. Rehabilitation is often understood as revamping a property to make it suitable for habitation while keeping the existing unit as low-income.	Two (2) points will be awarded to a project that involves the acquisition and rehabilitation of an existing multifamily rental housing development, whether or not it has existing rent or income restrictions, provided the project agrees to affordability restrictions for at least forty (40) years. *Maryland, 2015*
Blighted and At-risk properties	Project that seeks to invest in distressed/at-risk property, or historic preservation. It may also include an area defined by local government as distressed community, especially in terms of housing quality.	Rehabilitation of blighted buildings OR locally or federally designated historic structures. Blighted buildings are buildings that are in severe disrepair, including, but not limited to, boarded up, abandoned, or uninhabitable buildings, all of which have serious building code violations. (5 points) *Colorado, 2005*
QCT and Community Revitalization Plan	Developing a project in a qualified census tract (QCT), and/or as a part of community revitalization plan. It may also include urban/neighborhood renewal areas.	Developments located in a qualified census tract in which the development contributes to a concerted community revitalization plan. *Idaho, 2005*
Low-income Areas	A low-income area can be identified using poverty rate, income level, housing problems (cost burden, physical conditions), high rental housing demand, certain counties/cities/neighborhoods with special zoning/policy or simply low income and distressed areas.	Development is located in the following low-income counties designated in the most recent State Consolidated Plan: Bradley, Chicot, Crittenden, Desha, Fulton, Jackson, Lafayette, Lee, Monroe, Newton, Phillips, Polk, St. Francis, Sharp, Stone and Woodruff. *Arkansas, 2015*

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Appendix C continued

Code	Description	Example from QAPs
Access to Opportunity		
High Opportunity Area	Opportunity can be indicated by low poverty, high/mixed income, low renter share, school performance, economic growth, proximity to job locations, low share of affordable units or some priority areas.	Any proposed family development located in a census tract that has less than a 10% poverty rate (based upon Census Bureau data) with no other family tax credit units in such census tract. (25 points) *Virginia, 2015*
Transport Services	Projects that are located near transit services will receive points in QAPs. It can include distance to the nearest major transit routes or around Transit Oriented Developments among other indicators.	Applicants that can demonstrate that the project is located within 1/10 of a mile from a public transportation stop (i.e. bus stop), or are creating a public transportation stop within 1/10 of a mile, will be eligible to receive 5 points *Michigan, 2015*
Neighborhood Amenities	Neighborhood Amenities include a range of neighborhood services such as grocery store, hospital, school, parks etc.	Availability, quality and proximity of services, amenities, and features: grocery store; mall/strip center; gas/convenience; basic health care; pharmacy; schools/athletic fields; day care/after school; supportive services, public park, library, hospital, community/senior center, basketball/tennis courts, fitness/nature trails, public swimming pool, restaurants, bank/credit union, medical offices, professional services, movie theater, video rental, public safety (fire/police). *North Carolina, 2005*
Local Agency Contribution	Projects approved by local government and/or community. Certain levels of financial or service commitments may also be required in terms of satisfying the approval requirement. It may come as a letter, townhall, community meeting, or financial contribution	An applicant who provides signed, firm commitments for contributions or incentives from local government, private parties and/or philanthropic, religious or charitable organizations, valued at least 1 percent of the total development costs, will receive 1 point; if valued at more than 1 percent but less than or equal to 5 percent of the total development costs, an applicant will receive 2 points; if valued at more than 5 percent but less than or equal to 10 percent of total development costs, an applicant will receive 3 points; if valued at greater than 10 percent of total development costs, an applicant will receive 4 points. North Dakota, 2015

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Appendix C continued

Code	Description	Example from QAPs
Non-Score-Based Criteria		
Set-Aside	A criterion that potentially prioritizes or deprioritizes poverty deconcentration (beyond the IRS mandated set-aside criteria)	Eligible Distressed Area, 30% - Housing projects in eligible distressed areas, which include proposed or existing housing projects in distressed areas pursuant to MCL 125.1411(u). A list of Eligible Distressed Areas can be found on MSHDA's website. Michigan, 2005 *This criterion was added in the 2015 QAP*
Basis Boost	Basis boost is an economic incentive to developers who proposes developments in non-QCT, or non-DDA areas to make the development financially feasible	CHFA is authorized to award up to a 30 percent "basis boost" to buildings that it determines need the boost to be economically feasible. This basis boost, however, is not available to projects that qualify for a basis boost because they are already in a HUD Qualified Census Tract or DDA. The request must be supported by a narrative that details the reasons for the financial need for the CHFA basis boost. The CHFA basis boost only applies to new construction and rehab eligible basis of 9% Federal Credit LIHTC projects. This basis boost does not apply to 4% Federal Credit projects. Colorado, 2015
Item Change	A change (drop or addition) of a criterion that potentially prioritizes or deprioritizes poverty deconcentration	No example from QAPs directly. To illustrate, Wisconsin 2015 QAP dropped the Neighborhood Amenities criteria, which is deemed to prioritize poverty deconcentration.

Source: Author's tabulation from QAPs

Appendix D: Coded Values for 2005 QAP Criteria

State	Density Reduction				Disinvestment from Low-income Area				Access to Opportunity				Non-Score Section	Index	
	LT	LTm	MP	SD	RH	BP	QCT	LA	OA	NA	TS	LC	SA	PDS	PCS
Alabama	0	1	0	1	1	1	1	1	0	1	0	0	0	2	5
Arizona	0	2	1	1	1	0	2	0	0	0	0	0	-1	1	5
Arkansas	0	0	1	0	2	0	2	0	0	1	0	0	0	2	4
California	4	0	0	0	0	1	1	0	1	1	1	0	-1	5	3
Colorado	0	4	1	0	1	1	1	1	0	0	0	0	0	1	8
Connecticut	0	1	1	0	0	0	1	1	1	1	0	0	0	3	3
Delaware	0	2	1	1	1	0	1	0	1	1	1	2	0	4	7
Georgia	0	0	1	1	0	0	1	0	0	1	1	1	0	3	3
Idaho	0	0	1	2	1	0	1	0	0	0	0	1	0	3	3
Indiana	0	0	1	0	0	1	1	0	0	1	0	1	-1	1	3
Iowa	1	1	1	0	1	0	1	0	0	1	1	1	-2	1	5
Kansas	0	0	1	1	1	0	1	1	1	1	1	1	0	4	5
Kentucky	0	0	0	0	2	0	0	2	1	0	0	0	0	1	4
Louisiana	0	0	1	0	1	1	1	0	1	1	1	1	0	3	5
Maine	0	4	0	0	1	0	1	0	0	0	0	1	0	0	7
Maryland	1	0	0	0	0	0	1	0	1	0	0	0	0	2	1
Massachusetts	0	0	1	0	1	0	1	0	1	1	1	1	-2	1	4
Michigan	0	2	1	0	1	0	1	2	1	1	1	0	-1	2	7
Mississippi	1	1	0	1	1	1	1	0	0	0	0	1	0	2	5
Montana	0	2	0	0	1	0	1	1	0	1	0	2	0	1	7
Nebraska	0	0	1	0	0	1	1	0	0	0	0	1	0	1	3
Nevada	0	1	1	0	1	0	0	1	0	0	1	0	0	1	4
New Hampshire	0	0	0	0	2	0	1	0	1	0	0	1	0	1	4

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Appendix D continued

State	Density Reduction				Disinvestment from Low-income Area				Access to Opportunity				Non-Score Section	Index	
	LT	LTm	MP	SD	RH	BP	QCT	LA	OA	NA	TS	LC	SA	PDS	PCS
New Jersey	0	0	0	3	1	0	4	0	3	1	0	1	-2	5	6
New Mexico	3	0	1	1	2	0	1	1	1	0	0	1	0	6	5
North Dakota	0	2	0	0	2	1	1	0	0	0	0	1	-1	-1	7
Ohio	0	2	0	0	1	0	1	1	1	0	0	3	-2	-1	8
Oklahoma	0	1	0	0	0	0	1	0	0	0	0	2	0	0	4
Pennsylvania	0	1	1	0	0	0	1	0	0	1	0	0	-2	0	2
South Dakota	1	0	1	0	1	0	1	0	0	1	0	1	0	3	3
Tennessee	2	0	0	0	2	0	1	3	0	0	0	0	-1	1	6
Texas	0	2	0	1	1	0	1	1	1	1	0	3	-1	2	8
Utah	1	0	1	0	1	0	2	0	0	0	0	0	0	2	3
Virginia	0	0	0	0	1	0	1	0	0	0	1	1	0	0	4
Washington	0	2	0	0	1	1	1	0	1	0	0	1	-1	0	6
West Virginia	0	0	0	1	0	0	1	1	0	0	0	0	-1	0	2
Wisconsin	0	0	1	0	2	0	1	0	1	1	1	1	-1	2	5
Wyoming	0	0	0	0	0	0	1	0	0	1	0	1	1	2	2

Source: Author's calculation from 2005 QAPs

Note. LT = Low-income Targeting (less than 50%), LTm = Low-income Targeting (50% or more), MP = Mixed-income projects, SD = Spatial Dispersal of projects, RH = Rehabilitation, BP= Blighted and at-risk property, QCT = Qualified Census Tracts and Community Revitalization Plan, LA= Low-income Area, OA = Opportunity Area, NA = Neighborhood amenities, TS = Transit Services, LC = Local Agency Contribution, SA = Set-Aside, PDS = Poverty Deconcentration Score, PCS = Poverty Concentration Score.

Appendix E: Coded Values for 2015 QAPs Criteria

State	Density Reduction				Disinvestment from Low-income Area				Access to Opportunity				Non-Score Section			Index	
	LT	LTm	MP	SD	RH	BP	QCT	LA	OA	NA	TS	LC	SA	BB	IC	PDS	PCS
Alabama	0	0	0	0	1	0	0	0	1	1	0	0	0	1	4	7	1
Arizona	2	0	0	1	1	0	1	0	1	1	2	1	0	1	1	7	5
Arkansas	0	0	1	1	2	0	1	2	0	1	0	0	0	0	0	3	5
California	0	4	0	0	0	1	1	0	0	2	1	0	0	1	-3	0	7
Colorado	0	4	1	0	1	0	1	1	0	0	0	0	-1	1	2	3	7
Connecticut	1	0	1	0	2	0	1	1	1	0	1	1	1	0	-3	1	6
Delaware	1	0	1	0	1	0	1	0	2	1	1	1	-1	1	2	7	4
Georgia	1	0	0	1	1	0	1	0	1	2	1	1	1	1	0	7	4
Idaho	1	0	1	1	1	0	1	0	2	1	1	0	-1	1	3	9	3
Indiana	0	0	0	1	0	1	1	1	1	1	1	1	2	1	0	6	5
Iowa	0	0	1	1	0	0	0	0	1	1	1	1	1	0	3	8	2
Kansas	0	3	1	1	1	1	1	1	1	1	1	1	0	1	-2	3	9
Kentucky	0	0	0	0	0	2	1	0	0	1	1	0	2	1	-1	3	4
Louisiana	1	0	0	0	1	2	1	0	2	1	0	1	1	0	1	6	5
Maine	0	0	1	0	1	0	1	0	1	1	2	0	-2	1	5	7	4
Maryland	1	0	1	0	1	0	1	0	2	0	0	1	0	0	0	4	3
Massachusetts	0	0	1	0	0	0	1	0	1	0	1	1	0	1	1	4	3
Michigan	1	0	1	0	1	0	1	0	1	2	1	1	-1	1	2	7	4
Mississippi	0	0	0	1	2	1	1	0	0	1	0	1	-1	1	0	2	5
Montana	0	2	0	0	1	1	1	0	1	1	0	1	1	1	2	6	6
Nebraska	0	0	1	0	0	1	1	0	1	0	0	0	1	1	2	6	2
Nevada	1	0	1	0	1	1	1	0	1	1	1	1	0	1	2	7	5
New Hampshire	0	0	0	1	1	0	1	0	1	0	0	1	0	1	1	4	3

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Appendix E continued

State	Density Reduction				Disinvestment from Low-income Area				Access to Opportunity				Non-Score Section			Index	
	LT	LTm	MP	SD	RH	BP	QCT	LA	OA	NA	TS	LC	SA	BB	IC	PDS	PCS
New Jersey	0	0	0	0	0	0	2	0	2	1	1	1	0	1	-1	3	4
New Mexico	2	0	1	0	1	1	1	1	1	1	1	1	0	1	-2	4	6
North Dakota	0	2	0	0	0	2	1	0	0	0	0	1	1	1	1	3	6
Ohio	0	0	0	0	1	1	1	0	1	1	0	2	2	1	3	8	5
Oklahoma	1	0	0	0	1	0	1	0	1	0	0	0	0	1	3	6	2
Pennsylvania	0	2	0	0	0	2	2	0	2	0	0	0	0	1	-1	2	6
South Dakota	1	0	1	0	1	0	1	0	0	1	1	1	1	0	-1	3	4
Tennessee	2	0	0	0	1	0	1	3	1	0	0	1	-2	1	2	4	6
Texas	1	0	0	0	0	0	1	1	1	0	0	2	0	1	1	4	4
Utah	0	0	1	1	0	0	1	0	0	0	1	0	0	1	0	3	2
Virginia	0	0	0	0	0	0	1	0	1	0	1	1	1	0	2	4	3
Washington	3	0	0	0	0	1	1	1	1	1	1	1	0	1	2	8	5
West Virginia	1	0	0	1	0	0	1	1	1	0	0	0	-1	0	2	4	2
Wisconsin	0	0	1	0	1	0	1	0	1	0	1	1	2	1	-1	4	4
Wyoming	1	0	0	1	0	0	0	1	1	1	1	0	0	1	4	9	2

Source: Author's calculation from 2015 QAPs

Note. LT = Low-income Targeting (less than 50%), LTm = Low-income Targeting (50% or more), MP = Mixed-income project, SD = Spatial Dispersal of projects, RH = Rehabilitation, BP= Blighted and at-risk property, QCT = Qualified Census Tracts and Community Revitalization Plan, LA= Low-income Area, OA = Opportunity Area, NA = Neighborhood amenities, TS = Transit Services, LC = Local Agency Contribution, SA = Set-Aside, BB = Basis Boost, IC = Item Change, PDS = Poverty Deconcentration Score, PCS = Poverty Concentration Score.

Appendix F: Code Occurrence and Frequency from Inter-Rater Reliability Test

QAP Document	Code Occurrence			Code Frequency		
	Agreements	Disagreements	Percent	Agreements	Disagreements	Percent
Arizona 2005	20	1	95.24	19	2	90.48
California 2005	14	2	87.50	14	2	87.50
Delaware 2005	20	1	95.24	20	1	95.24
Kansas 2005	23	2	92.00	23	2	92.00
Louisiana 2005	18	0	100.00	18	0	100.00
Montana 2005	14	1	93.33	13	2	86.67
Oklahoma 2005	14	0	100.00	14	0	100.00
Texas 2005	17	1	94.44	17	1	94.44
Utah 2005	19	0	100.00	19	0	100.00
Wisconsin 2005	13	0	100.00	13	0	100.00
Iowa 2015	15	1	93.75	15	1	93.75
Kentucky 2015	18	0	100.00	17	1	94.44
Maryland 2015	15	0	100.00	14	1	93.33
Michigan 2015	18	3	85.71	18	3	85.71
New Hampshire 2015	15	0	100.00	14	1	93.33
Ohio 2015	14	0	100.00	14	0	100.00
Pennsylvania 2015	12	0	100.00	12	0	100.00
Washington 2015	21	1	95.45	19	3	86.36
Total	300	13	95.85	293	20	93.61

Source: MaxQDA output

Appendix G: Kappa Value Tabulation from the Inter-Rater Reliability Test

		Coder 1		
		1	**0**	
Coder 2	**1**	a = 632	b = 22	654
	0	c = 17	0	17
		649	22	671

P(observed) = Po = a / (a + b + c) = 0.94

P(chance) = Pc = 1 / Number of codes = 1 / 45 = 0.02

Kappa = (Po - Pc) / (1 - Pc) = 0.94

If there is an unequal number of codes per segment or if only one code is to be evaluated:

P(chance) = Pc = Number of codes / $(\text{Number of codes} + 1)^2$ = 0.02

Kappa = (Po - Pc) / (1 - Pc) = 0.94

Source: MaxQDA output

Appendix H: Results from the Confirmatory Factor Analysis

Model Information	
Estimator	ML
Optimization Method	NLMINB
Number of model parameters	31
Number of observations	38

Model Test			
User Model		Baseline Model	
Test statistics	111.963	T statistics	153.572
Degrees of freedom	89	Degrees of freedom	105
P-value (Chi-square)	0.05	P-value	0.001

User Model versus Baseline Model:			
Comparative Fit Index (CFI)	0.981	Tucker-Lewis Index (TLI)	0.978
Root Mean Square Error of Approximation (RMSEA)	0.014	Standardized Root Mean Square Residual (SRMR)	0.134

Latent Variables:

	Estimate	SE	z-value	P(>|z|)	CI Lower	CI Upper	Std.lv	Std.all
PCS=~								
LTm	1	1	1	0.549	0.52			
RH	-0.318	0.162	-1.97	0.049	-0.635	-0.002	-0.175	-0.282
BP	0.733	0.253	2.898	0.004	0.237	1.228	0.402	0.586
QCT	0.2	0.092	2.167	0.03	0.019	0.38	0.11	0.299
LA	-0.115	0.136	-0.843	0.399	-0.381	0.152	-0.063	-0.093
TS	-0.358	0.16	-2.239	0.025	-0.671	-0.045	-0.196	-0.334
LC	-0.067	0.12	-0.554	0.58	-0.302	0.169	-0.037	-0.065
PDS=~								
LT	1	1	1	0.16	0.211			
MP	0.691	0.33	2.096	0.036	0.045	1.337	0.111	0.22
SD	0.542	0.272	1.996	0.046	0.01	1.075	0.087	0.184
OA	0.294	0.375	0.783	0.434	-0.441	1.028	0.047	0.077
NA	0.529	0.344	1.539	0.124	-0.145	1.202	0.085	0.137
SA	-0.42	0.418	-1.004	0.315	-1.239	0.4	-0.067	-0.067
BB	-0.39	0.211	-1.851	0.064	-0.803	0.023	-0.062	-0.151
IC	2.134	1.209	1.766	0.077	-0.235	4.504	0.342	0.178

Covariances:

	Estimate	SE	z-value	P(>|z|)	CI Lower	CI Upper	Std.lv	Std.all
PCS~~								
PDS	-0.18	0.068	-2.652	0.008	-0.312	-0.047	-2.04	-2.04

Source: Author’s tabulation based on the Confirmatory Factor Analysis performed in RStudio using Lavaan package.

Appendix I: Poverty Deconcentration Measures and Groups

States	2005		2015		$NPDS_{05}$	$NPDS_{15}$	APDI	Group
	PDS	PCS	PDS	PCS				
Alabama	2	5	7	6	-3	6	9	Advancing Deconcentration
Arizona	1	5	7	2	-4	2	6	Advancing Deconcentration
Arkansas	2	4	3	-2	-2	-2	0	Deprioritizing Deconcentration
California	5	3	0	-7	2	-7	-9	Deprioritizing Deconcentration
Colorado	1	8	3	-4	-7	-4	3	Prioritizing Deconcentration
Connecticut	3	3	1	-5	0	-5	-5	Deprioritizing Deconcentration
Delaware	4	7	7	3	-3	3	6	Advancing Deconcentration
Georgia	3	3	7	3	0	3	3	Prioritizing Deconcentration
Idaho	3	3	9	6	0	6	6	Advancing Deconcentration
Indiana	1	3	6	1	-2	1	3	Prioritizing Deconcentration
Iowa	1	5	8	6	-4	6	10	Advancing Deconcentration
Kansas	4	5	3	-6	-1	-6	-5	Deprioritizing Deconcentration
Kentucky	1	4	3	-1	-3	-1	2	Prioritizing Deconcentration
Louisiana	3	5	6	1	-2	1	3	Prioritizing Deconcentration
Maine	0	7	7	3	-7	3	10	Advancing Deconcentration
Maryland	2	1	4	1	1	1	0	Deprioritizing Deconcentration
Massachusetts	1	4	4	1	-3	1	4	Prioritizing Deconcentration
Michigan	2	7	7	3	-5	3	8	Advancing Deconcentration
Mississippi	2	5	2	-3	-3	-3	0	Deprioritizing Deconcentration
Montana	1	7	6	0	-6	0	6	Advancing Deconcentration
Nebraska	1	3	6	4	-2	4	6	Advancing Deconcentration
Nevada	1	4	7	2	-3	2	5	Prioritizing Deconcentration
New Hampshire	1	4	4	1	-3	1	4	Prioritizing Deconcentration

Continued on the next page.

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Appendix I continued

State	2005		2015		$NDPS_{05}$	$NDPS_{15}$	APDI	Group
	PDS	PCS	PDS	PCS				
New Jersey	5	6	3	4	-1	-1	0	Deprioritizing Deconcentration
New Mexico	6	5	4	6	1	-2	-3	Deprioritizing Deconcentration
North Dakota	-1	7	3	6	-8	-3	5	Prioritizing Deconcentration
Ohio	-1	8	8	5	-9	3	12	Advancing Deconcentration
Oklahoma	0	4	6	2	-4	4	8	Advancing Deconcentration
Pennsylvania	0	2	2	6	-2	-4	-2	Deprioritizing Deconcentration
South Dakota	3	3	3	4	0	-1	-1	Deprioritizing Deconcentration
Tennessee	1	6	4	6	-5	-2	3	Prioritizing Deconcentration
Texas	2	8	4	4	-6	0	6	Advancing Deconcentration
Utah	2	3	3	2	-1	1	2	Prioritizing Deconcentration
Virginia	0	4	4	3	-4	1	5	Prioritizing Deconcentration
Washington	0	6	8	5	-6	3	9	Advancing Deconcentration
West Virginia	0	2	4	2	-2	2	4	Prioritizing Deconcentration
Wisconsin	2	5	4	4	-3	0	3	Prioritizing Deconcentration
Wyoming	2	2	9	2	0	7	7	Advancing Deconcentration

Source: Author's calculation

Note. PDS= Poverty Deconcentration Score., PCS= Poverty Concentration Score., $NPDS_{15}$=Net Poverty Deconcentration Score for 2015, $NPDS_{05}$=Net Poverty Deconcentration Score for 2005, APDI= Aggregate Poverty Deconcentration Index

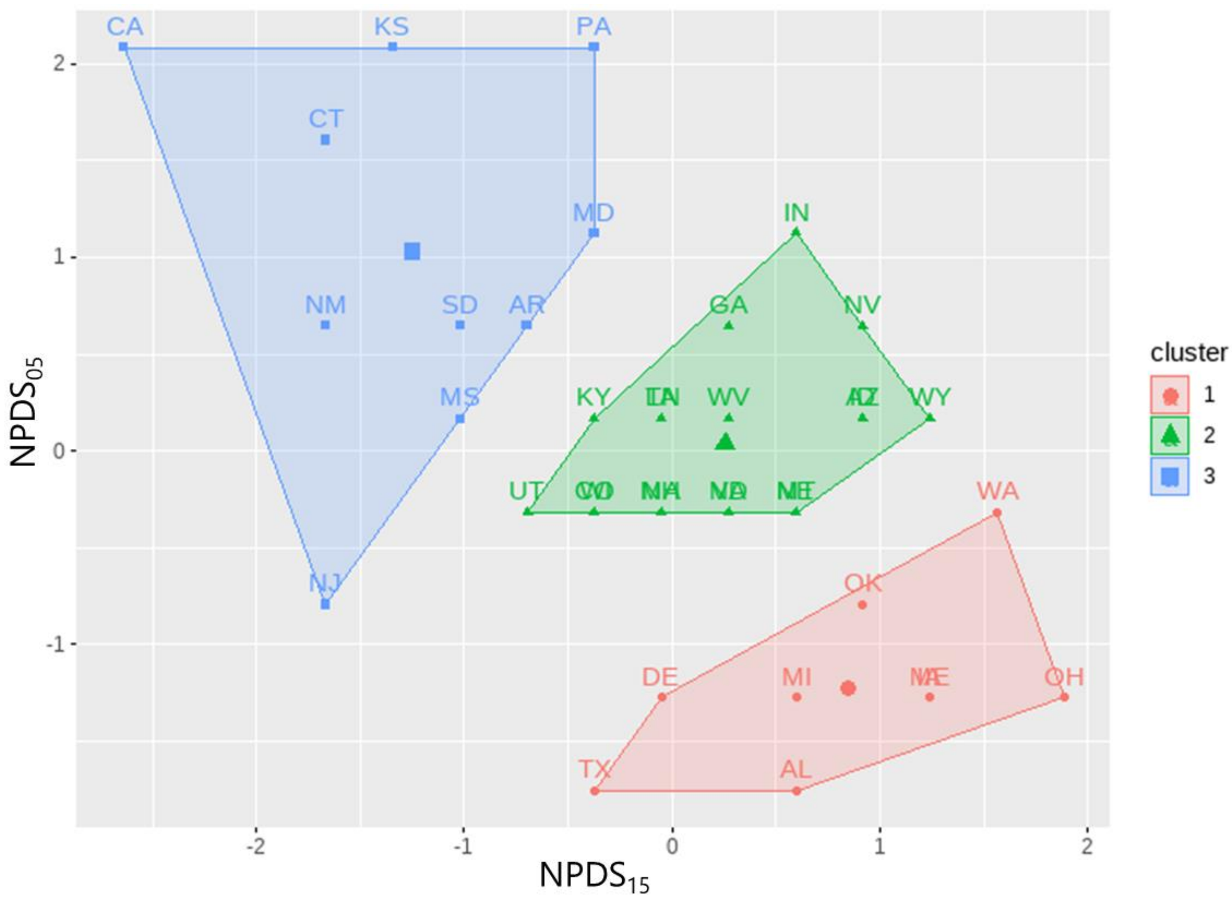
Appendix J: K-means Clustering and Associated Statistics

K-means groups and the mean cluster values

Items	Cluster		
	1	2	3
Number of States	9	19	10
$NPDS_{15}$	0.85	0.26	-1.25
$NPDS_{05}$	-1.22	0.1	1.1
Within cluster sum of squares (SS) by cluster	5.92	8.25	12.59
Between SS/Total SS		63.8%	

Source: Author's tabulation based on the k-means clustering performed in RStudio using the kmeans package

Cluster Plot using 3 groups: cluster of 9, 19 and 10 states



Source: RStudio output based on Author's calculation using kmeans package

Appendix J continued

Confusion Matrix for K-means and APDI classification methods

Reference [a]	Prediction [b]		
	Advancing Poverty Deconcentration	Prioritizing Poverty Deconcentration	Deprioritizing Poverty Deconcentration
Advancing Poverty Deconcentration	9	0	0
Prioritizing Poverty Deconcentration	5	14	0
Deprioritizing Poverty Deconcentration	0	0	10

Source: Author's calculation

Note: [a] Indicates reference group from the K-means method.

[b] Indicates prediction group from the APDI method.

Overall Statistics for K-means and APDI Confusion Matrix

Measures	Values
Accuracy	0.8684
95% Confidence Interval	0.7191, 0.9559
No Information Rate	0.3684
P-Value	0.0000000002693
Kappa Value	0.8004

Source: Author's tabulation based on the k-means clustering performed in RStudio using the kmeans package

K-means related statistics by cluster

	Cluster		
	1	2	3
Sensitivity	0.64	1.00	1.00
Specificity	1.00	0.79	1.00
Pos Pred Value	1.00	0.74	1.00
Neg Pred Value	0.83	1.00	1.00
Prevalence	0.37	0.37	0.26
Detection Rate	0.24	0.37	0.26
Detection Prevalence	0.24	0.50	0.26
Balanced Accuracy	0.82	0.90	1.00

Source: Author's tabulation based on the k-means clustering performed in RStudio using the kmeans package

Appendix K: Change in LIHTC Units between 2005-07 and 2015-17

State	Number of New Units			Percentage of New Units		
	2005-07	2015-17	Change	2005-07	2015-17	Change
Alabama	6816	438	-6378	5.08	0.52	-4.56
Arizona	2450	2247	-203	1.82	2.67	0.84
Arkansas	1692	129	-1563	1.26	0.15	-1.11
California	27131	7065	-20066	20.20	8.39	-11.81
Colorado	2470	7890	5420	1.84	9.37	7.53
Connecticut	898	1013	115	0.67	1.20	0.53
Delaware	294	602	308	0.22	0.72	0.50
Georgia	10583	4171	-6412	7.88	4.95	-2.93
Idaho	667	789	122	0.50	0.94	0.44
Indiana	1129	2052	923	0.84	2.44	1.60
Iowa	1407	1078	-329	1.05	1.28	0.23
Kansas	1864	1083	-781	1.39	1.29	-0.10
Kentucky	1686	64	-1622	1.26	0.08	-1.18
Louisiana	7804	0	-7804	5.81	0.00	-5.81
Maine	601	829	228	0.45	0.98	0.54
Maryland	2623	1800	-823	1.95	2.14	0.18
Massachusetts	1861	1329	-532	1.39	1.58	0.19
Michigan	4748	1632	-3116	3.54	1.94	-1.60
Mississippi	6316	194	-6122	4.70	0.23	-4.47
Montana	414	436	22	0.31	0.52	0.21
Nebraska	696	792	96	0.52	0.94	0.42
Nevada	1347	1111	-236	1.00	1.32	0.32
New Hampshire	811	580	-231	0.60	0.69	0.09
New Jersey	3741	144	-3597	2.79	0.17	-2.61
New Mexico	430	123	-307	0.32	0.15	-0.17
North Dakota	359	125	-234	0.27	0.15	-0.12
Ohio	5575	2386	-3189	4.15	2.83	-1.32
Oklahoma	1494	1031	-463	1.11	1.22	0.11
Pennsylvania	3012	2627	-385	2.24	3.12	0.88
South Dakota	532	555	23	0.40	0.66	0.26
Tennessee	4513	1467	-3046	3.36	1.74	-1.62
Texas	10991	20312	9321	8.18	24.13	15.94
Utah	1719	2543	824	1.28	3.02	1.74
Virginia	4267	3201	-1066	3.18	3.80	0.62
Washington	7770	8984	1214	5.79	10.67	4.89
West Virginia	673	516	-157	0.50	0.61	0.11
Wisconsin	2341	2567	226	1.74	3.05	1.31
Wyoming	572	287	-285	0.43	0.34	-0.09

Source: HUD LIHTC Database

Appendix L: Group Specific Changes in New Units

Group	Number of New Units			Percentage of New Units			
	2005-07	2015-17	Change	2005-07	2015-17	Change	Loss[a]
Advancing Deconcentration	44495	41843	-2652	33.13	49.70	16.57	5.29
Deprioritizing Deconcentration	48239	14733	-33506	35.92	17.50	-18.42	66.87
Prioritizing Deconcentration	41563	27616	-13947	30.95	32.80	1.85	27.84
Total	134297	84192	-50105				

Source: Author's calculation based on HUD LIHTC Database

Note: [a] Indicates percentage share of the loss of 50105 units between 2005-07 and 2015-17. Values are all negative.

Appendix M: Descriptive Statistics at the State Level

	Minimum	Maximum	Mean	Standard Deviation
APDI	-9.00	12.00	3.53	4.49
%LIHTC Units in				
Very-low (<10%) poverty tracts 2005	0.00	78.05	26.52	18.45
Very-low (<10%) poverty tracts 2015	0.00	71.83	29.07	20.58
Δ in Very-low Tracts	-41.67	62.25	2.55	21.45
High (>30%) poverty tracts 2005	0.00	49.05	26.05	12.43
High (>30%) poverty tracts 2015	0.00	100.00	20.12	22.04
Δ in Very-low Tracts	-49.05	75.81	-5.93	22.92
State-level variables in 2005				
% Minority	5.49	58.42	25.64	14.22
% Poverty	7.74	21.41	13.29	3.26
% Rental Vacancy	7.47	30.13	20.00	5.59
State-level variables in 2015				
% Minority	6.81	62.82	30.02	15.03
% Poverty	7.56	20.29	13.23	3.06
% Rental Vacancy	5.49	27.53	16.57	4.84
Δ in State-level variables				
% Minority	1.32	8.22	4.38	1.73
% Poverty	-2.04	2.03	-0.06	0.92
% Rental Vacancy	-11.06	9.30	-3.42	3.78

Source: Author's calculation

Appendix N: Calculation for Total Effect at the State Level

Group	Mean APDI	ΔP			Coefficients		Main Effect at ΔP			Interaction Effect at ΔP			Total Effect at ΔP		
		10	20	30	ΔP	APDI*ΔP	10	20	30	10	20	30	10	20	30
Very-low (<10%) Poverty rate															
DPD	-2.5	10	20	30	-1.94	-0.07	-19.40	-38.80	-58.20	1.75	3.50	5.25	-17.65	-35.30	-52.95
NULLPD	0	10	20	30	-1.94	-0.07	-19.40	-38.80	-58.20	0.00	0.00	0.00	-19.40	-38.80	-58.20
PPD	3.5	10	20	30	-1.94	-0.07	-19.40	-38.80	-58.20	-2.45	-4.90	-7.35	-21.85	-43.70	-65.55
APD	7.79	10	20	30	-1.94	-0.07	-19.40	-38.80	-58.20	-5.45	-10.91	-16.36	-24.85	-49.71	-74.56
All	3.53	10	20	30	-1.94	-0.07	-19.40	-38.80	-58.20	-2.47	-4.94	-7.41	-21.87	-43.74	-65.61
High (>30%) Poverty rate															
DPD	-2.5	10	20	30	17.89	-2.32	178.90	357.80	536.70	58.00	116.00	174.00	236.90	473.80	710.70
NULLPD	0	10	20	30	17.89	-2.32	178.90	357.80	536.70	0.00	0.00	0.00	178.90	357.80	536.70
PPD	3.5	10	20	30	17.89	-2.32	178.90	357.80	536.70	-81.20	-162.40	-243.60	97.70	195.40	293.10
APD	7.79	10	20	30	17.89	-2.32	178.90	357.80	536.70	-180.73	-361.46	-542.18	-1.83	-3.66	-5.48
All	3.53	10	20	30	17.89	-2.32	178.90	357.80	536.70	-81.90	-163.79	-245.69	97.00	194.01	291.01

Source: Author's calculation

Note: ΔP= Change in poverty rate. The subsequent row with 10, 20, 30 indicate the rate of change.

Main Effect = ΔP* Coefficient ΔP

Interaction Effect = Mean APDI * ΔP * Coefficient APDI*ΔP

Total Effect = Main Effect at ΔP + Interaction Effect at ΔP

Appendix O: Descriptive Statistics for Census Tract Level Variables

	Observations	Minimum	Maximum	Mean	Standard Deviation
All MSA Tracts					
% below Poverty	39845	0	100	14.93	13.13
% Minority	39845	0	100	33.75	29.60
% Rental Vacancy	39845	0	100	24.67	26.80
Units in 2005-07	39845	0	1100	5.25	31.02
Units in 2015-17	39845	0	805	3.91	25.34
ΔUnits	39845	-1100	805	-1.35	38.79
APDI	39845	-9	12	2.77	5.71
All very-low poverty MSA Tracts with poverty rate <10%					
% below Poverty	18362	0	10	5.21	2.62
% Minority	18362	0	100	20.70	20.04
% Rental Vacancy	18362	0	100	19.56	26.47
Units in 2005-07	18362	0	1100	2.24	20.32
Units in 2015-17	18362	0	590	2.32	19.28
ΔUnits	18362	-1100	590	0.08	27.35
APDI	18362	-9	12	2.39	5.79
All high poverty MSA Tracts with poverty rate >30%					
% below Poverty	4901	30.00	100	42.38	11.93
% Minority	4901	0	100	67.42	29.74
% Rental Vacancy	4901	0	100	32.23	25.46
Units in 2005-07	4901	0	750	12.51	48.84
Units in 2015-17	4901	0	533	6.89	33.17
ΔUnits	4901	-750	452	-5.62	57.39
APDI	4901	-9	12	3.73	5.33

Source: Author's calculation