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HABITAT III

THE CRA TURNS 40

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PD&R

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Katrina Durbak
U.S. Department of Housing and Urban Development

The views expressed in this article are those of the guest editor and do not represent the official positions or policies of the Office of Policy Development and Research, the U.S. Department of Housing and Urban Development, or the U.S. government.

What follows a major conference convened by the United Nations? How will the call to action put forward at Habitat III, the third United Nations (UN) Conference on Housing and Sustainable Urban Development, throughout its robust preparatory processes and in its formal outcome document be realized? Although it is too early to speak about the long-term legacy of this conference, the broad efforts leading up to it and recent innovative approaches as presented in this Symposium offer some insights into what lies beyond Habitat III.

The first United Nations Programme for Human Settlements (UN-Habitat) conference met in 1976 in Vancouver, Canada, sparking an international dialogue on urban issues. Twenty years later at Habitat II in Istanbul, Turkey, world leaders adopted the Habitat Agenda, a global action plan aimed at providing adequate shelter for all. In October 2016, more than 30,000 representatives of the nations of the world and nongovernmental organizations gathered for Habitat III in Quito, Ecuador.

The Habitat III conference was intended to reinvigorate the global commitment to sustainable urbanization, at a moment in history of rapid global urbanization. The global process leading up to Habitat III centered on engaged participation, organized both regionally and topically, from stakeholders, representatives, and technical experts to draft a *New Urban Agenda*, the outcome document of Habitat III.

The UN opened its process to input from a broad base of countries, interest groups, technical experts, and the general public. In all, 11 regional and thematic preparatory conferences were held around the world. A series of issue papers were created for public feedback. Two hundred technical

experts worked to develop foundational documents to feed into the *New Urban Agenda*, which was negotiated and ultimately agreed on as a nonbinding, consensus document of the member states of the UN.[1] The *New Urban Agenda* is organized around the following—

- Three transformative commitments.
  - Sustainable urban development for social inclusion and ending poverty.
  - Sustainable and inclusive urban prosperity and opportunities for all.
  - Environmentally sustainable and resilient urban development.
- Effective implementation.
  - Building the urban governance structure: establishing a supportive framework.
  - Planning and managing urban spatial development.
  - Means of implementation.
- Followup and review—organized by UN-Habitat, with national and local governments and other partner organizations.

U.S. Preparations for Habitat III

The United States participated in the Habitat III conference and preparatory processes for two primary reasons: (1) to further domestic efforts at providing affordable and accessible housing and fostering sustainable, inclusive communities, and (2) to contribute to the global sharing of knowledge and practices and diplomacy around these issues. The U.S. Department of Housing and Urban Development (HUD), at the request of and in partnership with the U.S. Department of State, led the official U.S. Habitat III preparatory process from September 2014 through October 2016 and the U.S. delegation to Habitat III in October 2016.

Cities and housing are of course domestic policy concerns. Thus, the Habitat III conference touched on several critical domestic issues. Although the *New Urban Agenda* contains some discussion of national urban policies in the document, which is not applicable to governments with a federal structure, including Australia, Canada, the United States, and others, the principles put forward in the *New Urban Agenda* are nonetheless generally aligned with interests that the U.S. government wished to promote, even if their legal implementation may require participation across federal, state, and local governments. With input from the U.S. Habitat III National Committee, HUD identified three main themes to guide the U.S. domestic preparations for Habitat III—

1. Investing in people and communities for upward mobility.
2. Securing housing options for all.
3. Building resilience in an era of change.

[1] See https://www2.habitat3.org/bitcache/97ced11dcecef85d41f74043195e5472836f6291?vid=588897&disposition=inline&op=view.

HUD assembled a Habitat III National Committee, comprising 44 federal government agencies, civil society, research organizations, affinity groups, and philanthropic organizations. Members of the U.S. Habitat III National Committee provided inputs to the U.S. negotiating position on the *New Urban Agenda* at numerous stages in its development. They contributed to HUD's two reports—a U.S. National Report for Habitat III, in line with UN-Habitat guidelines, for purposes of comparable data across countries and regions, and a U.S. 20/20 Habitat III Report. The 20/20 Report presented the U.S. story around housing, community development, and the fostering of inclusive, sustainable, and resilient communities across the United States, spanning the 20 years following Habitat II. HUD cohosted five domestic convenings to engage local and regional practitioners in the preparatory process. A subcommittee organized five simultaneous convenings informing the international affairs community about the intersection of their goals with those of urban development and housing. These sessions covered topics related to sustainable and safe urban development and aimed to advance U.S. policy for an increasingly urbanized world.

The United States actively participated in the Habitat III conference, with HUD Secretary Julián Castro leading the delegation to the conference and addressing the main plenary. Secretary Castro chaired an event, Equity and Inclusion: A Mayor and Minister Discussion of National-Local Policies To Combat Inequality and Achieve Opportunity for All. At this event, Secretary Castro and his Canadian counterpart, Minister of Families, Children and Social Development Jean-Yves Duclos, led a discussion among U.S. and Canadian mayors around opportunities to reduce inequality and to find collective, innovative solutions to challenges. Other events were organized by other U.S. federal agencies, and members of the U.S. delegation served on panels and presentations with government and nongovernment partners.

Multiple nongovernmental organizations from the United States also independently participated in the international processes run by UN-Habitat leading up to Habitat III and attended the Habitat III conference independently of the official U.S. delegation.

The U.S. Habitat III Documents and This Symposium

The U.S. National Report for Habitat III provided brief descriptions of efforts across the United States and numeric data for a series of indicators, per the UN-Habitat guidelines (HUD, 2015). The U.S. 20/20 Habitat III Report (HUD, 2016) described policies, programs, and initiatives across the United States organized by the three themes of the U.S. domestic preparations for Habitat III. It contains a variety of contributed essays by outside partners.

My goal in developing this symposium was to share some of the creative and scientific work that Habitat III either stimulated or brought to HUD's attention. The authors have all taken up the call to action of Habitat III to find innovative, yet feasible, approaches to the complex challenges of equitable, sustainable, and inclusive housing and urban development.

The first article, "Urbanizing for Equity: Harnessing Upzones as a Redistributive Policy Tool," by Rachel Fyall and Alexander Casey, presents a very local, innovative approach for addressing challenges of housing affordability—through local zoning tools. This peer-reviewed article considers

the hurdles around providing affordable housing associated with land value. Fyall and Casey (2017) propose an alternative policy that enables cities to capture a portion of this land value increase in order to fund housing equity priorities.

The second article, "Boundary Issues: The 2016 *Atlas of Urban Expansion* Indicates Global Densification," by John Wihbey, presents a technical approach for documenting and analyzing spatial urban growth. The importance of data, its reliability and availability, and its role in helping develop and refine policies and programs around land use, urban planning, and housing were recurring themes in the Habitat III effort (Wihbey, 2017).

The third article, "Missing 'Middle Scenarios': Uncovering Nuanced Conditions in Latin America's Housing Crisis," by Kira Intrator and Kaustubh Shivdikar, explores the challenge of data from a different perspective—namely the complexity of gathering adequate, accurate, and appropriate data. This peer-reviewed article proposes an innovative approach of utilizing unmanned aerial vehicles and artificial intelligence to gather more detailed information about housing conditions, so that local and national governments and international organizations can better target interventions and specific needs (Intrator and Shivdikar, 2017).

The fourth article, "Inclusion and Innovation: The Many Forms of Stakeholder Engagement in Habitat III," by Eugenie L. Birch, discusses the stakeholder engagement within the Habitat III effort and provides a commentary on how to further build on this approach. This article positions the importance of the role of stakeholder participation in tackling these issues from the UN to the local government level (Birch, 2017).

The final article is a perspective by Janet Kreda from the Canada Mortgage and Housing Corporation on the recent and forthcoming changes in Canada's policies and approaches toward housing. The Trudeau administration's development of a New Housing Strategy for Canada occurred in parallel with the development of the *New Urban Agenda*. Given the structural similarities between the governments of Canada and the United States, specifically the power of the provinces within Canada's federal system, the Canadian perspective can be seen as particularly relevant for U.S. readers (Kreda, 2017).

Acknowledgments

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Guest Editor

Katrina Durbak is a program analyst in the U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

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Urbanizing for Equity: Harnessing Upzones as a Redistributive Policy Tool

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Abstract

Alternative land use policies are needed to ensure equitable housing. This article explores the often lottery-like characteristics of significant land value increases that certain property owners realize following local zoning changes. Traditionally, property owners enjoy a financial windfall from land use modifications when provided the opportunity to redevelop to a higher density or sell to a developer. We propose an alternative policy that enables cities to capture a portion of this land value increase in order to fund housing equity priorities.

Introduction

The *New Urban Agenda* urges the reconsideration of equity as a fundamental component of urbanism. Although cities have long been places of opportunity, urbanization often prompts an increased cost of living, housing shortages, and other externalities that disproportionately burden low-income and poverty-stricken individuals and families. To respond to this paradox, the *New Urban Agenda* declares, "We commit ourselves to promoting equitable and affordable access to sustainable basic physical and social infrastructure for all" (UN, 2016: 7). If urban developments are to be sustainable, they must "leave no one behind" (UN, 2016: 5).

Beyond envisioning equitable cities as a desired outcome, the process of urbanization also offers equity-related challenges and opportunities. At a micro level, cities grow by the parcel or lot. A family farm begets a group of single-family homes, which begets an urban community of mixed use, multistory buildings. Even historical city centers grow taller and denser. The new development that enables urbanization creates an inequitable economic bounty; few mechanisms exist to redistribute the profits associated with new construction and rising land values.

In growing economies, changes in allowable land use often facilitate increased land values. This phenomenon is simplest as a function of density—as the allowable density of a land parcel expands, the value of the land usually increases. In the United States, local zoning processes typically determine land use and associated changes. Traditional zoning policies enable landowners to enjoy the financial benefits associated with zoning changes by selling or redeveloping properties to take advantage of newly allowed uses. In either scenario, the public action of zoning creates private wealth through increased land values.

Zoning changes can be a boon to private landowners, but land value increases create additional costs for renters and first-time homebuyers. Redevelopment can catalyze gentrification and the displacement of low-income renters. Although affordable residential density fosters access to the benefits of cities, the urbanizing process tends to exacerbate economic inequalities.

In response to the inequality inherent to urban growth, this article proposes a policy that enables cities to incorporate equity priorities into zoning changes. Rather than allowing for zoning changes to enrich private landowners, the proposed policy captures this wealth for redistributive purposes. The creation of Upzone Development Rights (UDR) separates the ownership of newly created allowable uses from the ownership of the land and its existing use. This article explores the potential for how such a policy might work in practice, acknowledging the likely political and legal challenges to such a radical innovation. This article contributes to the implementation of the *New Urban Agenda* by proposing an innovative policy tool that integrates equity into the development agenda.

Upzone Development Rights Policy Overview

In tight property markets with relatively few housing vacancies, existing zoning policies enable development demand and potential to build up in desirable locations. Unrealized demand percolates until cities grant permission to build new densities or uses. When governments allow for denser development in certain areas, they create bottlenecks of development demand. This excess demand drives up the market value for the properties within newly zoned areas.

Zoning decisions are (usually) strategic and tend to reflect existing or future infrastructure or growth trends. However, we use the term *lottery-like* to describe the somewhat arbitrary nature of exactly where zoning boundaries exist. An *upzone* refers to a defined geographic area within an urban setting rezoned for a higher, denser, or more profitable use.

Zoning boundaries can distinguish two parcels that may experience the characteristics of their neighborhood in very similar ways. For instance, two neighboring plots may benefit from a neighborhood's transportation access, safety, schools, and commercial establishments, but one lot may be zoned for midrise development and the other may permit only a single-family home. On either side of the zoning boundary, stark differences are likely for properties and property owners. Whereas a newly upzoned home may become a target for prospective developers previously unable to develop multifamily or commercial development in the area, the value of a similar home outside the zoning boundary remains relatively unchanged. This phenomenon creates winners who, much like those in a lottery, receive significant wealth despite taking the same action (or inaction) as their unlucky neighbor.

Rezoning can transfer significant value to property owners who win this lottery. We draw on the conceptual framework of Hagman and Misczynski (1978) and refer to property value gains created by public action as *windfalls*. Property owners enjoy some legal protections against zoning changes that decrease their property values, but they typically enjoy the entire increase in value that zoning and other publicly funded improvements create. Governments do expect indirect financial benefits due to increased property tax assessments, but greater tax revenues are comparatively small and often delayed by several years.

This article proposes that the public should benefit from the spikes in property values created by zoning policies, and once captured this wealth should help increase equity. A dedicated revenue source for redistributional purposes can serve as a meaningful antidote to the negative impacts of the urbanizing process on low-income populations. This practice embeds an equity component into urbanization, extracting value for redistribution only when market forces recognize land value increases.

The idea of windfall recapture is not novel in theory, and cities already possess some tools for capturing value from property owners. Several municipal finance tools harness the newly gained property values from public-sector investments to help finance those investments. Cities across the United States use instruments like tax increment financing, local improvement districts, impact fees, and the sale of development permissions to pay for investments within particular communities. Our proposed policy, UDR, is a variation on the sale of development permissions.

Our proposal differs from existing policies on a few key points. First and most important, we specifically address increased value for landowners resulting from zoning changes rather than capital projects. Unlike tools used to finance infrastructure projects, zoning increases do not require financing. Through a UDR system, cities obtain revenues not directly offset by corresponding costs. If windfalls fund equity investments, property owners within an upzone may not receive private financial gains from city zoning policy. Instead, we argue that the benefits of the wealth (property value increases) created through public action (upzones) need not accrue exclusively for the neighborhood where the wealth was created. Capturing windfalls for public purposes can fund broader issues of urban equity such as housing subsidies or targeted investments in less prosperous neighborhoods. This represents a significant departure from other common tools for capturing land value.

Second, we advocate that cities allow for market-based pricing systems when granting development permissions. Through the similar value-capture tools mentioned previously, government agencies determine the price or rate that community members pay for the public investments from which they benefit. The market-based approach, through a bidding or negotiation system, could maximize the value capture without imposing costs that disincentivize development or skew the market. This component is essential for ensuring the intended outcome of urbanization (that is, fostering the growth of cities so that more people may access benefits and lower prices from increased supply). To harness urbanization without impeding it, a UDR policy must not substantially delay or reduce multifamily development, because exacerbating current multifamily supply-demand imbalances could unintentionally offset equity benefits. However, if administered effectively, UDR could equitably redistribute gains without affecting the incentive structure to build.

Third, we argue for collecting an unmaterialized value by imposing a new cost to the buyer, rather than selling a development standard of value—like density bonuses—or taxing a realized property value increase. We expect that developers have a finite willingness to pay for parcels to develop newly allowable higher-density projects, so they will cut acquisition costs elsewhere in order to secure UDR. Imposing a new expense to bid for and secure the development permissions for the newly acquired parcel should lead to a corresponding decrease in the price the developer offers to the seller. Simply, we expect the developer to offer less to the property owner, thus transferring most of the windfall to the government for redistributive purposes.

Although a UDR policy reduces the incentive for homeowners to sell, the number of upzoned parcels likely remains a finite resource. Therefore, a homeowner may still extract a modest windfall compared with similar parcels outside the upzone. Rather than eliminating windfalls, this proposal merely enables a city to collect revenue to reinvest toward equity goals. Many cities already experience neighborhood opposition to upzones, and a UDR system may even foster broader support for upzones as the resulting wealth creates citywide benefits. Regardless, it is essential that cities maintain their commitment to upzones in order to achieve the positive outcomes density can provide.

Finally, we firmly assert that the recaptured windfall must advance "equitable and affordable access" to a city. Although we stated previously that a UDR system enables cities to obtain revenues not directly offset by corresponding costs, we view certain urbanizing trends such as rent increases, gentrification, and the displacement of low-income households as the costs of upzones. The upzoned parcels may not exemplify these trends, but a more holistic perspective reveals these aggregate effects of urbanization. The specific needs of a city should determine how exactly to use these funds, but programs such as rent subsidies, downpayment assistance, and community revitalization projects may appropriately promote equity goals while supporting urbanization and reaping the benefits that upzones and density provide.

To present a compelling argument for such a policy innovation, we first establish the connection between zoning, windfalls, and equity. We then describe a brief case of windfalls in practice. We then present a review of existing mechanisms for capturing windfalls. We conclude with our policy proposal for a UDR system based on market forces.

Zoning, Windfalls, and Equity

Our policy proposal echoes long-ignored calls to better moderate the effect of public policy on land values. Hagman and Misczynski (1978) described the lottery-like nature of the status quo: planning, even when conducted in the public interest, can be perceived as an "arbitrary and capricious […] non-system of planning" through which a landowner could win or lose millions by "the decision of a government body or by the stroke of a planner's pen" (Hagman and Misczynski, 1978: 21). Although city- or neighborhood-level scrutiny may convey logical land use policies, parcel-level decisions about zoning boundaries rarely result from such careful analysis.

Land use regulation is an effective tool for balancing the density needs of a growing city with other urban priorities, such as open spaces, the preservation of historic buildings, and affordable housing. Changes in land use policy, however, often create new inequities. When residential

neighborhoods are upzoned, seemingly random homeowners may sell their properties at inflated prices, reflecting new development potential. Under this system, homeowners capture the entire windfall attributed to zoning actions. Neighbors outside of a rezoned area lack this opportunity. Mitigating the ability of existing property owners to capitalize on zoning changes would lessen the inequities currently inherent to zoning changes.

By offsetting the lottery-like effects of upzones, a windfall capture scheme also dampens the potential for politically motivated zoning boundaries. Developers and influential property owners have less incentive to disrupt planning if the parcel-level decisions have lower financial stakes. Planning can focus on maximizing public benefit rather than engaging in disputes centered on private benefit concerns. Thus, recapturing windfalls would both diminish the inequitable fortunes caused by zoning and reduce the likelihood that private interests drive parcel-level planning decisions.

The link between zoning and geospatial inequity related to housing affordability also justifies harnessing zoning as tool for the redistribution of land values. In many parts of the country, the price of housing generally reflects the price of construction; however, in particular high-cost cities, the traditional land-value and construction-cost model poorly predicts the price of housing (Glaeser and Gyourko, 2002). Instead, evidence suggests that zoning and land use restrictions prompt higher housing prices (Glaeser and Gyourko, 2002). Although zoning provides a variety of public benefits related to the strategic growth of a city, its link to increased housing costs and geospatial inequity validate distributing the financial gains from zoning to those adversely affected by zoning and land use restrictions. Other city planning strategies can mitigate these negative externalities, but we advocate harnessing the windfalls through a value capture mechanism and investing them in equity-focused strategies.

A Brief Case of Windfalls in Practice

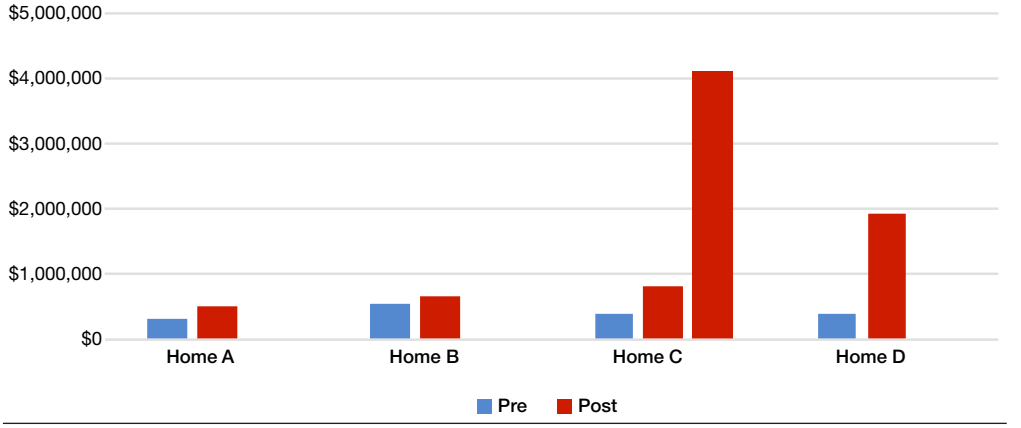
To illustrate the phenomenon of windfalls, we examine the market value changes of four single-family homes within or adjacent to the Roosevelt Upzone in Seattle, Washington. In 2012, the city of Seattle increased density and height allotments in several zones surrounding a future light rail station in the Roosevelt neighborhood. Large public investments like light rail generally increase property values, but examining the vastly different resale values of a few similar properties illuminates how zoning affects values independently from public investments.

This case presents four properties that, due to their proximity, should benefit similarly from the public and private investments in the area, including the forthcoming major infrastructure improvement to the neighborhood. All four homes are in the same neighborhood; however, homes A and B were not rezoned for higher allowable building uses, whereas homes C and D were. Exhibits 1 and 2 illustrate the increase in market value and percentage increase in market value, respectively, before and after the Roosevelt Upzone. The median sale prices of homes in the Roosevelt area increased at an average rate of 6.84 percent per year during the past 5 years.[1]

[1] http://www.trulia.com/real_estate/Roosevelt-Seattle/6869/market-trends/.

Exhibit 1

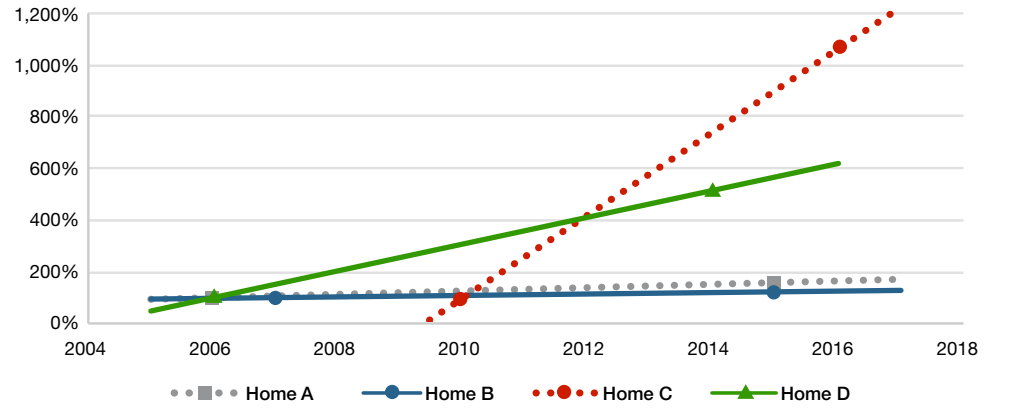
Pre- and Post-2012 Roosevelt Upzone Market Value



Source: King County Assessor's Office, parcels 922140-0695 (A), 922140-0555 (B), 952810-2875 (C), and 952810-2640 (D)

Exhibit 2

Market Value as a Percentage of Pre-Upzone Sale Price (2012 Roosevelt Upzone)



Source: King County Assessor's Office, parcels 922140-0695 (A), 922140-0555 (B), 952810-2875 (C), and 952810-2640 (D)

Home A has two bedrooms, one bathroom, and 1,020 square feet. It was built in 1919 and is in fair condition.[2] Home A sits on a 2,400-square-foot lot that remains zoned for single-family homes and is three blocks from the heart of the Roosevelt Upzone. Home A sold for $332,000 in 2006 and resold for $525,000 in 2015. This represents a 58-percent market value increase over 9 years. This increase breaks down to $21,444 per year, or 6.5 percent per year of the 2006 value equally distributed over 9 years, similar to the overall neighborhood average.

[2] Parcel records and condition quality designations are according to the King County Assessor's Office.

Home B sits one block east of home A in the same residential neighborhood surrounding the Roosevelt neighborhood commercial development. Home B is a three-bedroom, two-bathroom, 1,750-square-foot single-family home built in 1920. Home B is also in fair condition and, like home A, its zoning did not change during the 2012 rezone. Unlike home A, home B's 3,807-square-foot lot is currently zoned for lowrise development, although the only existing structure is a single-family home. Home B sold for $550,000 in 2007 and resold for $673,000 in 2015. This represents a market value increase of 22 percent 8 eight years. This increase breaks down to $15,375, or 2.8 percent, per year of the 2007 value equally distributed over 8 years.

Because no single-family zones were upzoned during the 2012 Roosevelt Upzone, the closest comparisons are single-family homes built in lowrise zones, like home B, that sold after their lots transitioned from lowrise to midrise zoning. Home C spent the better part of the past two decades as a single-family home on a 4,120-square-foot lot zoned for lowrise development. During the 2012 rezone, home C's zoning designation changed to midrise. Home C is a 960-square-foot, two-bedroom, one-bathroom single-family home built in 1919. In 2010, home C sold for $388,500. In 2015, after the rezone, home C sold for $815,900, which represents an increase of 110 percent over 5 years. The increase breaks down to $85,480, or 22 percent, per year of the 2010 value equally distributed over 5 years. Home C sold again in August 2016 for $4.133 million, with no property improvements since the previous sale. Comparing this second sale to the 2010 sale price represents an increase of 964 percent over 6 years. This increase breaks down to $624,083, or 161 percent, per year of the 2010 value equally distributed over 6 years.

Home D experienced a similar transition as home C and previously existed as a single-family home on a 4,634-square-foot lot zoned for lowrise. The structure, built in 1904, featured two bedrooms, two bathrooms, and 1,410 square feet of finished space. During the 2012 Roosevelt Upzone, home D's zoning changed to midrise. Home D was demolished 2 months after its most recent sale. The demolition illustrates the divergence of land values from the value of property improvements after land suddenly inherits additional development potential. Home D best depicts this land value increase after an upzone, because it sold for a highly inflated price almost immediately before being torn down. Home D sold for $377,500 in 2006 and, following the rezone, sold for $1.946 million in 2014. This price represents an increase of 415 percent over 8 years, which breaks down to $196,000, or 52 percent, per year of the 2006 value equally distributed over 8 years. On the former site of home D, construction began on a midrise apartment building 2 weeks after demolition of the single-family home.

A comparison of market values for the properties outside of the rezone (homes A and B) with the values of those within the rezone (homes C and D) illustrates divergent value trends. Whereas this brief case cannot account for an isolated monetization of zoning changes in this neighborhood, the examples of a few single-family homes that were upzoned to midrise and subsequently sold demonstrate the significant discrepancies in land value increases compared with neighboring homes outside of the upzone. Rather than allow for zoning to drive such disparate trends, recapturing and redistributing the zoning-induced windfall would harness that value for the public good.

Existing Mechanisms for Land Value Capture

Land value recapture is already a well-established policy tool. Municipal financing tools such as tax increment financing, local improvement districts, and impact fees exploit the presumed value engendered by public investment in order to help pay for the improvement. Existing policy tools take advantage of the positive financial forecast attributed to the public benefit infrastructure project.

Through tax increment financing, governments finance infrastructure improvements by earmarking property tax revenues from the area that the improvement is likely to benefit (Dye and Merriman, 2006). Local improvement districts enable benefiting properties to finance capital improvements through bond issues by forming special assessment districts and paying the debt obligations for the projects that benefit them over time through assessments on their property (MRSC, 2009). Some local governments require impact fees from new developments to provide public capital facilities for that development.

> Local governments throughout the country are increasingly using impact fees to shift more of the costs of financing public facilities from the general taxpayer to the beneficiaries of those new facilities. As a general matter, impact fees are capitalized into land values, and thus represent an exaction on the incremental value of the land attributable to the higher and better use made possible by the new public facilities. (APA, 1997)

Our policy proposal relies on a sale of development permission system as an administratively feasible and effective structure to frame UDR for equity reinvestment. A sale of development permission system is predicated on government controlling the right to develop and granting such permission in exchange for contributions toward public goods—in this case, purchase of the right to build on newly awarded allotments within a particular zone. Under a sale of development permission system, a government can recapture unearned windfalls as a return to the community that created the value (Hagman and Misczynski, 1978).

The experience of São Paulo, Brazil, provides a clear example. During a budget crisis in the 1990s, the São Paulo municipality began granting the right to exceed building height restrictions within certain zones in exchange for "equivalent value in monetary resources, land, or public works" (Froes and Rebelo, 2006: 1). The funds generated through the sale of additional occupancy allotments by the São Paulo municipality helped finance part of the São Paulo Metro Line 4 project (Froes and Rebelo, 2006). São Paulo's regulations do not require density fee payments from developers "for buildings that fall within the normal limitations on floor space." However, in specified high-development zones, developers must pay for additional floor space above normal density (Peterson, 2009: 76).

Under São Paulo's system, once the total stock of new development potential was tallied, the system allows for the "transfer of individual lots … through property certificates … which are not linked to any specific lot" (Froes and Rebelo, 2006: 5). The prices of these permissions are set on an area-by-area basis by the municipality (Froes and Rebelo, 2006). The funds generated from this system are dedicated to financing the urban investments outlined in the law that created the sale of development permission system (Peterson, 2009). An additional benefit to the development permission systems is the speed at which government funds can be materialized.

> This form of syndication of additional construction area allows the anticipation of resources for the implementation of public works, which are going to enhance the appreciation of the value of the areas which they serve. The sale of potential construction through auction by the Stock exchange also allows for a faster process and gets significant resources in volume in a shorter period of time. (Froes and Rebelo, 2006: 5)

A similar policy in the state of Maharashtra, India, allows developers to buy additional floor space beyond the maximum allowable amount under current policy within two specific districts. According to Peterson (2009: 77), for "upper-income housing, the cost per square foot of additional building area will be set at 80 percent of the price per square foot of land in the assessment zone."

Systems based on transfer of development rights (TDR) operate similarly, although they are founded on different principles. TDR systems allow low-density property owners to monetize their forgone development potential by selling the potential to enable extra density in a high-density area. TDR systems can incentivize the preservation of open space, historic buildings, and rural areas, but they do not account for the negative externalities of high-density spaces on disadvantaged populations nor the inequitable process that designates some property owners as TDR-receiving sites whereas others lack that opportunity. In short, TDR systems help preserve some public benefits, but the wealth created through density increases stays in private hands.

Upzone Development Rights: A Market-Based System

Although windfall capture mechanisms exist, they often finance infrastructure investments more directly beneficial to those paying for development permissions, thus resembling the theoretical framework of a special purpose assessment. Using these revenues to redistribute zoning-induced wealth to achieve intracity equity creates an additional degree of separation between payer and beneficiary.

The aforementioned examples of sale of development permission systems in Brazil and India rely on unilateral pricing, whereby local governments set the prices for development permissions. However, unilateral price controls risk stifling or significantly altering the development landscape if pricing schemes do not reinforce market preferences. Alternatively, a market-oriented pricing system for development rights would maximize the efficiency of the value capture and minimize the disincentives for development (Hagman and Misczynski, 1978).

A market-based approach could involve blind bidding, public auction, or a negotiation system for development permissions, thus enabling a city to recapture the maximum windfall while protecting incentives to develop.

Under this market-based proposal, ownership of development rights for achieving new zoning maximums could be purchased divorced from ownership of the land, which could trigger a secondary negotiation between the landowner and the holder of newly acquired development permission (Hagman and Misczynski, 1978). Market-based TDR systems and private purchases of air rights provide precedents for enabling market mechanisms to determine a monetary value for development rights unique to each transaction.

Compared with a government pricing system, a market-based system minimizes the risk that a development permission price is set too low and substantial windfalls are not captured, or that the price is set too high and development is stifled in areas prioritized for denser development. However, a few pitfalls to this system persist. A bidding or auction system may lead to a slowdown of development if owners of development rights do not utilize them or are unable to negotiate successfully with landowners, although this risk mirrors dynamics in the existing real estate market.

Existing city permitting structures could incorporate a market-based UDR system. Although political hurdles are inevitable with any large-scale policy change, especially one with redistributive intentions, the untethering of the value of increased development potential from property acquisition costs can be streamlined. Once zoning authorities adopt upzones, construction-permitting agencies could create permits specifically for achieving new zoning potential, which the market could then monetize for density-increasing redevelopment. With marketable development permissions a new requirement, the value of the permissions, which the developers pay the city to acquire, should lead to a corresponding decrease in the price the developer offers to the seller if we assume developers have a maximum of land acquisition costs based on a project's earning potential. At this point, the buyer can make an offer to the seller and negotiate a price for the home.

Zoning changes that allow for additional density, height, or uses of new developments in an area will trigger the creation of UDR. Each parcel within the upzone area is bestowed affiliated UDR; however, consistent with the aforementioned proposals for market-based pricing systems, the UDR for each parcel is marketed as a separate, severable entity. A negotiation system between the government and one or multiple bidders will determine the UDR value from that upzone, thus reflecting the market value for increasing density on a particular lot. Through processes outlined within adopted city policy, developers must purchase from the city the UDR of each parcel on which it wishes to build to the newest zoning potential. The city will transfer all revenue from the sale of UDR, net administrative costs, to the designated agencies, programs, or redistributive mechanisms charged with improving urban equity. UDRs would capture value increases before transactions with, or redevelopment by, property owners; therefore, this system would enable most of the capital previously granted to homeowners to provide funding for redistributive purposes administered by the local government.

Conclusion

The Habitat III United Nations conference sought innovative approaches to urban sustainability, prioritizing the role of equity in development. A UDR system responds to this challenge by radically altering land transactions in urbanizing areas. By harnessing the financial windfalls created through public land use decisions, a UDR system can simultaneously tame the lottery-like repercussions of current zoning practices and fund investments in more equitable cities. Although the political barriers for transferring private gain into redistributive policies are likely to be high, this policy innovation that embeds equity into the urbanizing process deserves consideration.

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Boundary Issues: The 2016 *Atlas of Urban Expansion* Indicates Global Dedensification

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Abstract

Cities around the world are consuming land at a rate that exceeds population growth, according to the 2016 Atlas of Urban Expansion*—a precise analysis of 200 global urban growth boundaries drawn from satellite images, population figures, and other data. Produced through a partnership among the United Nations Programme for Human Settlements, the New York University Urban Expansion Program, and the Lincoln Institute of Land Policy, the study parses the drivers and effects of sprawl and creates the basis for a science of cities. This article examines some of the critical findings of the* Atlas of Urban Expansion*, such as a general trend of falling density across the world's cities, as well as the identification of a variety of aerial visual signatures of unplanned settlements. Future data collection challenges and implications for land use policy are discussed.*

Introduction

When city growth comes up in public discourse, the conversation nearly invariably focuses on population. We speak of booming cities that have grown from, for example, 2 to 5 million in population in only a few decades or declining cities that are hollowing out and losing residents at a rapid rate.

The common unit of understanding and measurement, in other words, is nearly always the number of people. Measures of land use are often missing from the picture, despite the fact that cities grew much more in land use than in population between 1990 and 2015, according to data (UN-Habitat, 2016a) from the United Nations Programme for Human Settlements (UN-Habitat).

In developed countries, urban population grew 12 percent while urban land use increased 80 percent. In developing countries, population expanded 100 percent and urban land use rose 350 percent.

Land use issues will become more critical as the world population exceeds 9 billion and 2.5 billion persons migrate to cities by 2050, according to United Nations (UN) projections. Configuring urban areas and their available resources to support this massive inflow will be crucial to sustaining human life on the planet (Buhaug and Urdal, 2013; Angel, 2012).

How exactly are these rising urban populations changing global maps? Further, can we observe regular, even predictable, patterns? Are these trend lines, such as they are, sustainable over time?

To date, little scientific understanding exists of broad global patterns related to how city borders, systems, and land use patterns are changing. The online *Atlas of Urban Expansion* (hereafter, the *Atlas*) aims to fill this crucial gap in knowledge (Angel et al., 2016). Produced through a partnership among UN-Habitat, the New York University Urban Expansion Program, and the Lincoln Institute of Land Policy, the new *Atlas* performs precise analysis of satellite imagery, population figures, and other data to study the changing nature of cities from 1990 to the present. The full report and data were unveiled in October 2016 at the Habitat III global cities summit in Quito, Ecuador, as part of the implementation of the UN's *New Urban Agenda*.

The new *Atlas* analyzes 200 cities (up from 120 in the 2012 sample), selected from among the 4,231 cities in the world with populations greater than 100,000 (as of 2010), which constitute a stratified sample of large urban areas. The 200 cities in question contain about 70 percent of the world's urban population (Angel et al., 2016).

The UN statistics division has now accepted and adopted this UN Sample of Cities as a way to conduct ongoing analysis of urbanization trends (UN-Habitat, 2016b). "Cities, how they form, and the effects of urbanization on the quality of human life must now be treated as a science. The unprecedented confluence of climate change, population boom, and the rush to live in cities means that our critical human development will take place in cities" (UN News Centre, 2016).

With unplanned settlement fluidly redefining many urban boundaries, experts and planners say that producing a consistent method for studying cities as contiguous spatial units, not only administrative jurisdictions, is crucial (Angel, 2016). The UN Sample of Cities also enables transition from an urban agenda based on country-level data to one predicated on city-based data collection and analysis.

Studying such a sample enables us to infer some generalizable rules about large urban areas. "The sample accurately represents that universe, so you can actually make statements about that universe given information about the sample. That's the more scientific contribution of this *Atlas*" (Angel, 2016).

Land Consumption and Dedensification

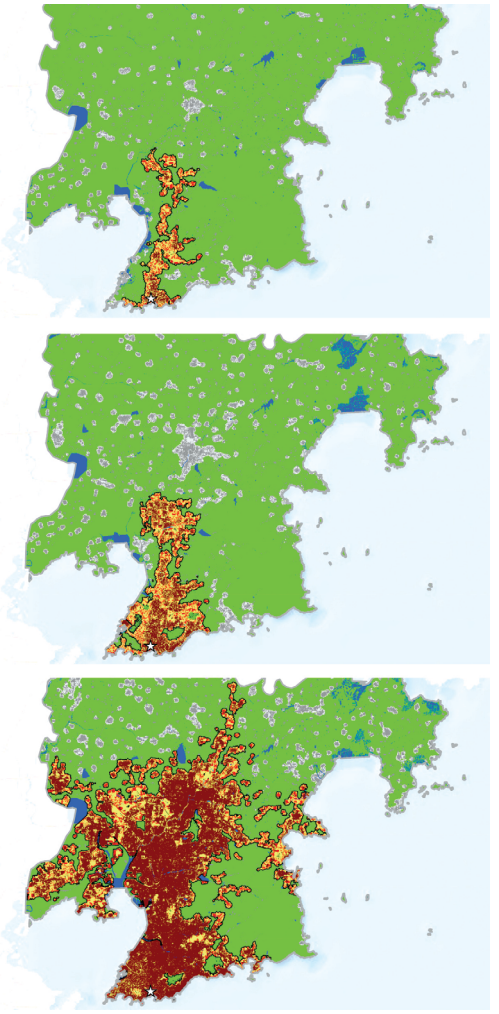
One reliably observed pattern is that cities around the world are stretching out physically and consuming land at a rate that exceeds population growth. This tendency corroborates the findings of the first-edition *Atlas*, which indicates falling density (Angel et al., 2016). In the past, falling density was

termed "sprawl," and some refer to it now as "dedensification." In any case, for a planet increasingly concerned with sustainability, energy efficiency, climate change, and resource scarcity, falling density is a troubling trend. Density generally allows for greener and more sustainable living patterns.

Qingdao, China, had among the fastest rates of population growth and outward urban expansion in the UN Sample of Cities. Population grew at an average annual rate of 7.2 percent per year between 1990 and 2013, rising from 853,000 to 4.5 million, and the built-up area associated Qingdao's urban extents grew even faster, at 11.6 percent per year. Qingdao's expansion areas revealed mostly planned, orderly extensions. Exhibit 1 shows the city in 1990, 2000, and 2013.

Exhibit 1

Urbanization in Qingdao, China, in 1990 (Top), 2000 (Middle), and 2013 (Bottom)



Note: The brown sections are built-up urban areas, red sections are built-up suburban areas, black sections are built-up rural areas, light green sections are urbanized open space, and green sections are rural open space.
Source: New York University, Urban Expansion Program

Angel (2016) noted a kind of rough statistical rule that emerges from the new *Atlas* work—as populations double, land use triples. Many policymakers have been unable, or unwilling, to see this reality unfolding in recent decades.

Chen (2016) observed that the issue of sustainable growth is "very uneven in terms of planning officials' awareness." In many countries, "various orthodoxies are battling it out," and frequently the "cards are stacked against us" in terms of changing norms and official attitudes. "For many, many decades, and in some countries for centuries, there have been incentives [for] building on virgin land." Even where political will for change exists, there are "multiple dimensions of capability to build upward, such as in-ground infrastructure" (Chen, 2016). Wider complex systems must be coordinated from a policy perspective in order to achieve greater density and land conservation.

In any case, the data analysis effort undertaken in the *Atlas*—which at root is intended to help define a new "science of cities"—may serve as a wakeup call. Angel said the *Atlas* can be a "tool for convincing policy makers that the expansion they must prepare for is considerably larger than their own little back-of-the-envelope calculations, or what their planners have in their master plans" (Angel, 2016).

Increasing density again will necessitate sacrifice and modification of existing norms for living standards in many places. It will require people to live in smaller apartments and homes, in multifamily housing, and in higher buildings. It also will frequently require redevelopment of low-density areas in cities.

McCarthy commented that the data are "a little bit chilling," as they reveal a pervasive pattern that signals substantial trouble ahead. "It's something that we have to stop—whether we call it 'sprawl' or 'de-densification' or something else. We can't continue to consume all of our best land with urban development. We still have to feed ourselves. We still need to collect water" (McCarthy, 2016).

McCarthy also noted many ill-fated attempts to build large housing units far outside denser urban areas, leaving millions of units across the world largely empty. These failed attempts have happened in many countries, from Mexico and Brazil to South Africa and China. "Why is it that we continue to build these developments in the middle of nowhere and expect people to live there?" McCarthy (2016) noted. The lesson is that it is vital to link jobs and industrial activity with housing.

More proactive planning clearly is required for growth across the world, according to *Atlas* researchers. That means finding the right ways to channel city growth spatially and to create the infrastructure—transportation, water, sewer, and other necessities—so the new settlements and housing units are serviced appropriately.

Moreover, it is also necessary, *Atlas* researchers say, for many of the big cities around the world—from Lagos, Nigeria, to Mexico City, to Zhengzhou, China—to adopt more next-generation thinking about so-called "polycentric" cities. That will require moving beyond the traditional paradigm of hulking, monocentric cities with a huge urban core and instead creating polycentric networked hubs, whereby a metropolitan area will have many interlinked urban centers.

Signatures of Unplanned Settlement

The satellite imagery analyzed in the *Atlas* also highlights other key patterns that are both drivers and symbols of the overall dedensification trend worldwide.

One granular mark is a lack of four-way intersections, a clear sign that roads are being laid out haphazardly. Such informality and unplanned development have been increasing over time across the world. The pattern, however, is strongly correlated with lower gross domestic product, or GDP, per capita, and therefore is more pronounced in the developing world and global south. Linked to this observed pattern is an increase in urban block size, as shantytowns and unplanned settlements of many kinds grow without regard to transportation needs.

Exhibit 2 shows clear qualitative differences in the layouts of streets and blocks in the expansion areas of Kozhikode, India (top), which were mostly unplanned, and Qingdao (bottom), which were mostly planned. From 1990 to 2014, 28 percent of Qingdao's built-up area was in roads and streets compared with 8 percent in Kozhikode; four-way intersection and average block sizes were 51 square kilometers and 4.7 hectares, respectively, in Qingdao compared with 10 square kilometers and 7.5 hectares, respectively, in Kozhikode. The amount of residential development in formal land subdivisions or housing projects accounted for 76 percent of Qingdao's expansion area compared with 1 percent of Kozhikode's.

Exhibit 2

Layout of Expansion Areas in Kozhikode, India (Top), and Qingdao, China (Bottom)

Source: Bing

The *Atlas* also suggests a pervasive lack of orderly connections to arterial roads, which are key to facilitating transportation to employment and economic networks. Built-up areas within walking distance of wide arterial roads are less frequent than they were in the 1990s, according to data from that decade (Angel, 2012). More generally, there is simply not enough land being allocated for roads.

In many unplanned, rapidly growing cities such as Kozhikode, poor road network connectivity and the low share of land in streets compromises mobility and poses serious economic challenges for residents (exhibit 3). Obtaining city-level estimates for urban layout metrics required analyzing dozens of quasi-randomly located 10-hectare study areas, or locales, distributed throughout a city's entire expansion area.

In addition, low-density tracts and small dwellings are unnecessarily consuming precious urban open space—parks and green spaces that can make dense urban areas more livable.

Angel (2016) noted that planners need to get ahead of the coming wave of urban migration and secure land for transportation, affordable housing, arterial roads, and open space. That kind of planning needs to happen before settlement, after which land prices soar and the logistics of moving populations become trickier. "This can be done at a relatively small cost," said Angel (2016), who suggested that planners begin to "make some minimal preparations for it."

Even in countries where a high degree of central planning occurs, the data contained in the *Atlas* may prove helpful for diverse land management challenges. According to Liu (2016), "Compared to most cities in the developing world, Chinese cities are better managed. The *Atlas* is still useful for China, as it provides accurate, visual urban expansion data and analytics to planners that could strengthen their understanding of the scale and patterns of urban expansion in their cities."

Exhibit 3

Digitization of Road Features in Kozhikode, India (Left), and Qingdao, China (Right)

Source: Google

The *Atlas* Data Challenge

The data collection and analysis that went into producing the *Atlas* highlight future challenges for urban theory and monitoring of global cities, especially in developing nations. Blei (2016) acknowledged that assembling the 200 cities for the stratified sample was difficult, as no universally accepted definition exists for a metropolitan area. Researchers had to account for variables such as regional location, growth rate, and population size in order to ensure the sample was valid, and they had to create a careful and defensible methodology.

The National Aeronautics and Space Administration (NASA) Landsat database, a satellite imagery program running since the 1970s, was the basis for the spatial analysis (NASA, 2017) Although that methodical, scientific data set is of exceedingly high quality, the underlying population data, which were key for establishing migration- and settlement-related patterns, were frequently less than perfect.

"Some countries have very well-established data programs," Blei (2016) noted. In other cases, however, the data are very coarse, and large cities, particularly in the developing world, have only broad census zones. It is therefore difficult, at times, to make fine-grained insights about population changes in connection with land use shifts, because the researchers had to assume equal density over large tracts of the metropolitan area in question.

Scanning the NASA pictures, the researchers analyzed pixels to identify impervious coverage surface or soils. They performed this task with powerful software according to well-established methods, but correlating it with population data was not always smooth. "Unfortunately, there's not very much we can do if the data are not very good, but we did the best we could under the circumstances," Blei (2016) noted.

Evidence suggests the need for less variation in population data collection and synthesis across countries to derive more actionable insights for policymakers in every country. More global consensus is needed around the definition of cities. The U.S. Census Bureau (Wilson et al., 2012) defines them very precisely as "urbanized areas," or "metropolitan statistical areas," but they are frequently defined in more scattered ways by other countries' data collection agencies. Asia and Africa—home of many of the fastest-growing cities, both in terms of population and geographic extent—suffer from a lack of granular city population data that speak to neighborhood-level change.

Global Nuances and Uncertain Futures

The *Atlas* contributes to a long debate in policy and academic circles about how to measure sprawl, both high and low density, and the best models for addressing related issues. The *Atlas* also speaks to a long research literature on the consumption of resources and quality of life in urban contexts.

Silva (2016) said that the *Atlas* research will continue to help advance understanding of government planning and rulemaking and of residential pricing. The 2016 *Atlas* project includes surveys conducted with various stakeholders in cities that might yield insights on planning policies and markets, among other issues.

Silva (2016) noted, "it's definitely an effort that is needed. It's a first-mover type of project. The measure of success will be the extent to which other researchers, whether through critique or support of the initial idea, can improve upon it and contribute to our understanding of how cities are growing, or even contracting."

It will also help ground-level understanding for those studying or making policy in particular cities. Silva (2016) pointed to Buenos Aires, Argentina, which he called a "classic case" where the expansion of territory is occurring faster than the population growth—and where many people are being displaced outward from the denser city core. Silva said that research by Goytia et al. (2015) has shown how lax land use regulation affects settlement patterns. Land markets and their regulations affect affordability, and these dynamics can result in unplanned settlements.

Kudva (2016) praised the "very careful work" performed in the *Atlas* effort. She worries, however, that smaller cities—those with populations of less than 100,000 and therefore excluded from the analysis—may see different dynamics that are subject to more variable patterns and experiences.

In trying to create "one science of cities," she noted, planners and policymakers may miss significant differences between small and big metropolitan areas, limiting the capacity to imagine creative interventions. "The difference between small and big can be the ability to influence political processes, the ability to garner funds, to organize, to intervene. For a person like me who is interested in smaller places, things like the *Atlas* provide important suggestions, important points of reference, important counterpoints, but they are not always useful" (Kudva, 2016).

Kudva also noted that it is possible large-scale, emerging changes related to energy systems, global warming, sea-level rise, and political upheaval may alter worldwide land use patterns compared with those observed in the past. The issue of falling density is potentially reversible, she said. "That trend could change. We need to play a more interventionist role" (Kudva, 2016).

Nonetheless, better data and a more detailed picture of settlement patterns could help substantially address challenges common to cities of many different sizes. Chen (2016) noted that research like the *Atlas* is necessary to combat issues such as unequal access to opportunity. "We need baseline data, and we need to understand the relationship between how we use land and other things."

The issue of global inequality, which McCarthy (2016) called the biggest "unassailable challenge" of cities, looms in all the data. Beyond the layers of the global maps in the *Atlas* are facts and dilemmas that researchers and policymakers are only beginning to understand and address. "The biggest one is the absolute concentration of poverty and geographic isolation of large segments of the population," McCarthy (2016) observed, noting that sometimes 30 to 50 percent of residents in many large cities live in "deplorable conditions."

Decent affordable housing that is meaningfully integrated into the economic network and flow of cities has to be a priority. Many national efforts to date have failed to achieve that goal, however. "That's the thing that I find most vexing," McCarthy (2016) said.

That issue—and many others affecting the world's fast-growing cities—is framed more precisely and powerfully by the new, comprehensive data.

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Missing 'Middle Scenarios': Uncovering Nuanced Conditions in Latin America's Housing Crisis

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Abstract

This article proposes a novel approach to capturing housing deficiencies in rapidly urbanizing regions that is more suitable for data capture, policymaking, and redevelopment. Housing deficit data need to be accurately captured and categorized to adequately act on them. As underscored in the New Urban Agenda, *urban policymakers need to be able to set accurate and realizable targets to address the housing crisis. Local governments require precise knowledge of ground realities to strategically allocate money and resources, target solutions, and avoid needless waste. Planners and architects require detailed data and plans to respond to complex conditions. Citizens and nongovernmental organizations should be informed of their communities' needs to engage and collaborate in enhancing local urban service delivery. The goal of this article is threefold: (1) to explore a new method to rapidly capture high-quality housing data in the region; (2) to discuss how these deficits and spatial patterns could be clustered into a new form of place-based deficiency typologies; and (3) to contribute to a more precise analysis of housing shortfalls for planners, policymakers, and local governments using the Latin American region as a case-study scenario.*

The proposed solution has the potential to be lower cost, more accurate, rapid, and scalable compared with currently applied techniques and technologies such as census data and satellite imagery. This research serves as a call to action and an exploration in the potential to leverage unmanned aircraft systems and a leading artificial intelligence machine learning algorithm applied to its output data to test, program, and study geospatial data for the purpose of capturing and categorizing rapidly changing qualitative housing typologies in Latin America.

Introduction

Latin America and the Caribbean are plagued by massive housing deficits. Currently, more than 59 million individuals—one in three families—live in deficient housing that lacks basic infrastructure, is unsuitable to inhabit, or built with low-quality materials (Bouillon, 2012). This dilemma is compounded by the fact that Latin America is one of the fastest-growing and most-urbanized developing regions in the world (Bredenoord, van Lindert, and Smets, 2014). Formal housing has not been able to keep pace; illegal or informal settlements have remained one of the more common, and in some regions the primary, means of providing housing for low-income households. In addition, housing occupies the most sizeable surface area in cities. Although figures vary considerably, the principal land use in all cities is residential, occupying from 65 to 75 percent of the surface (Rodrigue, 2013). At the urban scale, tackling the housing challenge directly addresses the most predominant land use in cities. However, deficits in Latin America and the Caribbean are calculated and collapsed into a simplistic binary of qualitative and quantitative shortfalls. An absence of shared definitions, inconsistent methodologies, and outdated information compound this issue. Although directionally helpful, the binary definition of qualitative and quantitative shortfalls is unable to accurately capture complex urban realities. Binary definitions are static and do not help pinpoint acute needs. Moreover, binary definitions do not measure the magnitude of specific characteristics of the housing crisis at a neighborhood, urban, or regional scale. Categorizing housing deficiencies through a binary lens helps produce binary responses. Nuanced and targeted solutions that address ground realities are likely neglected.

Among the main pillars examined and problematized at the 2016 United Nations Conference on Housing and Sustainable Urban Development (Habitat III) were guidelines and improvements to national urban policy and housing policies (clustered under the key areas of urban frameworks, and urban housing and basic services respectfully). Habitat III also addressed the need for accurate and timely data capture to ensure closer alignment between local needs and national urban planning frameworks. As stated in Habitat III's *New Urban Agenda*, articles 111 and 156 affirm the importance of capturing "differentiated analysis of housing supply … based on high-quality, timely, and reliable disaggregated data at the national, sub-national, and local levels" and encourage the use of digital tools such as "geospatial information systems … to improve long-term integrated urban and territorial planning and design" (United Nations, 2017).

Drivers for Change: Why Is a New Approach Needed?

The current method used to define and analyze the housing deficit in Latin America is binary and, therefore, limited. The housing shortage in Latin America is neither a monolithic statistic nor binary in nature. Regional housing deficits are calculated and collapsed into a simplistic binary of qualitative and quantitative shortfalls. Qualitative shortfalls represent the inadequacy of housing units with respect to structural shortfalls, such as poor housing materials and quality; insufficient space; privation of basic infrastructure (for example, electricity, sanitary disposal of waste, and potable water); poor location; and insecure tenure. Quantitative deficiencies denote a lack of shelter, severe overcrowding, or a need for a completely new dwelling. Although directionally helpful, the binary definition is unable to accurately capture complex urban realities. The definitions are static

and do not pinpoint acute needs, nor do they measure the magnitude of specific characteristics of the housing crisis at the neighborhood, urban, or regional scale. Examining and categorizing housing deficiency through a binary lens helps produce binary responses. Nuanced, targeted, and effective solutions that address the ground reality likely are overlooked or neglected. As underscored throughout the *New Urban Agenda*, the development of robust and accurate urban policies is vital to providing the necessary framework and support to urban development, acting as a key instrument to capture and target current and future urban priorities and to coordinate and guide the actions of national and local actors, as well as private and public investments.

Housing deficiencies do not exist in a binary bubble. The urban reality is much more complex, with a wide variety of conditions that constitute "middle scenarios." This article argues that these missing middle scenarios—which cut across regional, urban, and neighborhood scales—need to be explored and exposed. Imagine an agglomeration of poorly ventilated slum housing in an urban center with weak roofs and collapsing walls surrounded by highrise buildings. Compare this scenario with decrepit lowrise social housing in a periurban region rebuilt with deteriorating walls and roofs and with little to no access to public transportation or schools. Although both display similar measures of qualitative shortfalls (for example, weak walls and roofs), these two scenarios have very different sets of conditions and solutions. An analysis of housing shortfalls more suitable for redevelopment is desperately needed.

To generate accurate policies, urban plans, and architectural or landscape designs, middle scenario typologies are needed to reflect the complexity of the housing challenge and condition. Although a significant range of complex urban conditions exists, patterns of typologies likely will emerge. These patterns need to be captured, learned, and analyzed. This article explores a solution to this challenge; it proposes that a catalog of local, regional, and national housing deficiency typologies be developed through pattern-recognition and machine learning on the back end of an unmanned aerial vehicle (UAV). The goal of cataloging these deficits is to generate a new method of clustering typologies and a more nuanced analysis of the housing deficit. In sum, the proposed solution would help address the shortcoming of current measurements and provide a novel approach to collect and parse housing deficiency data.

Institutional Challenges

In Latin America, an absence of shared definitions and a prevalence of inconsistent methodologies and outdated information characterize the quantitative and qualitative shortfalls regarding housing data. Little agreement exists in the region as to what defines qualitative deficiencies and adequate shelter or as to the methodology of how to capture these shortfalls. Definitions vary by country and by researcher in the field of housing, from setting a minimum predefined livable space—wherein households or individuals living beneath this minimum requirement are classified as inadequate—to assessing housing conditions by measuring levels of deprivation (Rojas, 2015).

There is a paucity of data. The Economic Commission for Latin America and the Caribbean completed the most recent Latin American regional assessment in 2000, primarily by drawing on census data from the 1990s (UN-Habitat, 2011). Census data largely exclude informal areas and settlements. Ad hoc or independent efforts have been launched to address this data gap by the

Center for Social Research at the nonprofit TECHO or through an interim housing census launched in 2015 in Brazil and Mexico (to be carried out every decade).[1] Nevertheless, there remains a lack of timely, high-quality data capture and analysis. Specifically, local and national data on informal settlements tend to be imprecise and fragmented (Fernandes, 2011). Moreover, despite the fact that numerous regional and international agencies attempt to provide reliable statistics and encourage standardization and updated methodologies to measure deficiencies, a desperate need remains for the production of standardized and periodic data.[2] Census data are captured every decade. Regionally, the average amount of time dating to the most recent census is more than 6 1/2 years (see exhibit 1). Outdated, inaccurate, and binary information needs to be replaced, and the absence of shared definitions and inconsistent methodologies needs to be countered.

Exhibit 1

Census Data Captured by Year, Latin America

Notes: At the time of this research, Guatemala's Instituto Nacional de Estadistca (INE) website was disabled and not open to the public. All countries that conduct the housing census collect qualitative and quantitative housing data. In 2015, Mexico and Brazil introduced an interim housing census that will be carried out every decade. Chile will create a new one-off census in 2017 because the data captured in 2012 did not adhere to the required data standards.
Sources: Map by Kira Intrator and Ricardo Martínez Campos using data from Instituto Nacional de Estadística y Censos (INEC; Argentina); Instituto Nacional de Estadística de Bolivia (Bolivia); Instituto Brasileiro de Geografia e Estadística (Brazil); Instituto Nacional de Estadística (INE; Chile); Departamento Administrativo Nacional de Estadística (Colombia); INEC (Costa Rica); Oficina Nacional de Estadística (Dominican Republic); INEC (Ecuador); Dirección General de Estadística y Censos (El Salvador); INE (Guatemala); INE (Honduras); Instituto Nacional de Geografía, Estadística e Informática (Mexico); INEC (Nicaragua); INEC (Panama); Dirección General de Estadísticas, Encuestas y Censos (Paraguay); Instituto Nacional de Estadística e Informática (Peru); INE (Uruguay); INE (Venezuela)

[1] To counter the lack of data on informal settlements, the Center for Social Research conducted alternative census studies in Argentina, Chile, Colombia, and Nicaragua in 2015.

[2] Examples of regional and international agencies seeking standardized definitions, updated housing indicators, methodologies, and regional coordination around indicators include the Regional Office on Latin America and the Caribbean, the Latin American and Caribbean Demographic Centre, and the Global Housing Policy Indicators.

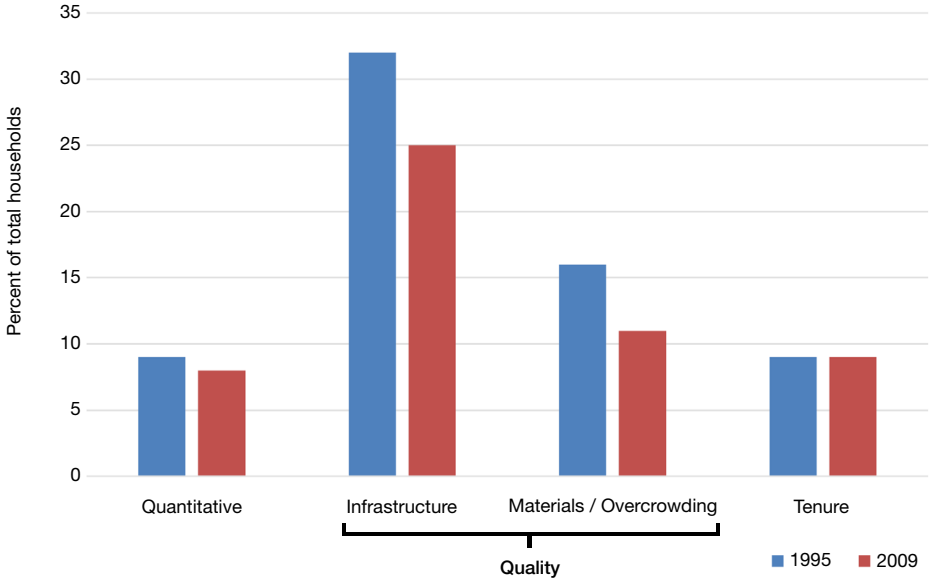
General Scope and Scale of Challenge

The regional, urban, and neighborhood-scale impact of Latin America's housing crisis is massive. Latin America's housing deficit and the concomitant rise of central and peripheral informal housing settlements has heightened large-scale urbanism challenges. The dynamics that determine polycentric or periurban expansion are complex—ranging from housing policies, sociospatial issues, a lack of serviceable land, and weak urban planning and infrastructure—a chief result of which is the unavailability of suitable, affordable housing.

Urban areas in Latin America suffer primarily from qualitative housing deficiencies. Of these qualitative deficiencies, the most pervasive is inadequate infrastructure, followed by a shortfall in the quality of the materials used for shelter. Basic infrastructure provision includes sanitary disposal of waste and access to electricity and potable water. Additional qualitative shortfalls include overcrowding; poor-quality or impermanent materials; inadequate roof, wall, or floor conditions; and tenure. Rojas and Medellin (2011) corroborated that the region's greatest unmet need is qualitative (exhibit 2). In addition, statistics published at a major continental ministerial meeting indicate that 60 percent of households have access to suitable housing in the region. Of the remaining 40 percent, 22 percent live in dwellings that are structurally deficient and the final 18 percent need entirely new houses (MINURVI, 2007). According to more recent studies in the category of infrastructure, the leading challenge is inadequate sanitation, affecting 13 percent of urban households (about 17 million households), and 6 percent (or 8 million households) lack piped water. Electricity access appears to be inconsequential, with nearly universal coverage (Bouillon, 2012).

Exhibit 2

Urban Housing Deficiencies by Type, Latin America



Source: Adapted from Rojas and Medellin (2011)

Uncovering 'Missing Middle' Scenarios in Latin America's Housing Crisis

A UAV, commonly known as a drone, is a pilotless aircraft. UAVs are a component of unmanned aircraft systems (UAS), which include a UAV, a ground-based controller, and a system of communications between the two. The flight of UAVs may operate with various degrees of autonomy, either remotely by a human operator or fully or intermittently autonomously by onboard computers (ICAO, 2011). UAS provide a cheaper and faster alternative to conventional mapping techniques. The advantage of using these systems is demonstrated in the speed and accuracy with which the provide geospatial data and their capacity to generate accurate data of existing formal or informal spatial developments. UAS are a logical means of collecting and parsing spatial patterns and data due to the fast pace of Latin America's urban growth, the presence of undocumented informal housing settlements, and the fact that housing census data are collected once every decade. The proposed solution is for the UAS data to feed into a new form of image-based machine learning, developed from current urban conditions. Machine learning, using the long short-term memory (LSTM) algorithm, would help surface patterns and provide the primary input to the formulation of these missing middle scenarios and urban spatial typologies.

UAS counter the cost, complexity, and time of conventional mapping. Multilateral agencies, researchers, the private sector, and governments are testing the nascent field of UAS mapping. During the past year, for example, The World Bank used UAS to generate geospatial data for surveying land in countries with weak or outdated geospatial data infrastructure (World Bank, 2016). At a smaller scale, independent research initiatives experiment with UAS as a primary input for participatory mapping and to collect geospatial data for informal housing settlements in unmapped regions (Barnes, Volkmann, and Muller, 2015). Through seed funding from initiatives such as Drones for Good from the United Arab Emirates, private-sector startups use UAS to undertake a range of activities such as three-dimensional mapping, ocean navigation and surveillance, and emergency surveillance in remote geographies (UAE Drones for Good, 2017).

In Latin America, governments primarily use UAS for activities related to intelligence, surveillance, and reconnaissance operations, with a few governments beginning to apply alternative purposes such as monitoring environmental crimes in the Brazilian Amazon rainforest and architectural digs in Peru (Cawley, 2014, 2013; Emol, 2013). However, these data collection approaches remain binary in nature and do not employ or combine artificial intelligence with UAS. The proposed approach and solution has yet to be to be applied to defining or addressing the housing crisis in developing regions.

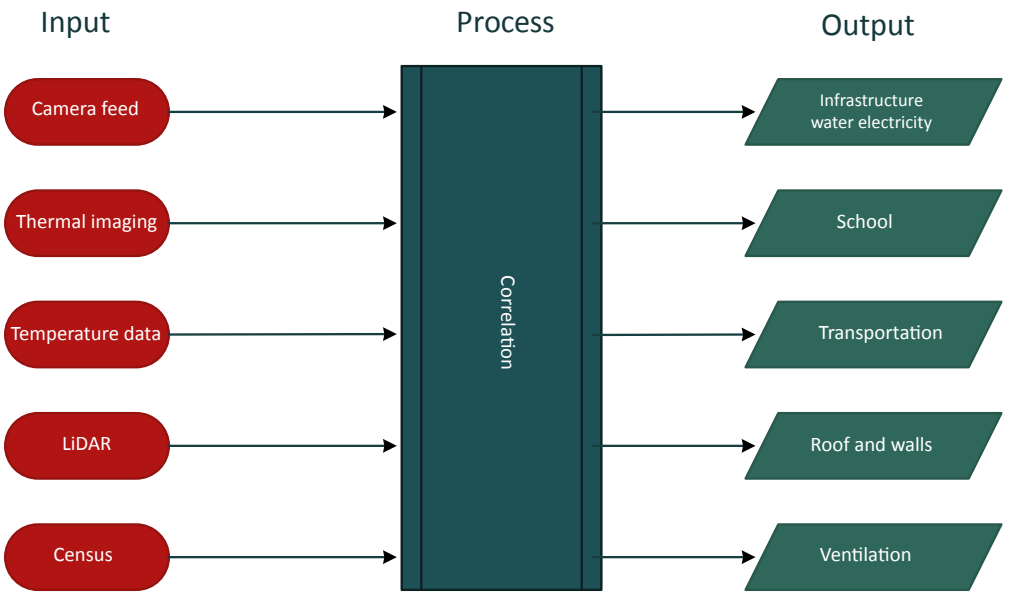
The UAS could be used in a new way—to test, program, and study geospatial data for the purpose of capturing and categorizing qualitative housing typologies in Latin America. UAS have yet to be deployed in Latin America for the specific use of cataloging housing and their surrounding urban spatial characteristics. This idea responds to a critical need for urban and housing deficit data that are accurate and rapidly generated. The proposed solution could use and expand on current data libraries as a baseline input (for example, census data, local survey data, infrastructure provision,

and so on) related to qualitative urban housing conditions. Moreover, the solution aims to capture the types of shortages compromising an individual home, as well as examine the larger urban fabric in which it resides.

The proposed concept explores a novel approach to the data mining process by using the latest LSTM model. Predictive models, such as deep neural networks, have the potential to generate a real-time heat map of city characteristics and housing deficiency needs. Many of the recurrent neural network algorithms, such as the LSTM model that contains prolific nodes, have made an impact in real-life applications. LSTM is extensively used and adapted through algorithms involving speech recognition and are applied in the field of robotics for vision analysis, scene labeling, and face recognition. For example, in their work of speech recognition, Sak, Senior, and Beaufays (2014) dissected acoustic frames that were analyzed using a phoneme database with the LSTM model. Unlike the simple feed-forward neural networks, LSTM models are tantamount to cyclic connection-based modeling sequences; through the use of LSTM, these sequences are converged quickly, and the data are processed in real time. The proposed model is unique because of the parameters that are input into the algorithm. Although a simple LSTM network, this model will be peculiar in that the data provided by the drone will be processed in real time using its array of various sensors (see exhibits 3 and 4).

Exhibit 3

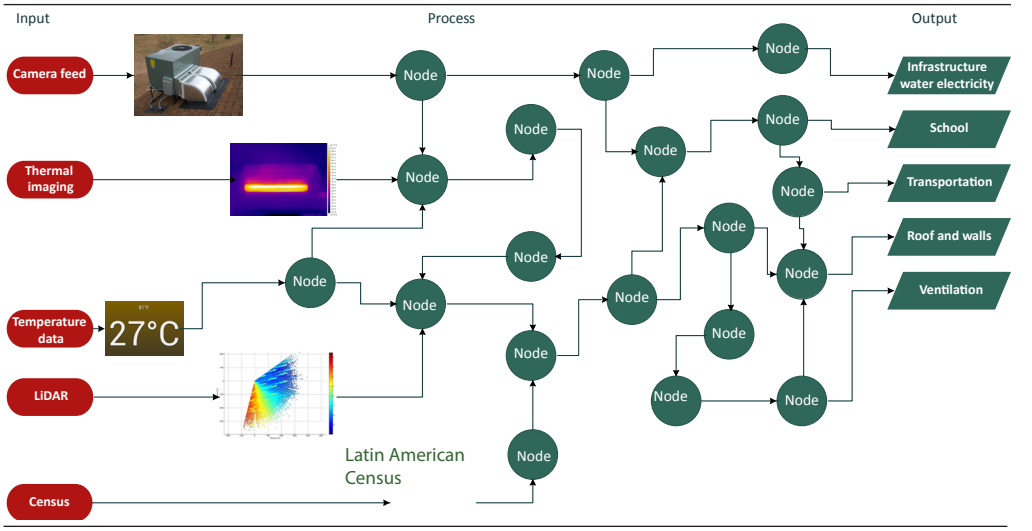
Input and Output Samples for the Long Short-Term Memory Algorithm



LiDAR = Light Detection and Ranging.

Exhibit 4

Snapshot of Long Short-Term Memory Algorithm (or Reoccurring Neural Network) Functions



LiDAR = Light Detection and Ranging.

Implementing the Model

LSTM models are well known for finding both closely related and sparsely related dependencies. This important characteristic of LSTM models can be directly correlated to our problem statement. The short-term dependencies will develop logic nodes for medium-sized databases with immediate connection to the output—for example, connecting light detection and ranging (LIDAR) data to calculate the distance between objects and gather information on the number of floors of a building. In contrast, the long-term dependencies of the model will be capable of relating abstract concepts to one another.[3]

The input to the proposed solution includes UAS equipped with camera feed, thermal imaging, and LIDAR sensors (exhibit 3). Existing census and temperature data would further be fed into the LSTM system as external data sources. The camera feed from the UAS is of higher quality, more detailed, less expensive, and more timely than census data collection and has the potential to be much more scalable than existing satellite or Landsat imagery. Thermal imaging enables estimates of how many people live in a given house or area, and LIDAR would provide basic input such as the topography of the region and the height of buildings (for example, LIDAR combined with thermal imaging data could be cross-referenced to calculate how many individuals live in a given dwelling and space).

[3] For example, a long-term dependency could include connecting temperature data from a region with the availability of public transportation. Even though a heat map of a particular area may seem superfluous in identifying the availability of public transport, such data help determine the relationship by linking the heat map data to previous data samples. If a similar pattern of heat map variations with respect to time were found after the introduction of public transport in another region, the algorithm would conclude the presence of public transport in an area with similar heat-map-to-time data patterns.

A prototype of the LSTM model could be conducted in a small preselected urban agglomeration in which input parameters are collected and the LSTM model trained through data tagging of the region. In its maiden flight, the drone gathers data and streams it to a local database. The LSTM model would use this data to correlate and drive conclusions about the spatial patterns and clusters of housing deficiencies of that area. Previous census data would then be compared with these findings and the aberrations used to fine-tune the LSTM model. Once such a network is established, it would use the correlation (also known as learned neural network nodes) on the surrounding houses in the area (see exhibit 4). The UAS, when deployed, will transmit massive amounts of data to online servers for large-scale computations. An important feature of the LSTM model is the ability to process data in real time. The model is capable of processing gathered intelligence and correlating it with previous data, thus providing output in real time. Real-time output makes the data processing faster. The algorithm would be deployed on rented servers, as the server environment would enable easy and, in most cases, automatic expansion of the algorithm through the self-replication of the code. This ability to extrapolate its computational capability would not only enable multiple drone deployments but would keep the downtime of the model to a minimum, due to the fact that servers have multiple redundancies. Such a model of running algorithms on low-cost, dedicated rental servers is advantageous, as it would allow for building on the readily available high-tech infrastructure of premium server services such as Amazon Web Services and Google Cloud Platform. With respect to the financials of deploying the UAS, the initial hardware costs incurred for the drone, LIDAR sensors, and thermal imagers would be substantial. After this initial investment, longer-term recurring charges would be minimal and include only hardware maintenance and server infrastructure charges. Moreover, the pool of big data that this type of initiative would generate would be massively helpful to multiple sectors across industries. For example, the real estate industry would be able to locate regions requiring redevelopment, the food and supply industries would be able to better allocate resources, and governments would be able to map and create requisite policies to abate high levels of pollution.

To generate correlations and categorize spatial housing deficiency patterns, the algorithm receives data from the UAS. The algorithm will initially generate nodes, or so-called virtual decisionmakers, and start interconnecting the nodes based on the type of data collected in real time from the drone. This interconnection of nodes will enable users to conclude connections and map out high-quality housing deficiency patterns through the use of remotely related parameters. For example, UAS send data of a select region to the servers. The algorithm uses the primary data from the camera feed to process telltale signs that certain objects are present on roofs by comparing them with its database of objects. For example, the UAS discovers the existence of large ventilation shafts and air-conditioning units on a roof, and the algorithm concludes that the building is well-ventilated. Object recognition and image annotation will be carried out by matching object features, including speeded-up robust features (SURF) and Fast Retina Keypoint (FREAK) features. The SURF and FREAK features enable the LSTM algorithms to match corner points and edges of objects in the camera feed. This feature comparison makes it possible for the model to detect ventilation, the availability of water supply by detecting water pipes, and structural integrity of the buildings through the detection of crevices in buildings and discoloration of walls. Other data, such as the LIDAR sensor feeds, enable a topographical analysis of the region and a calculation of the height of given infrastructure and buildings. Another critical feature of the neural network is its ability

to predict certain outputs in the absence of direct inputs; it extrapolates the data it has retrieved to predict parameters it has never been fed. It does so by extrapolating from indirect inputs. For example, if no image or sensor data of the interiors of houses exist to provide direct information regarding levels of overcrowding or the quality of floors or ceilings, it uses thermal images and LIDAR data to relate them to floor and ceiling conditions. Although the accuracy of the model reduces when relying on indirect parameters, it is an added advantage nevertheless.

A limitation of the proposed model is that the sensors used by the UAS are susceptible to weather changes. One way to tackle this issue is by adding or subtracting Delta errors to the sensor readings. However, this adjustment would eliminate the error only if these weather-induced errors remained constant when data are fed to the network. In contrast, weather induced errors fluctuate considerably when covering a large area. This limitation would be addressed as the network grows; with a substantial amount of data, the error is reduced by taking the simple average of repetitive data. An additional implementation challenge to be addressed would be military areas and no-fly zones. To address this issue, the data channeled through the network could be preprocessed to avoid legal and privacy issues. Such an attempt can be made by selectively muting onboard sensors when a drone flies in those areas. Many Latin American countries have their own drone regulations. Panama, for example, divides drones into four categories based on weight (AAC, 2016). Argentina requires drones to stay out of a 5-kilometer radius around airports (ANAC, 2015).

Conclusion

Housing deficit data need to be captured and categorized accurately for policymakers, urban planners, architects, citizens, and nongovernmental organizations to adequately act on it. This article outlined a novel approach to capturing and recategorizing missing middle scenarios of rapidly changing qualitative housing typologies in Latin America by leveraging UAVs and neural network machine learning. The proposed solution is more suitable for data capture, policymaking, and redevelopment in rapidly urbanizing regions and has the potential to be lower cost, more accurate, rapid, and scalable compared with currently applied techniques and technologies such as census data and satellite imagery.

Authors

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Inclusion and Innovation: The Many Forms of Stakeholder Engagement in Habitat III

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Abstract

With an unprecedentedly high level of stakeholder participation, Habitat III offered many opportunities for contributions to the New Urban Agenda. *This innovative and inclusive process created a strong framework for continued involvement in the subsequent implementation of the agenda. These efforts are an important and lasting part of the Habitat III legacy.*

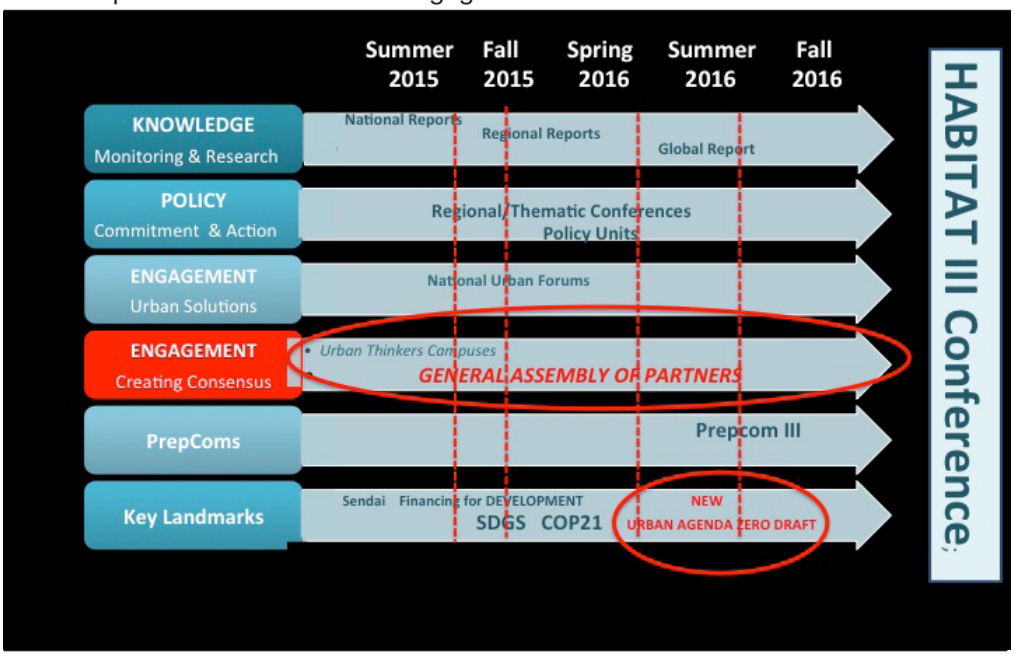
Introduction

In 2013, as the United Nations (UN) General Assembly approved the details for the Conference on Housing and Sustainable Urban Development (Habitat III) preparations, the member states made an explicit request to Joan Clos, the Habitat III Secretary General charged with overseeing the arrangements along with a bureau composed of representatives of 10 member states. They called for "improved participation of local authorities and other stakeholders in the preparatory process and the conference itself" (UN General Assembly, 2013: 4). Clos quickly transformed this request into an innovative, 18-month, multistep, multiparty process that involved thousands of participants in specific activities aimed at delivering a strong conference outcome. Clos also knew, as a former mayor, that if the conference was to be effective, he needed to develop a broadly accepted outcome document (named the *New Urban Agenda*) through intense and widespread involvement of many stakeholders (Scruggs, 2016a). Finally, he knew that beyond the formal commitments of the member states to the *New Urban Agenda* at Habitat III, the implementation to take place during the following two decades would require strong multiparty stakeholder participation, the foundations for which would be laid during the preparatory process.

Thus, the preparatory process developed under his direction and embedded in ongoing courses of action had three types of components: (1) knowledge sharing and reflection, (2) policy recommendations, and (3) engagement activities.[1] Each component had stakeholder involvement depending on the nature of the desired contribution to the preparations, the conference, and later implementation. The result was the involvement of thousands of participants, even before the conference that had some 30,000 attendees, whose interests were ignited for ongoing work (Scruggs, 2016b). This article provides an overview of these efforts and discusses how they constitute an important legacy on which to build strong implementation programs. It will have a special focus on the development of the General Assembly of Partners (GAP), a new engagement platform created for Habitat III. Exhibit 1 illustrates the elements of the preparatory process.

Exhibit 1

The Components of Stakeholder Engagement



Knowledge Sharing and Reflection: Stakeholders Contribute

The knowledge sharing and reflection component involved national governments and regional commissions. It asked them to evaluate their work on housing and sustainable urban development since Habitat II, sharing this evaluation with stakeholders. The United States, for example, assembled a national committee of governmental and nongovernmental stakeholders who reviewed

[1] The other ongoing processes were the Habitat III preparatory conferences held in October 2015 (New York, United States), April 2016 (Nairobi, Kenya), and July 2016 (Surabaya, Indonesia), and the UN deliberations around disaster risk reduction, financing development, sustainable development goals, and climate change.

a seven-chapter national report, largely written by the U.S. Department of Housing and Urban Development (HUD), and opted to develop an annex to the U.S. report in time for the conference. In addition, the U.S. National Committee solicited U.S. aspirations to be reflected at Habitat III by convening five regional conferences and sponsoring a discussion series on global agreements in Washington, D.C., for national leaders. The National Committee met three times during the preparatory period, was invited to become part of the U.S. delegation to Habitat III, and now constitutes an organized body (open to other members) to contribute to implementation as individual organizations or collectively. Their next target will be the United Nations Programme for Human Settlements (UN-Habitat) biannual World Urban Forum (WUF), one of the monitoring mechanisms for the *New Urban Agenda*. In the past, HUD's Office of International and Philanthropic Innovation has led in organizing stakeholder contributions to WUF, a role it is likely to continue for the next convening in Kuala Lumpur, Malaysia, in 2018.

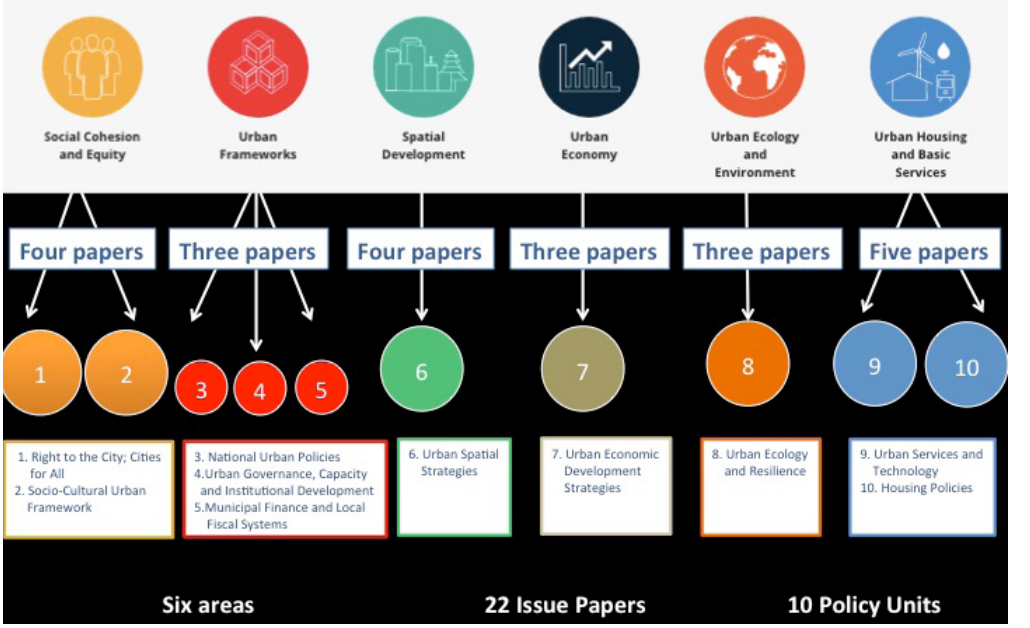
Policy Recommendations: Stakeholders Involved

To collect policy recommendations for the *New Urban Agenda*, the UN General Assembly accepted the Secretary General's plan of soliciting two official input streams derived from the Habitat III Policy Units and the Habitat III Regional and Thematic conferences. The policy unit concept was new to the UN. It brought in 200 experts nominated by the member states and civil society organizations to synthesize material from 22 issue papers written by UN staff from agencies throughout the organization. The topics for both the papers and the policy units were organized under six large headings: (1) social cohesion and equity, (2) urban frameworks, (3) spatial development, (4) urban economy, (5) urban ecology and environment, and (6) housing and basic services. Exhibit 2 illustrates this format. The policy units had a presence in official hearings held at the UN prior to the issuance of the zero draft of the *New Urban Agenda* and had special sessions at Habitat III. UN-Habitat, the coordinator of the *New Urban Agenda* implementation, now is calling on them to contribute to an emerging strategy document, tentatively entitled *Action Framework for the New Urban Agenda*, to serve as guidance for member states.

The 11 Habitat III Regional and Thematic conferences, which convened between the fall of 2015 and the spring of 2016, developed declarations that served as the second official input for the *New Urban Agenda*. Four regional conferences, sponsored by member states, took place in the Czech Republic, Indonesia, Mexico, and Nigeria. Seven thematic conferences, sponsored by local governments, took place in Abu Dhabi, United Arab Emirates (renewable energy); Barcelona, Spain (public space); Cuenca, Ecuador (intermediate cities); Mexico City, Mexico (financing development); Montreal, Canada (metropolitan governance); Pretoria, South Africa (informal settlements); and Tel Aviv, Israel (civic engagement). These meetings involved local stakeholders, thus magnifying stakeholders' ability to participate in crafting the outcome document. The momentum gained in these conferences will be integrated into the programming of the WUF through its plenary and other events.

Exhibit 2

Habitat III Issue Papers and Policy Units



Engagement Activities: Stakeholders Active in Formal Channels

To ensure representation of key stakeholder groups, the Habitat III secretariat encouraged the creation of an innovative engagement platform, the General Assembly of Partners. The idea for GAP originated in the workings of UN-Habitat's World Urban Campaign (WUC), the members of which quickly realized that WUC, a UN-Habitat project formed to advocate that agency's work, was not be able to act as an independent entity for a UN-wide conference. To remedy this problem, they conceived of GAP at the first Urban Thinkers Campus held in Caserta, Italy, in October 2015. They devised a constitution, consulted among the likely stakeholders, and proposed the organization at the second Habitat III preparatory conference in April 2015. As its designers intended, GAP was to emulate the UN General Assembly in structure and purpose. It was a representative body, led by a president and vice president, composed of 14 GAP Partner Constituent Groups (PCGs)—the UN's 9 major groups recognized in 1992 at the UN Conference on Environment and Development (Earth Summit), the Habitat Agenda Partners (formed after Habitat II), and other interested groups. It aimed to contribute to Habitat III and the *New Urban Agenda* by providing an official channel for stakeholder engagement and collaboration, developing and advocating for common positions, and elaborating and adopting position statements while respecting the individual differences among the PCGs. The GAP constitution called for elected co-chairs to head each PCG and an executive committee composed of the PCG co-chairs and the officers. The constitution called for GAP members to meet in plenary as a decision-making body. The UN General Assembly acknowledged GAP in its December 2015 resolution recognizing the modalities for Habitat III (UN General Assembly, 2015).

During the months prior to Habitat III, the executive committee met six times, and the GAP full membership met four times to develop its position. GAP issued two declarations—the Nairobi Declaration, presented to the Bureau of the Preparatory Committee (hereafter, the Bureau), articulating its presence and commitment to developing collective contributions to the *New Urban Agenda* and the New York Declaration, detailing GAP's intended legacy document. In May 2016, GAP issued its legacy document, *Partnerships for the New Urban Agenda*, which identified areas of contributions from the partners in the implementation of the *New Urban Agenda* (knowledge, advocacy, piloting, and innovation, and monitoring). This document became the basis for GAP interventions with member states as they developed the *New Urban Agenda*.

GAP was extremely active in the deliberations for the *New Urban Agenda* in several ways beyond promoting its partnership agreement. Its involvement increased with growing recognition of GAP by the member states. GAP representatives were official members of the drafting committees for the Habitat III Regional and Thematic conferences. GAP mounted side events at the conferences. The regional conference in the Czech Republic invited the GAP president to address the opening and closing ceremonies. Further, GAP members were well represented as individual experts in the Habitat III Policy Units. In June 2016, GAP organized the stakeholder hearings mandated by the UN General Assembly modalities in which each PCG and more than 40 stakeholders commented on the zero draft of the *New Urban Agenda*. At this time and forward, GAP had multiple, lengthy meetings with the Bureau and co-facilitators (UN ambassadors charged with assembling the final drafts of the *New Urban Agenda*). GAP PCG chairs were recognized to make statements at the informal meetings held in New York City in May and June and at the Third Preparatory Committee of the Habitat III Conference. Throughout this time, GAP increased the number of PCGs, adding one recognizing older persons and another recognizing persons with disabilities; its membership exploded, rising from about 100 at its formation in April 2015 to more than 1,200 unique organizations and individual members in September 2016. Overall, its membership encompassed 58,000 networks and had an outreach in the millions.

For Habitat III, GAP was quite visible. It organized 16 roundtables and 4 assemblies, with the president's and vice president's speeches included in the opening and closing ceremonies. UN Secretary General Ban Ki-moon met privately with the GAP Executive Committee. In an analysis of the *New Urban Agenda*, GAP identified 20 paragraphs in which its interventions on behalf of knowledge, advocacy, innovation, and monitoring were present. Each PCG, in similar analyses, found many areas of support for their respective interests. Finally, the *New Urban Agenda* recognized GAP by name.

GAP was originally intended to be a short-term project, to self-extinguish with the end of the Habitat III Conference, as reflected in its constitution. However, at its Fifth Plenary meeting, held at the Habitat III Conference, its members decided otherwise. Encouraged by the Habitat III Secretary General to capitalize on the positive momentum generated in the preparatory process and at the conference, and by a sense of accomplishment as enumerated previously, they voted to extend the GAP's life into the *New Urban Agenda* implementation stage.

Currently, GAP leadership is engaged in the adaptation process. Its executive committee met in January 2017 in New York City, where they hammered out the revised constitution and pledged to

develop focused strategic implementation frameworks built on intra- and inter-PCG relationships and commitments. A follow-up meeting held in New York City in April yielded the final program that was approved at GAP's Sixth Plenary prior to UN-Habitat's Governing Council meeting in Nairobi in May 2017. Forster (2017) underlined the importance of the ongoing GAP work.

Although GAP organized the 16 PCGs, it was not the only stakeholder activity recognized in the Habitat III preparations and conference. Notably, the Global Taskforce of Local and Regional Governments—which formed in 2013 to offer a platform for subnational governments at UN conferences, represents thousands of localities throughout the world, and drives its messages straight to the community level—was extremely active. It participated in the Habitat III Regional and Thematic conferences; co-chaired one of the Habitat III Policy Units; organized the mandated hearing for mayors, county, and provincial leaders to comment on the zero draft in May; and put together a roundtable and the multiday Second Global Assembly of Local and Regional Authorities toward Habitat III. It is now engaged in multiple follow-up activities around the *New Urban Agenda*. For example, it brought mayors to the 61st Session of the Commission on the Status of Women in March to discuss the *New Urban Agenda* and will continue to do so in UN meetings related to urbanization and sustainable development throughout this year.

Conclusion: The Many Forms of Stakeholder Involvement

The many entry points for stakeholder involvement is a hallmark of Habitat III, born out of the desire to mobilize strength for the implementation of the *New Urban Agenda*. Its predecessors, Habitat I and II, did not support the extensive preparatory experiences demonstrated by Habitat III. The creation of the Habitat III Policy Units and their work in developing one of two official input streams to the *New Urban Agenda*, the organization of Habitat III Regional and Thematic conferences with drafting committees empowered by recognition as the other official input stream to the *New Urban Agenda*, were innovative. As were the preparatory conference modalities that called for expert and stakeholder hearings and permitted stakeholder visibility via making statements at member state meetings. The recognition by the Bureau and the co-facilitators of stakeholders in their dialogues with stakeholders were exceedingly important in opening up Habitat III and the *New Urban Agenda* to voices beyond the member states.

Although the *New Urban Agenda* reflects these inroads, which represent greater recognition of the importance of stakeholder engagement in crafting global agreements—especially those related to cities and human settlements—the real proof of this progress is yet to come. Responsibilities will lie on both sides: the stakeholders will need to continue to engage seriously in the implementation activities, and member states will need to retain openness to these activities, distribute powers to the appropriate level of government, and engage in dialogues to make it possible. GAP represents more than 58,000 networks and the Global Taskforce of Local and Regional Governments—representing thousands of subnational governments worldwide—which lay the foundation for bringing the aspirations and commitments of the *New Urban Agenda* to the local level. The follow-up work, engaging multiparty stakeholders with all spheres of government, will need to be contextual and tailored to the localities in which it will take place. This effort will involve not only growing the number of stakeholders energized through the Habitat III, a process requiring substantial

organizational and communication skills, but also working out the allocation of tasks to the appropriate groups, governmental entities, and partnerships that will make achieving sustainable urbanization a reality. The framework exists, and energetic leadership on all sides will be necessary.

Acknowledgments

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Housing Perspectives on Habitat III: Canada

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Abstract

Canada was one of more than 170 countries to participate in Habitat III and embrace the principles of the New Urban Agenda. *Implementing the* New Urban Agenda *will mean addressing the social, economic, and environmental sustainability of our cities, with housing a key priority. This article describes Canada's approach to developing its National Housing Strategy, sets out the key priorities and themes, and describes the synergy between the Strategy and the principles of the* New Urban Agenda.

Intensity and excitement marked the buildup to and participation in the United Nations (UN) Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador. Now governments, nongovernmental organizations, communities, public servants, academics, and citizens must get down to the hard work of translating the good intentions of the *New Urban Agenda* into concrete actions and meaningful change for people and the planet.

The government of Canada embraced the guiding principles set for the Habitat III summit, which align well with Canada's interest in improving access to housing and building healthier communities across the country. Those principles will guide work as our government embarks on the development of important national strategies and solutions related to housing, poverty reduction, childcare, infrastructure, climate change, and other challenges in both the urban and rural contexts.

Prime Minister Justin Trudeau said recently at the UN General Assembly, "Diversity is a source of strength, not weakness. Our country is strong not in spite of our differences, but because of them" (Trudeau, 2016). Working together is something that Canada does well and will be vital as we undertake the important work of implementing the *New Urban Agenda*. Safe, adequate, and affordable housing is an essential component of inclusive, sustainable urban centers and requires continued partnerships with provinces, municipalities, academia, civil society, youth, indigenous peoples, and others. Going forward, we will engage with our partners to share what we learned from Habitat III and discuss how we can implement the *New Urban Agenda*.

Throughout the negotiation process on the *New Urban Agenda*, Canada fought hard to ensure an inclusive approach—to have groups like youth, children, immigrants, people with disabilities, indigenous peoples, women, and people who are lesbian, gay, bisexual, transgender, and intersex officially recognized in the *New Urban Agenda*. Canada strives to be an inclusive society, but it faces challenges. Although its housing system is fundamentally sound, Canada can and must do better. High levels of homelessness continue to plague many Canadian communities, and new approaches to community building are needed to ensure all people have equal opportunities to thrive in society and contribute to the economy. A lack of affordable housing is a significant contributing factor to social challenges such as poverty and homelessness, unemployment and poor health, and poor educational outcomes.

At the same time Canada was preparing for Habitat III in Quito, the government was also in the midst of consulting widely with Canadians on the vision, priorities, and outcomes of a National Housing Strategy (NHS). Thousands of Canadians took part by filling in an online survey, submitting ideas in writing, and joining the conversation on social media. Many also participated in formal consultations, such as a series of expert and stakeholder roundtables and focus groups to get the views and input of Canadians facing some of the most difficult housing challenges, including people who have been homeless, indigenous peoples, people living in the north, newcomers to Canada, and persons with disabilities.

In November 2016, Canada released *What We Heard*, which summarizes the themes and priorities identified by Canadians throughout the consultation process (Conference Board of Canada, 2016). For example, the government heard consistently that the NHS should consider the entire housing system and spectrum of housing needs while prioritizing the most vulnerable. The government heard of a need for better integration of housing and support services and access to capital to facilitate more affordable housing options. It heard a strong partiality for policies that enable local communities to drive local solutions to housing problems.

A number of themes also emerged from the consultations covering topics Canadians felt needed to be addressed in the NHS.

- Every effort should be made to reduce or eliminate homelessness in Canada.
- The strategy needs to prioritize the housing needs of low-income and vulnerable Canadians.
- Special attention needs to be given to addressing the unique challenges facing indigenous peoples, wherever they may live.
- The strategy should respond to the growing housing affordability challenges faced by low- and middle-income Canadians, especially in large cities.
- Housing should shape communities that are both inclusive and sustainable.
- A strong social housing sector needs to be a pillar of the NHS.

For the most part, Canadians across the country ranked outcomes related to affordability, sustainability, and inclusivity as the top three priority outcomes of the NHS, which are very much in line with those outlined in the *New Urban Agenda*. In particular, achieving greater social inclusion of

those who are often not able to fully participate in the prosperity of the country is a key outcome for which to strive. Canada looks forward to creating meaningful change in the social and economic outcomes for its most vulnerable citizens (notably for seniors, indigenous peoples, veterans, victims of domestic violence, and those with mental health issues).

The government is committed to release a comprehensive NHS in 2017 that aims to—

- Mobilize partnerships across the housing system.
- Achieve better housing outcomes for Canadians with indicators and targets to track progress and a strong performance measurement framework.
- Optimize government investments and assets (for example, lands and buildings) in order to ensure a fiscally sustainable approach to achieving outcomes.
- Improve housing affordability for those who need support and provide pathways toward greater self-reliance and prosperity.
- Identify gaps and provide a continuum of flexible policy and program responses built on best evidence of what will produce the desired outcomes.
- Promote innovation and new approaches, including financing approaches and private sector partnerships.
- Situate housing as part of a holistic approach to achieve broader socioeconomic and environmental outcomes.

The 2017 federal budget, released on March 22, proposed $11.2 billion over 11 years for new federal programs and initiatives that will address important housing needs and shape Canada's long-term vision and priorities for a NHS. A proposed National Housing Fund (NHF) includes allocations for the renewal of the social housing sector, innovative approaches to the development of affordable housing, a coinvestment fund to promote partnerships where housing can support complementary social objectives, and direct lending, which will increase the impact of these investment dollars. Funding will also go toward renewing the federal-provincial-territorial partnership in housing and supporting shared affordable housing priorities.

The proposed NHF also includes targeted funding to—

- Reduce chronic and episodic homelessness.
- Support efforts to improve housing conditions in the north.
- Make surplus federal lands and buildings available to housing providers at low or no cost for the development of affordable housing.
- Support expanded housing research and improve data collection and analytics, including developing and implementing a new Housing Statistics Framework.
- Address critical repair and affordability needs, and encourage development of new housing, for indigenous people living off reserve.

In addition to substantial new investments in housing, approximately $1.7 billion in annual housing funding, which was scheduled to decline as long-term operating agreements end, has been preserved. Options for reinvesting these funds in support of sustainable social housing are being considered. The 2017 budget also proposed new investments for indigenous peoples, including $4 billion for infrastructure in indigenous communities, a significant portion of which will go to housing, where it is most needed. In 2017, Canada Mortgage and Housing Corporation and Indigenous and Northern Affairs Canada will work with First Nations, Inuit, and Métis groups to codevelop distinct initiatives to improve outcomes and move toward greater autonomy and responsibility for their housing on the part of indigenous peoples.

The *New Urban Agenda* challenges governments to make bold changes to the way they plan and invest in infrastructure, social services, and economic development in urban centers. Canada recognizes the importance of housing as the foundation for social and economic opportunities, which lead to better lives for Canadians. The 2017 budget demonstrates this commitment to housing through significant proposed investments, which would build on existing programs and the $4.3 billion for new and existing housing initiatives included in the 2016 budget. Details of Canada's NHS will be released later this year.

Habitat III brought government leaders and civil society from around the world together to agree on a vision for socially, economically, and environmentally sustainable cities that put people and adequate housing at the center. The NHS will be one part of Canada's integrated approach to creating healthier and more sustainable communities and a significant step toward realizing the vision and goals of the *New Urban Agenda*. Achieving the desired outcomes of the NHS and of the *New Urban Agenda* will depend on us—individuals at all levels of government and civil society—to take the vision to heart, to promote it on a daily basis in our work, and to take actions that make a difference.

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Symposium

The CRA Turns 40
Guest Editor: Carolina Reid

Guest Editor's Introduction

The Community Reinvestment Act at 40

Carolina Reid
University of California, Berkeley

In 1977, Congress enacted the Community Reinvestment Act[1] (CRA) in an effort to expand access to credit and to encourage private capital to return to formerly redlined neighborhoods. CRA established that federally insured banks and thrifts have a "continuing and affirmative obligation" to meet the credit needs of the communities that they serve, including low- and moderate-income neighborhoods, consistent with safe and sound banking practices. Since its enactment, CRA has been subject to significant debate, reflecting differing ideological views of the role of government in overcoming market failures (Barr, 2005; Chakrabarti et al., 2009). Forty years after the law's passage, the question of whether banks have an obligation to serve low-income communities—and what form that obligation should take—is no less salient. This symposium seeks to inform that debate by bringing together new research and commentaries on CRA in an effort to better understand the impact of the law and to provide insights into how it could be improved to better serve the credit needs of low- and moderate-income communities.

Three themes emerge from the contributions in this symposium. The first is that CRA has a measurable impact on access to credit but that larger market forces often mute its effect. Bostic and Lee (2017) examine an important, underappreciated aspect of CRA—its role in expanding access to credit for small businesses. Analyzing data from nearly two decades of small business lending, they find that CRA increases access to small business loans but that the impact is influenced by macroeconomic market conditions and varies over time. Butcher and Munoz (2017) use newly accessible credit bureau data to examine the impact of CRA on a broad set of consumer credit outcomes. They find that CRA leads to increased credit market activity, including increases in the total number of loans, the number of people covered by the credit bureau data, and the fraction of individuals with a valid risk score. Importantly, they find no effect of CRA on increased delinquencies or foreclosures, adding to a growing body of evidence that CRA did not play a role in the subprime crisis (Avery and Brevoort, 2011; Canner and Bhutta, 2008; FCIC, 2011; Reid and Laderman, 2011; Reid et al., 2013).

Two other contributions to this symposium look at CRA's impact from a different angle, asking, "what can we learn from CRA to inform future housing policy"? In their article, Quercia and Riley (2017) reflect on the lessons learned from an innovative effort to scale CRA mortgage lending using

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.

the secondary market: the Community Advantage Program (CAP) run by Self-Help. Building on their extensive research on the impacts of CAP, Quercia and Riley explore how policymakers can balance risk management with efforts to expand the scale of CRA lending to low-income families. In his commentary, Immergluck (2017) examines the strengths and weaknesses of CRA against those of another key piece of legislation designed to increase housing equity: the Affirmatively Furthering Fair Housing (AFFH) rules. His analysis reveals limitations in the AFFH regulatory structure, including the lack of consistency and specificity of the quantitative measures. It also highlights that, despite uneven implementation over the years, CRA's approach to regulatory compliance has worked relatively well.

A second key theme in this symposium is the importance of public participation and advocacy in the implementation of CRA. The "stick" of CRA is relatively weak; ratings largely come into play only during mergers and acquisitions or branching activities, and most banks receive "satisfactory" or "outstanding" ratings (Avery, Courchane, and Zorn, 2009). As a result, the role of community-based coalitions has been critical to holding banks accountable for their CRA activities. Casey, Farhat, and Cartwright (2017) provide empirical evidence for this important aspect of CRA, illustrating how community mobilization in St. Louis, Missouri, was associated with positive lending outcomes in CRA-eligible tracts. However, the pieces by Bull (2017) and Silver (2017) point out critical challenges to the public accountability aspects of CRA. Bull highlights how the data collected as part of a CRA exam are often hard to access, and the reporting of CRA activities is at a geographic scale that does not allow for community development corporations to engage effectively with local banks about the credit needs in their communities. In his commentary, Silver shines light on the regulators and the processes by which public comments are considered as part of CRA exams and bank merger applications, and he offers tangible suggestions for how these processes could be strengthened.

The third theme relates to the question of how CRA could be improved, particularly given the changes in the banking sector that make parts of CRA seem anachronistic. Gaughan (2017) looks specifically at the rise of financial technology (FinTech) companies. He argues that FinTech provides an opportunity to broaden CRA coverage and leverage technological innovation to more equitably distribute CRA investments to the communities most in need. Yezer (2017) takes a different view, suggesting that the changes in banking have made CRA obsolete. He argues that, over the years, political interests have held sway over economic analysis in the development of housing and mortgage market policy, to the detriment of households and neighborhoods. Willis (2017) asks one of the most enduring questions confronting CRA: how do we actually know if a bank has done an adequate job of meeting the credit needs of the community it serves? He proposes that examiners develop new metrics that account for local housing market conditions and provides one example of how such a metric could work in New York City.

Given the continuing disparities in access to credit and the importance of credit for economic mobility, the goal of CRA is as critical and relevant today as it was 40 years ago. The contributions in this symposium provide welcome additions to the interdisciplinary literature on CRA and will hopefully help to inform ongoing policy efforts to expand access to opportunity for low- and moderate-income households.

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Small Business Lending Under the Community Reinvestment Act

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Abstract

This article reviews small business lending patterns from 1996 to 2015 and examines the role of the Community Reinvestment Act (CRA) in shaping small business lending patterns. Using the data that have been reported pursuant to the CRA, we observe that the number of small business loans dramatically increased from 1996 to 2015, while the loan volumes remained essentially unchanged, which translates into a significant decline in the size of the average small business loan. Next, using a regression discontinuity design, we seek linkages between changes in small business lending in a census tract during three distinct periods—1996 to 2002, 2003 to 2011, and 2012 to 2015—and that tract's status as being covered by the CRA. We observe a positive association between small business lending and the CRA from 1996 to 2002 and from 2012 to 2015 and observe a negative association from 2003 to 2011. The findings are consistent with a view that banking institutions strategically respond to the CRA, but that the incentives presented by macroeconomic market conditions can overwhelm any incentives the CRA provides.

Introduction

Capital is the lifeblood of every community. For a community's residents, capital is critical for purchasing durable goods, such as appliances and a car, that are essential for a family's day-to-day life. In addition, families generally need capital in order to achieve homeownership, which is a primary vehicle for building wealth and avoiding the costs associated with housing instability (Green and White, 1997; Gyourko, Linneman, and Wachter, 1999; Linneman and Wachter, 1989; Sinai and Souleles, 2005; Turner and Luea, 2009). Capital is also essential for a community's businesses,

which use capital to acquire land and equipment that are needed to stand up and operate their enterprises. Business success is essential for communities, as businesses are an important source of jobs and provide the basic services that enable communities to function and thrive.

Given this essential role of capital for community health, access to capital and credit has been a concern of policymakers for decades. A large volume of evidence has made clear that capital markets have fallen short where equal access is concerned, which has triggered legislative action to try to improve the state of capital access (Blanchflower, Levine, and Zimmerman, 2003; Munnell et al., 1996). The Community Reinvestment Act[1] of 1977 (CRA) is one such piece of legislation. The CRA seeks to ensure that banking institutions reinvest a significant portion of the deposits they take from local communities back into those communities (Garwood and Smith, 1993). The CRA also establishes that a banking institution's record of reinvestment will be considered as a factor when that institution seeks to acquire other institutions or complete another activity that requires regulatory approval.

A revision to the CRA in 1995 gave the act an additional role—to monitor the performance of banking institutions in providing small business credit. The CRA revision established that banking institutions must report on their lending to small businesses and their provision of small loans to businesses (Canner, 1999). The article uses the data that have been compiled under the CRA to describe changes in small business lending from 1996 to 2015 and examine the role of the CRA in shaping small business lending patterns.

We begin by reviewing the literature examining how the CRA has influenced banking activity, particularly mortgage and small business lending. We then introduce our methodology and data set that are used in this article. The subsequent section describes the patterns in small business lending from 1996 to 2015 at a national level. The next-to-last examines the effectiveness of the CRA on small business lending, using a regression discontinuity design (RDD). The final section concludes by summarizing the findings and considering some potential implications of the findings.

Literature Review—The Effect of the CRA

The literature on the effects of the CRA has focused on how banks engage with local community organizations, the volume and distribution of mortgage loans, and the volume and distribution of small business loans. One response of banking institutions to the introduction of CRA has been to enter into agreements with local organizations, whereby banking institutions pledge to devote significant resources to support CRA objectives. Several studies have sought evidence of whether these agreements are associated with increases in lending activities. Bostic and Robinson (2003) found a positive association between the number of new CRA agreements in a county and lending in that county during a 3-year period. Bostic and Robinson (2005) similarly found that banking institutions that enter into CRA agreements increase their lending activity when the agreement is in force and maintain higher levels of lending even after the agreement has expired.

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.

Regarding mortgage lending, a number of studies have sought to quantify the impact of the CRA on the volume and distribution of loans. We highlight only a few here. Based on a survey of banking institutions, Avery, Bostic, and Canner (2005) found that the CRA induced institutions to engage in lending that they would not have and that most of these new activities were profitable. Bhutta (2011) found that the CRA was associated with increases in mortgage lending in large metropolitan areas in the late 1990s and early 2000s, although effects were not significant on average for the entire nation. Bhutta concluded that government interventions to offset information externalities that suppress credit supply may be justified. Gabriel and Rosenthal (2008) compared the effects of the CRA, which targets banking institutions, with similar regulations that target activities of Fannie Mae and Freddie Mac. Their results are mixed, although they found weak evidence that the CRA increases homeownership in CRA-eligible tracts. More recently, some have argued that the CRA was the main catalyst of the financial crisis of the mid-2000s (Agarwal et al., 2012), although the evidence strongly suggests otherwise (Avery and Brevoort, 2015; Reid et al., 2013).

The literature on the CRA's impact on small business lending is much smaller than the literature on the law's impacts on mortgage lending. Zinman (2002) was the first paper, to our knowledge, that examined the (causal) effects of the CRA on small business lending. Using a framework that is analogous to a triple difference approach, the author compared the dollar amount of small business loans outstanding of banks and commercial borrowers by their bank asset size and regulator toughness in the wake of the 1995 CRA reforms. Also, Zinman restricted the bank sample to those around the CRA asset size cutoff (between $150 million and $350 million) to control for any unobserved bank characteristics (regression discontinuity sample). The estimates found in the paper suggest that the CRA (specifically, the 1995 CRA reforms) increased small business lending by 15 percent of base period lending, which ultimately led the CRA-affected areas to increase payroll and reduce bankruptcies.

A more recent attempt to assess the effectiveness of the CRA on small business lending is found in Bates and Robb (2015). From an analysis based on the Kauffman Firm Survey, the paper found positive associations between minority residential areas and loan availability between 2004 and 2011. Although the authors interpreted the regression results as impacts of CRA, the methodology does not allow for a causal interpretation of the findings because the paper (1) equates minority communities with the CRA eligible low- and moderate-income (LMI) neighborhoods and (2) uses ZIP Codes rather census tracts as the geographic unit of analysis.

In sum, relatively little documentation exists of how small business lending has evolved since the introduction of the small business lending data reporting mandate, as part of the major reforms to the CRA in 1995. Relatively little work comprehensively describes patterns in small business lending and empirically examines the effects of the CRA on small business lending. Using the most comprehensive and current data available, we will attempt to fill the gap in the existing literature.

Method and Data

To examine the role of the CRA on small business lending, we use RDD. One of the key characteristics of the law is that the threshold for eligibility is clear: to be a "CRA-eligible" neighborhood, the Median Family Income (hereafter, median income) in a tract should be less than 80 percent of the

median income for the surrounding area. Given this regulatory framework, neighborhoods slightly below and above the CRA threshold are theoretically quite similar, save for their CRA designation. This close similarity enables us to view any discontinuities in outcomes at the threshold as effects of the CRA. The RDD approach has been often used to evaluate the effectiveness of the CRA on home mortgage lending (Avery and Brevoort, 2015; Berry and Lee, 2007; Bhutta, 2011; Gabriel and Rosenthal, 2008), but this article is the first to apply this approach to examine the CRA effects on small business lending.

In a standard RDD, we estimate the impact of the CRA on small business lending as—

$$y_{ijk} = \beta LMI_{ij} + \psi \boldsymbol{X}_{ijk} + CountyFE_j + YearFE_k + \varepsilon_{ijk}, \quad (1)$$

where y_{ijk} is small business loan originations in census tract i in county j in year k. $\boldsymbol{LMI_{ij}}$ is an indicator that is equal to 1 if a census tract is a CRA-eligible LMI neighborhood, and the indicator is equal to 0 otherwise. $\boldsymbol{X_{ijk}}$ is a vector of neighborhood characteristics that are associated with small business lending, including the median income ratio between tract and corresponding metropolitan area. The model also includes county and year-fixed effects to control for any year- and location-specific heterogeneities.

For the model, we use four samples: (1) all census tracts, (2) census tracts with a median income ratio within 10 percentage points of the CRA cutoff, (3) tracts within 5 percentage points of the cutoff, and (4) tracts within 3 percentage points of the cutoff. The results based on all census tracts provide a reference, but we focus on the narrower samples to estimate the effects of the CRA on small business lending. The narrower sample will enable a more accurate comparison, but at the cost of statistical power due to smaller sample size.

The primary data used for the analysis are the 1996–2014 CRA aggregate flat files provided by the Federal Financial Institutions Examination Council (FFIEC).[2] The CRA aggregate flat files include information on the number and dollar amount of small business loans originated, aggregated at census tract level, by banks and thrifts. In the CRA report, small business loans are defined as business loans of $1 million or less. The data also provide the number and dollar amount of those loans to businesses with gross annual revenues of $1 million or less. Although they provide relatively limited information as compared with the Home Mortgage Disclosure Act[3] data, the CRA data are the most comprehensive publicly available data on small business lending. Greenstone, Mas, and Nguyen (2015) reported that the CRA data cover approximately 86 percent of all loans amounting $1 million or less.

Using the data set, we test the role of the CRA on four outcome variables: (1) number of small business loans ($1 million or less), (2) dollar amount of small business loans, (3) number of small business loans to small firms (with gross annual revenues of $1 million or less), and (4) dollar

[2] The 1995 CRA reform made depository institutions with assets above a certain asset-size threshold report small business, small farm, and community development lending activity that they originate. Since 2005, the CRA asset-size threshold is adjusted on an annual basis. It was $1 billion in 2005 and is $1.226 billion in 2017.
[3] Pub. L. 94–200, 89 Stat. 1124.

amount of small business loans to small firms. In this article, we focus on small business loan originations, rather than loan purchases, and restrict our sample to census tracts within metropolitan statistical areas or metropolitan divisions.

We supplement the CRA data with data from various other sources. First, we use data on every tract's median income as a percentage of the median income for its surrounding metropolitan area, included in the 1996-to-2014 census and demographics files provided by FFIEC. These data enable us to identify those tracts that receive attention under the CRA based on the 80-percent threshold. In addition, we use decennial censuses and the American Community Survey (ACS) to link various neighborhood characteristics of the census tracts in which the small business loans were originated to the CRA data. These characteristics include population, number of housing units, vacancy rate, homeownership rate, minority population share, share of the population age 25 and over, share of the population that has a bachelor's degree, share of the population with income less than the poverty rate, the ratio of the tract median income to the metropolitan area median income, median house value, and median gross rent. We link data from (1) the 1990 census to the CRA data from 1996 to 2002, (2) the 2000 census to the CRA data from 2003 to 2011, and (3) the 2010 census and the 2006–2010 ACS to the CRA data from 2012 to 2014. Lastly, we obtain the number of establishments from the ZIP Code Business Patterns database from 1996 to 2014. As the data set is reported at ZIP Code level, we converted the data into census tracts using population as weights.

Trends in Small Business Lending

We begin our analysis by presenting trends in the small business lending from 1996 to 2015, focusing on the small business loans originated in LMI neighborhoods. Panel A of Exhibit 1 shows the number and dollar volume of small business loans by income category of census tracts. In 2015, the depository institutions subject to the CRA originated 5.7 million small business loans totaling $219.2 billion.[4] The number and dollar amounts have changed dramatically during the period from 1996 to 2015, corresponding to some extent to the business cycle fluctuations during the period. The number of small business loans exploded from 2.3 million in 1996 to 13.1 million in 2007 before plummeting to 4.0 million in 2010. The average loan size shrank dramatically between 1996 and 2015; the total dollar volume of lending is effectively the same in 2015 as it was in 1996, despite the fact that the number of loans in 2015 is more than double the number in 1996. As a consequence, the average loan size in 2015 ($38,200) is only about 40 percent of the average loan size in 1996 ($93,650).

The data for small business loans to small businesses show the same pattern (Panel B). Current loan volumes are much higher in 2015 than in 1996, whereas real loan dollars are smaller in 2015 than in 1996. Thus, the average small loan to businesses in 2015 ($26,600) was only 37 percent of the average small loan in 1996 ($70,900).

Exhibit 2 shows how small business loans and loans to small businesses are distributed across census tracts grouped by relative median income. Although the number of loan originations has

[4] All monetary amounts throughout this article are in 2016 dollars.

Exhibit 1

Number and Dollar Amount of Small Business Loans by Income, 1996 to 2015

Panel A. All Small Business Loans

	Number of Small Business Loans (in thousands)					Dollar Amount of Loans (in $ billions)				
	All Tracts	Below 50%	50 to 79%	80 to 119%	120+%	All Tracts	Below 50%	50 to 79%	80 to 119%	120+%
1996	2,332	121	372	1,157	683	218.4	13.8	34.9	102.5	67.2
1997	2,494	128	399	1,228	739	232.3	14.2	37.2	108.3	72.6
1998	2,488	121	388	1,234	745	227.3	13.4	35.6	106.7	71.6
1999	3,091	123	451	1,554	962	242.0	13.6	37.6	114.2	76.5
2000	4,867	191	711	2,446	1,520	237.1	13.0	36.4	113.1	74.7
2001	5,727	250	872	2,871	1,735	292.6	15.9	44.5	139.7	92.6
2002	7,000	287	1,062	3,534	2,118	324.9	17.0	49.4	155.8	102.7
2003	7,429	282	1,260	3,540	2,347	347.6	16.8	61.9	158.2	110.7
2004	7,708	285	1,283	3,677	2,463	358.0	17.0	63.8	161.7	115.4
2005	7,601	257	1,245	3,594	2,505	322.3	15.3	56.6	142.8	107.7
2006	12,238	402	1,926	5,504	4,406	350.9	15.9	60.3	153.5	121.2
2007	13,079	414	2,013	5,931	4,721	369.7	15.9	62.3	161.9	129.6
2008	10,021	318	1,504	4,505	3,695	311.5	13.5	51.8	137.1	109.1
2009	4,455	150	665	1,975	1,665	208.8	9.7	35.7	92.1	71.3
2010	4,048	137	598	1,780	1,533	187.6	8.9	32.2	82.9	63.6
2011	4,852	167	725	2,130	1,830	202.7	9.4	34.8	89.0	69.5
2012	4,924	245	801	1,972	1,906	203.7	13.8	37.8	80.3	71.8
2013	4,743	247	789	1,889	1,818	206.7	14.0	38.7	81.4	72.7
2014	5,302	272	895	2,101	2,034	207.4	13.8	38.7	81.3	73.6
2015	5,741	299	983	2,265	2,194	219.2	14.2	40.6	85.4	78.9

Panel B. Small Business Loans to Businesses With Gross Annual Revenues of $1 Million or Less

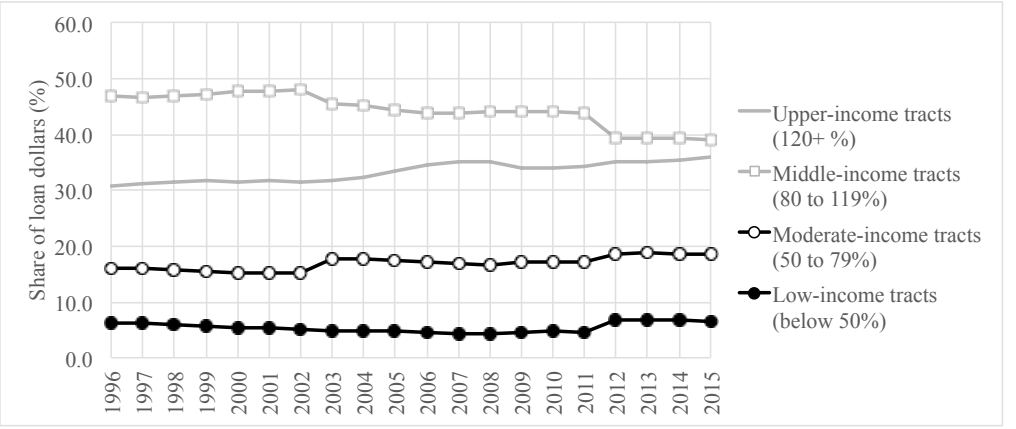
	Number of Small Business Loans (in thousands)					Dollar Amount of Loans (in $ billions)				
	All Tracts	Below 50%	50 to 79%	80 to 119%	120+%	All Tracts	Below 50%	50 to 79%	80 to 119%	120+%
1996	1,334	57	201	688	388	94.6	4.8	14.1	46.1	29.5
1997	1,260	52	186	647	375	98.1	4.8	14.1	47.1	32.2
1998	1,451	57	211	745	438	107.7	5.0	15.2	52.2	35.4
1999	1,858	68	262	950	579	117.7	5.3	16.6	57.5	38.3
2000	2,022	72	286	1,042	621	110.0	4.9	15.5	54.2	35.5
2001	2,481	104	373	1,259	744	134.9	5.8	18.6	66.5	44.0
2002	2,215	82	310	1,137	686	145.2	6.1	19.8	71.5	47.9
2003	2,851	95	465	1,386	905	161.4	6.3	26.3	76.1	52.8
2004	2,919	92	464	1,419	944	160.0	6.1	26.0	74.7	53.2
2005	3,646	110	565	1,749	1,221	146.7	5.7	23.4	66.8	50.7
2006	4,483	134	686	2,102	1,561	154.7	5.8	24.4	69.6	54.8
2007	4,988	146	763	2,345	1,735	154.2	5.5	24.1	69.8	54.8
2008	3,135	91	470	1,486	1,088	115.4	4.1	17.6	53.1	40.6
2009	1,527	44	223	721	538	77.6	2.7	11.8	35.6	27.4
2010	1,422	41	206	667	509	68.9	2.5	10.3	31.6	24.5
2011	2,192	67	312	983	831	76.1	2.7	11.5	34.5	27.4
2012	2,183	96	341	877	869	75.2	3.9	12.7	30.4	28.1
2013	2,315	104	364	921	926	75.2	3.9	12.9	30.3	28.1
2014	2,494	116	406	990	982	72.7	3.9	12.4	29.1	27.2
2015	3,015	143	500	1,194	1,179	80.1	4.2	13.5	31.9	30.5

Notes: Based on the Federal Financial Institutions Examination Council's tract classification rules, neighborhoods are categorized by Median Family Income (MFI) into low- (less than 50% of MFI), moderate- (50 to 79% of MFI), middle- (80 to 119% of MFI), and upper- (equal to or more than 120% of MFI) income. The sample is restricted to small business loans in metropolitan statistical areas or metropolitan divisions, reported by the lending institutions that are subject to the Community Reinvestment Act (CRA) of 1977. Dollar figures are adjusted to 2016 dollars.
Source: 1996–2015 CRA aggregate flat files

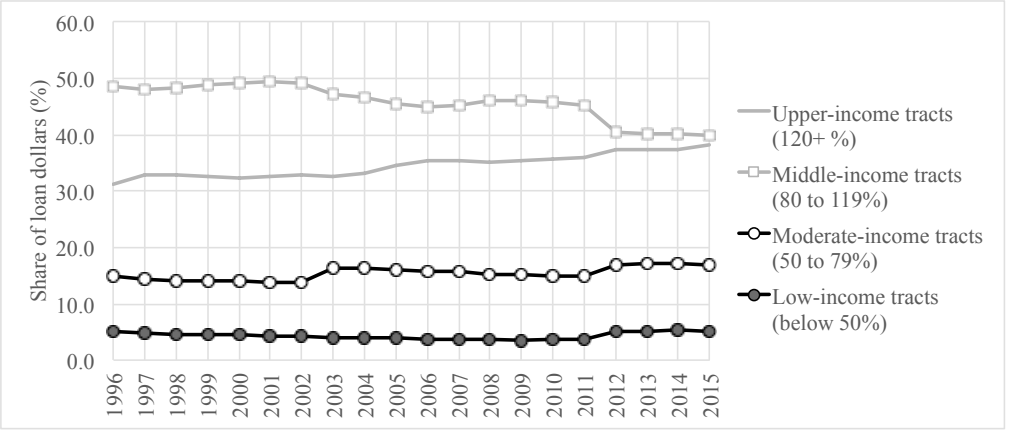
Exhibit 2

Distribution of Small Business Loan Dollars Across Tracts Grouped by Relative Median Income, 1996 to 2015

Panel A. All Small Loans



Panel B. Small Loans to Small Businesses



Notes: Based on the Federal Financial Institutions Examination Council's tract classification rules, neighborhoods are categorized by Median Family Income (MFI) into low- (less than 50% of MFI), moderate- (50 to 79% of MFI), middle- (80 to 119% of MFI), and upper- (equal to or more than 120% of MFI) income. The sample is restricted to small business loans in metropolitan statistical areas or metropolitan divisions, reported by the lending institutions that are subject to the Community Reinvestment Act (CRA) of 1977.
Source: 1996–2015 CRA aggregate flat files

fluctuated during the period, the dollar-calculated share of loans has been relatively stable, even during the financial crisis of 2007 through 2008. Upper- and middle-income tracts have received between 75 and 80 percent of small business loan dollars, while LMI tracts have received from 20 to 25 percent of small business loan dollars. The skew of loan dollars to more affluent neighborhoods may not come as a surprise, but the lack of variation through the difference stages of the business cycle does.[5] One might have expected increasing concentrations in higher-income tracts as the economy weakened. One sees similar trends when shares are calculated based on the number of loans.[6]

Regression Discontinuity Analysis

To examine whether the evidence is consistent with the view that the CRA influences small business lending, we pooled the CRA aggregate flat files from 1996 to 2014 and conducted regressions using samples that vary in terms of the bandwidths around the 80-percent CRA eligibility threshold (regression discontinuity samples). Exhibit 3 presents the results for regressions including four distinct dependent variables: (1) number of small business loans (panel A), (2) dollar amount of small business loans (panel B), (3) number of small business loans to firms with gross annual revenues of $1 million or less (panel C), and (4) dollar amount of small business loans to firms with gross annual revenues of $1 million or less (panel D).

Before turning to the main relationships of interest, we discuss the relationships between the dependent variables and the covariates. The relationships are largely consistent across the four regressions and conform to expectations. Small business lending activity, whether measured in terms of the number of loans or the loan dollar volume, is greater in census tracts with more business establishments and more residents with college degrees and less in tracts with higher homeownership rates, minority population shares, unemployment rates, median rents, and median house value. We also generally observe less small business lending activity in tracts with larger populations and in tracts with higher vacancy rates. The one exception is that the results show that small business lending activity is higher in tracts that have higher poverty rates. This finding is somewhat surprising but could be explained by the fact that small businesses often lack the capital and cash flows required to locate in more affluent communities. It could also be the result of general land use patterns, as higher-income neighborhoods tend to be more residential and not have large commercial corridors. These relationships, which almost uniformly conform to what is seen in other research on small business lending, suggest that the regression results represent legitimate relationships (Bates, 1997, 1991; Bates and Robb, 2015; Bostic and Lampani, 1999; Cavalluzzo and Cavalluzzo, 1998; Immergluck, 1999, 2004).

Turning to the variable of interest—being in a CRA-covered LMI tract—we see that the full sample shows small significant positive relationships, which would generally be consistent with the idea that the CRA had significant positive effects on small business lending activity. However, further examination calls this interpretation into question. Coefficient estimates on LMI status become

[5] We observe two discontinuities in the data, in 2002–2003 and in 2011–2012. We believe these discontinuities are a result of updates to the census tract boundaries that occur with each decennial census.

[6] The calculation, not shown in this article, is available on request from the authors.

Exhibit 3

Results of Regression Discontinuity Analysis, 1996–2014 (1 of 4)

Panel A. Number of Small Business Loans

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	1.368	***	0.559		– 0.076		0.142	
Neighborhood characteristics								
Population	0.001	***	– 0.003	***	– 0.001	***	– 0.001	
Housing units	0.007	***	0.010	***	0.002		– 0.000	
Establishments	0.512	***	0.504	***	0.577	***	0.593	***
% vacancy	0.224	***	– 0.257	***	– 0.076		0.021	
% homeownership	– 0.181	***	– 0.285	***	– 0.285	***	– 0.264	***
% minority	– 0.347	***	– 0.291	***	– 0.320	***	– 0.321	***
% bachelor's or higher	0.399	***	0.297	***	0.153	**	0.155	*
% unemployed	– 0.136	***	0.015		0.062		– 0.385	**
% poverty	0.354	***	0.296	***	0.364	***	0.116	
Median income ratio	0.372	***	0.395	***	0.217		0.468	
Median gross rent	– 0.008	***	– 0.022	***	– 0.021	***	– 0.029	***
Median value	– 0.000	***	– 0.000	***	– 0.000	**	– 0.000	***
Year FEs (Ref. 1996)								
1997	0.237		– 0.198		– 0.538		– 1.219	
1998	– 1.387	***	– 1.544	**	– 1.624		– 2.180	
1999	7.999	***	5.404	***	5.420	***	4.522	***
2000	36.977	***	28.536	***	28.488	***	26.724	***
2001	50.671	***	41.134	***	41.220	***	38.900	***
2002	70.340	***	57.738	***	57.699	***	53.809	***
2003	66.064	***	53.628	***	55.936	***	50.026	***
2004	69.124	***	55.496	***	58.269	***	52.310	***
2005	66.596	***	51.717	***	54.216	***	48.514	***
2006	137.182	***	102.317	***	104.463	***	98.313	***
2007	149.185	***	110.945	***	112.906	***	106.781	***
2008	102.890	***	72.249	***	74.669	***	68.497	***
2009	18.422	***	6.805	***	9.554	***	3.437	*
2010	12.367	***	1.820	**	4.649	***	– 1.394	
2011	25.126	***	11.909	***	14.880	***	8.744	***
2012	24.957	***	15.872	***	17.913	***	15.516	***
2013	21.770	***	13.758	***	15.653	***	13.198	***
2014	28.631	***	19.806	***	22.069	***	19.144	***
County FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.410		0.357		0.350		0.359	
Number of observations	1,213,980		264,734		133,133		79,091	

Exhibit 3

Results of Regression Discontinuity Analysis, 1996–2014 (2 of 4)

Panel B. Dollar Amount (in Thousands) of Small Business Loans

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	157.284	***	– 13.621		– 43.193		10.004	
Neighborhood characteristic								
Population	– 0.179	***	– 0.369	***	– 0.244	***	– 0.179	***
Housing units	– 0.094	***	0.202	**	– 0.381	***	– 0.507	***
Establishments	32.654	***	31.599	***	35.071	***	34.648	***
% vacancy	18.537	***	– 4.303		9.988	**	13.483	**
% homeownership	– 36.723	***	– 34.483	***	– 35.554	***	– 34.592	***
% minority	– 8.516	***	– 7.396	***	– 11.817	***	– 14.364	***
% bachelor's or higher	– 11.465	***	– 20.361	***	– 24.934	***	– 26.071	***
% unemployed	– 13.881	***	– 4.937		– 13.469		– 38.580	*
% poverty	3.193	***	17.702	***	22.183	***	9.124	
Median income ratio	24.015	***	21.545	***	14.200		52.839	**
Median gross rent	– 0.119	***	– 0.001		0.159		– 0.528	***
Median value	– 0.001	***	– 0.001	***	– 0.001	*	– 0.003	***
Year FEs (Ref. 1996)								
1997	95.139	***	62.077		67.704		23.825	
1998	– 34.070		– 40.764		– 48.726		– 79.750	
1999	169.949	***	147.719	**	153.953		120.315	
2000	44.323		76.579		58.426		– 72.395	
2001	952.542	***	747.526	***	704.688	***	562.681	***
2002	1,392.043	***	1,120.210	***	1,092.542	***	897.420	***
2003	1,631.522	***	1,519.169	***	1,600.939	***	1,130.636	***
2004	1,711.392	***	1,569.795	***	1,691.739	***	1,205.396	***
2005	1,105.599	***	996.182	***	1,094.211	***	607.780	***
2006	1,492.491	***	1,231.292	***	1,354.065	***	903.729	***
2007	1,722.410	***	1,382.915	***	1,480.346	***	1,021.885	***
2008	876.474	***	728.665	***	832.337	***	353.352	
2009	– 619.574	***	– 416.929	***	– 308.445	**	– 787.210	***
2010	– 929.205	***	– 664.522	***	– 563.048	***	– 1,040.692	***
2011	– 675.790	***	– 464.771	***	– 345.630	**	– 825.632	***
2012	– 634.690	***	– 375.300	***	– 364.694	***	– 533.726	***
2013	– 623.969	***	– 339.416	***	– 327.930	***	– 506.278	***
2014	– 658.897	***	– 368.798	***	– 342.551	***	– 561.497	***
County FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.270		0.197		0.186		0.153	
Number of observations	1,213,980		264,734		133,133		79,091	

Exhibit 3

Results of Regression Discontinuity Analysis, 1996–2014 (3 of 4)

Panel C. Number of Small Business Loans to Small Firms

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	– 0.163		0.213		0.402		0.358	
Neighborhood characteristics								
Population	0.001	***	– 0.001	***	– 0.000		– 0.000	
Housing units	0.004	***	0.005	***	0.002	***	0.002	**
Establishments	0.179	***	0.171	***	0.198	***	0.201	***
% vacancy	0.004		– 0.190	***	– 0.115	***	– 0.088	***
% homeownership	– 0.062	***	– 0.095	***	– 0.089	***	– 0.086	***
% minority	– 0.132	***	– 0.118	***	– 0.128	***	– 0.134	***
% bachelor's or higher	0.216	***	0.207	***	0.163	***	0.162	***
% unemployed	– 0.013		– 0.023		– 0.024		– 0.115	**
% poverty	0.113	***	0.132	***	0.154	***	0.099	***
Median income ratio	0.121	***	0.161	***	0.186	***	0.185	
Median gross rent	– 0.004	***	– 0.010	***	– 0.009	***	– 0.012	***
Median value	– 0.000	***	– 0.000		0.000		– 0.000	**
Year FEs (Ref. 1996)								
1997	– 2.100	***	– 2.276	***	– 2.340	***	– 2.542	***
1998	0.645	***	– 0.107		– 0.197		– 0.334	
1999	7.222	***	5.005	***	5.057	***	4.882	***
2000	9.621	***	7.218	***	7.216	***	6.843	***
2001	17.072	***	13.730	***	13.627	***	12.984	***
2002	12.000	***	8.556	***	8.406	***	7.574	***
2003	17.912	***	14.033	***	15.099	***	13.246	***
2004	18.528	***	14.175	***	15.327	***	13.562	***
2005	29.422	***	22.286	***	23.273	***	21.402	***
2006	42.023	***	31.260	***	32.130	***	30.183	***
2007	49.472	***	37.472	***	38.301	***	36.245	***
2008	21.202	***	14.502	***	15.531	***	13.625	***
2009	– 3.132	***	– 5.197	***	– 4.132	***	– 6.097	***
2010	– 4.685	***	– 6.583	***	– 5.446	***	– 7.344	***
2011	7.331	***	1.797	***	2.925	***	0.925	
2012	5.508	***	1.775	***	2.921	***	2.487	***
2013	7.106	***	2.787	***	3.815	***	3.438	***
2014	9.295	***	5.077	***	6.282	***	5.815	***
County FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.401		0.335		0.348		0.341	
Number of observations	1,213,980		264,734		133,133		79,091	

Exhibit 3

Results of Regression Discontinuity Analysis, 1996–2014 (4 of 4)

Panel D. Dollar Amount (in Thousands) of Business Loans to Small Firms

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	85.835	***	– 9.557		9.043		10.991	
Neighborhood characteristics								
Population	– 0.038	***	– 0.130	***	– 0.078	***	– 0.069	***
Housing units	0.195	***	0.291	***	0.090	***	0.103	***
Establishments	10.252	***	9.407	***	10.337	***	9.830	***
% vacancy	2.184	***	– 8.414	***	– 3.483	***	– 3.971	***
% homeownership	– 13.259	***	– 13.062	***	– 13.052	***	– 12.448	***
% minority	– 3.264	***	– 2.809	***	– 3.978	***	– 4.860	***
% bachelor's or higher	3.387	***	0.199		– 0.754		– 1.919	
% unemployed	– 5.173	***	– 4.473	***	– 6.287	***	– 12.043	***
% poverty	3.021	***	10.520	***	11.568	***	9.336	***
Median income ratio	10.950	***	10.432	***	13.837	***	18.362	**
Median gross rent	– 0.180	***	– 0.192	***	– 0.119	***	– 0.277	***
Median value	– 0.000	***	0.000		0.000		– 0.000	*
Year FEs (Ref. 1996)								
1997	13.359		– 36.431	*	– 37.483		– 62.449	
1998	161.172	***	86.519	***	93.639	***	81.821	*
1999	311.794	***	222.048	***	235.004	***	222.586	***
2000	163.312	***	119.800	***	119.730	***	78.528	*
2001	572.105	***	415.413	***	405.562	***	365.309	***
2002	711.259	***	517.698	***	505.751	***	455.856	***
2003	798.475	***	703.885	***	748.147	***	623.367	***
2004	752.324	***	661.010	***	726.854	***	607.474	***
2005	528.510	***	449.287	***	507.231	***	384.615	***
2006	635.176	***	504.336	***	574.988	***	459.529	***
2007	609.207	***	484.533	***	544.791	***	413.074	***
2008	27.721	**	36.656		101.241	***	– 27.467	
2009	– 529.544	***	– 404.294	***	– 355.247	***	– 476.979	***
2010	– 659.078	***	– 516.316	***	– 461.213	***	– 583.210	***
2011	– 540.328	***	– 429.045	***	– 368.175	***	– 493.373	***
2012	– 599.313	***	– 439.903	***	– 406.926	***	– 443.850	***
2013	– 610.139	***	– 441.388	***	– 407.550	***	– 444.015	***
2014	– 661.552	***	– 490.633	***	– 443.572	***	– 497.518	***
County FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.285		0.229		0.228		0.213	
Number of observations	1,213,980		264,734		133,133		79,091	

FE = fixed effects. LMI = low- and moderate-income.

** p < 0.1. ** p < 0.05. *** p < 0.01.*

Notes: Robust standard errors are in parentheses. The fixed effects regression models were conducted for county fixed effects. The sample is restricted to small business loans, in metropolitan statistical areas or metropolitan divisions, reported by the lending institutions that are subject to the Community Reinvestment Act of 1977. Headers of columns 3–5 indicate interval rotations for the samples used.

statistically insignificant as we narrow the bandwidth around the 80-percent CRA threshold. It would seem that the link between the CRA and small business lending activity from 1996 to 2014 is, at best, weak.

However, the pooled cross-sectional regressions, which present average effects of the CRA on small business lending from 1996 to 2014, might conceal changes in the CRA impacts during a period of nearly two decades that included two recessions and two long periods of extended growth. To find out, we repeated this regression discontinuity analysis on an annual basis, and the results based on the sample 77-to-83 bands are shown in exhibit 4.[7] The error bars, in light gray, show the 95-percent confidence intervals and indicate that the estimated coefficients on the LMI dummy are not statistically different from 0 in general. However, we can observe certain cycles in the effects of the CRA over time. Although statistically not significant, positive estimated coefficients are mainly found in the 1996-to-2003 and 2012-to-2014 regressions, and negative coefficient estimates are found in the 2003-to-2011 regressions.

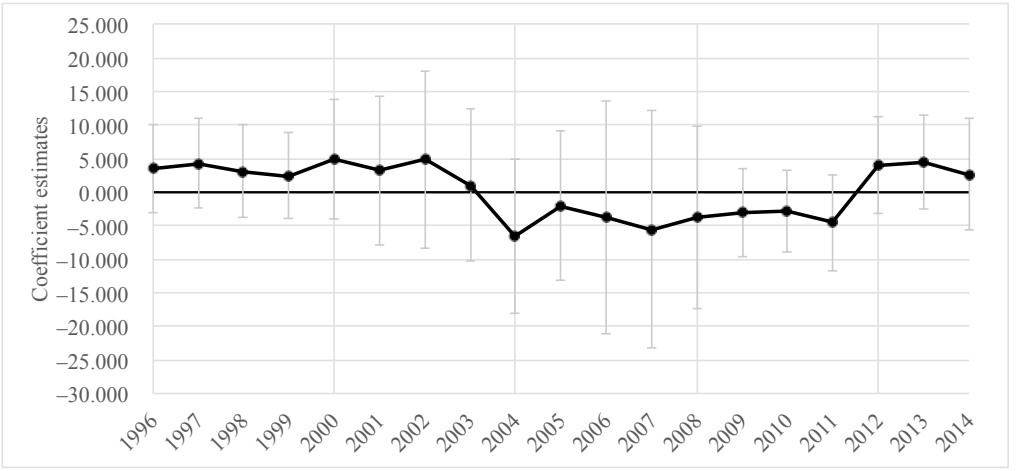
The three distinctive periods coincide with the years when the LMI status was determined based on the 1990 census, 2000 census, and 2006–2010 ACS 5-year estimates, respectively. Thus, we pooled the CRA data into those three time periods and repeated the regression analysis. The results are shown in exhibits 5 through 7. As one might expect, the CRA impact generally is found to be positive for both the number and amount of small business loans in the 1996-to-2002 sample, even within a narrow range around the income threshold (exhibit 5). During this period, the effects are strongest in the regressions using the narrowest band, which is the cleanest test of the role of the CRA in influencing small business lending activity. Although no clear relationship between the CRA and the number of small business loans from 2003 to 2011 was seen, we do observe significantly lower small business loan dollar volumes in the LMI neighborhoods as compared with non-CRA eligible tracts (exhibit 6). Finally, during the most recent 3 years of 2012 to 2014, we observe an opposite pattern from that of the 2003-to-2011 period (exhibit 7). Here again, the number of loans is not statistically different in LMI tracts than in other tracts, but the size of the loan dollars is significantly larger.

[7] The relationships for the covariates (available on request) are qualitatively unchanged with varying bandwidths.

Exhibit 4

Estimated Coefficients on LMI Dummy From Stratified Regressions by Year, 77 to 83 Percent (1 of 2)

Panel A. Number of Small Business Loans



Panel B. Dollar Amount (in Thousands) of Small Business Loans

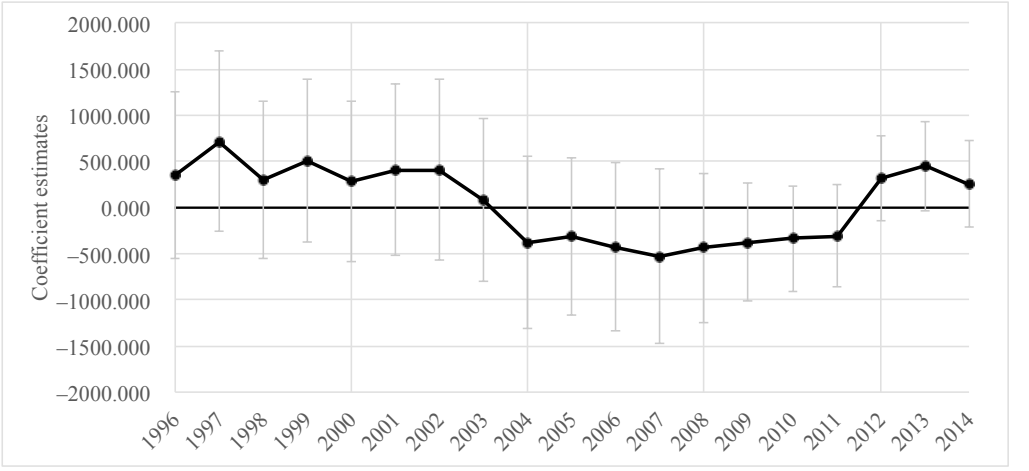
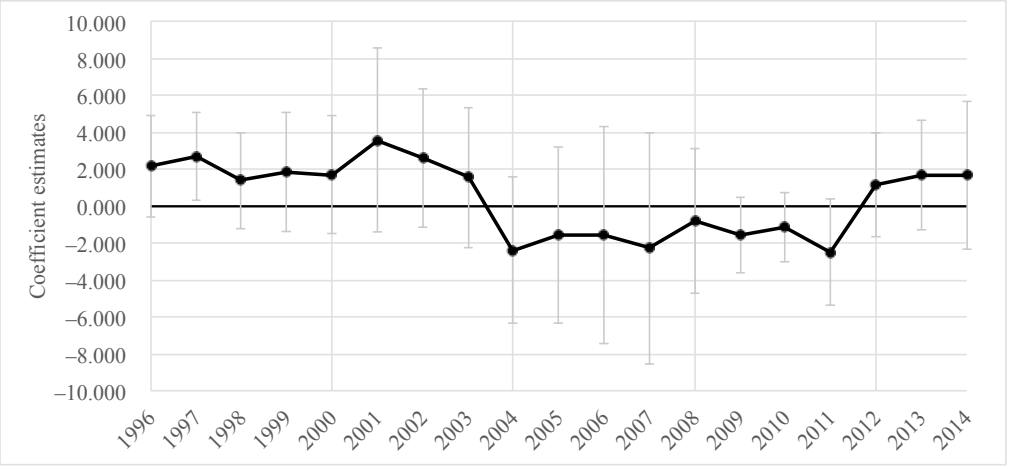


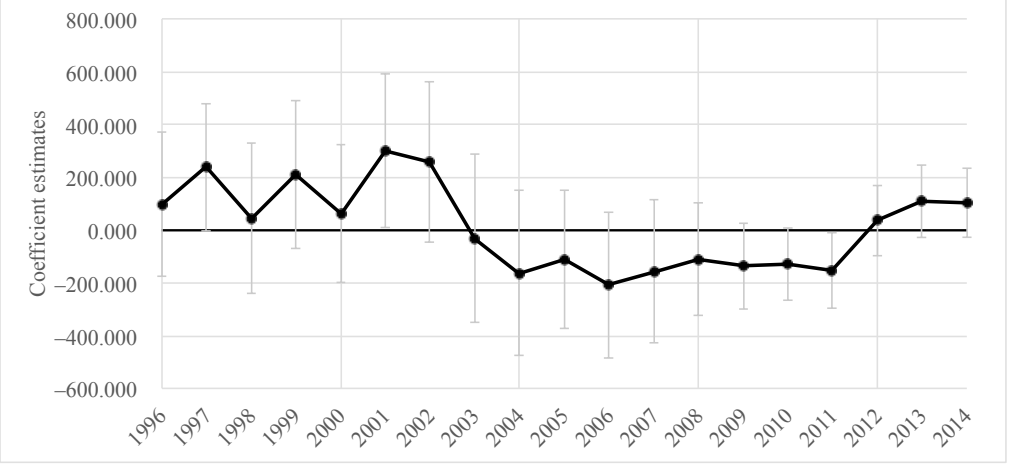
Exhibit 4

Estimated Coefficients on LMI Dummy From Stratified Regressions by Year, 77 to 83 Percent (2 of 2)

Panel C. Number of Small Business Loans to Small Firms



Panel D. Dollar Amount (in Thousands) of Business Loans to Small Firms



LMI = low- and moderate-income.

Notes: Estimated coefficients are based on the regression discontinuity analysis, with the sample 77–83% bands, repeated on an annual basis. The error bars, in light gray, show the 95% confidence intervals of the estimates.

Exhibit 5

Results of Regression Discontinuity Analysis, 1996–2002

Panel A. Number of Small Business Loans

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	– 0.533		0.618		0.031		3.685	**
	(0.435)		(1.032)		(1.283)		(1.689)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.364		0.245		0.221		0.240	
Number of observations	414,714		92,906		47,371		27,934	

Panel B. Dollar Amount (in Thousands) of Small Business Loans

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	177.884	***	– 89.343		8.937		410.028	**
	(41.508)		(95.883)		(129.149)		(161.287)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.247		0.128		0.118		0.089	
Number of observations	414,714		92,906		47,371		27,934	

Panel C. Number of Small Business Loans to Small Firms

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	– 0.273		0.036		0.457		2.263	***
	(0.175)		(0.355)		(0.472)		(0.633)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.332		0.213		0.250		0.233	
Number of observations	414,714		92,906		47,371		27,934	

Panel D. Dollar Amount (in Thousands) of Business Loans to Small Firms

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	99.436	***	– 57.241	**	24.809		167.638	***
	(13.544)		(27.246)		(38.573)		(51.035)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.253		0.173		0.172		0.148	
Number of observations	414,714		92,906		47,371		27,934	

FE = fixed effects. LMI = low- and moderate-income.

** $p < 0.05$. *** $p < 0.01$.

Notes: Robust standard errors are in parentheses. The fixed effects regression models were conducted for county fixed effects. The sample is restricted to small business loans, in metropolitan statistical areas or metropolitan divisions, reported by the lending institutions that are subject to the Community Reinvestment Act of 1977. Headers of columns 3–5 indicate interval rotations for the samples used.

Exhibit 6

Results of Regression Discontinuity Analysis, 2003–2011

Panel A. Number of Small Business Loans

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	– 1.213	**	– 1.016		– 2.303		– 3.297	*
	(0.532)		(1.031)		(1.462)		(1.916)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.421		0.397		0.410		0.413	
Number of observations	583,102		127,974		63,474		37,604	

Panel B. Dollar Amount (in Thousands) of Small Business Loans

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	80.884	***	– 19.232		– 193.724	**	– 287.597	**
	(30.023)		(61.382)		(89.751)		(120.825)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.282		0.250		0.258		0.256	
Number of observations	583,102		127,974		63,474		37,604	

Panel C. Number of Small Business Loans to Small Firms

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	– 1.381	***	– 0.801	**	– 0.656		– 1.192	*
	(0.180)		(0.370)		(0.524)		(0.686)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.430		0.396		0.406		0.408	
Number of observations	583,102		127,974		63,474		37,604	

Panel D. Dollar Amount (in Thousands) of Business Loans to Small Firms

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	56.669	***	– 28.554		– 44.186		– 95.308	**
	(10.438)		(20.984)		(30.615)		(39.887)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.301		0.254		0.257		0.258	
Number of observations	583,102		127,974		63,474		37,604	

FE = fixed effects. LMI = low- and moderate-income.

** p < 0.1. ** p < 0.05. *** p < 0.01.*

Notes: Robust standard errors are in parentheses. The fixed effects regression models were conducted for county fixed effects. The sample is restricted to small business loans, in metropolitan statistical areas or metropolitan divisions, reported by the lending institutions that are subject to the Community Reinvestment Act of 1977. Headers of columns 3–5 indicate interval rotations for the samples used.

Exhibit 7

Results of Regression Discontinuity Analysis, 2012–2014

Panel A. Number of Small Business Loans

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	1.284	***	2.437	**	4.723	***	3.604	*
	(0.483)		(1.141)		(1.599)		(2.080)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.364		0.273		0.276		0.285	
Number of observations	216,162		43,773		22,149		13,403	

Panel B. Dollar Amount (in Thousands) of Small Business Loans

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	80.604	**	88.211		384.676	***	317.680	**
	(32.802)		(76.705)		(104.817)		(129.645)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.232		0.192		0.193		0.210	
Number of observations	216,162		43,773		22,149		13,403	

Panel C. Number of Small Business Loans to Small Firms

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	0.614	***	1.346	***	2.065	***	1.349	
	(0.198)		(0.492)		(0.698)		(0.935)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.408		0.280		0.263		0.271	
Number of observations	216,162		43,773		22,149		13,403	

Panel D. Dollar Amount (in Thousands) of Business Loans to Small Firms

	All Tracts		[70%, 90%)		[75%, 85%)		[77%, 83%)	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LMI tract	50.702	***	45.896	**	111.915	***	75.031	**
	(9.022)		(21.874)		(29.691)		(36.889)	
Neighborhood characteristics	Yes		Yes		Yes		Yes	
County FEs	Yes		Yes		Yes		Yes	
Year FEs	Yes		Yes		Yes		Yes	
Within *R*-squared	0.253		0.185		0.161		0.178	
Number of observations	216,162		43,773		22,149		13,403	

FE = fixed effects. LMI = low- and moderate-income.

** p < 0.1. ** p < 0.05. *** p < 0.01.*

Notes: Robust standard errors are in parentheses. The fixed effects regression models were conducted for county fixed effects. The sample is restricted to small business loans, in metropolitan statistical areas or metropolitan divisions, reported by the lending institutions that are subject to the Community Reinvestment Act of 1977. Headers of columns 3–5 indicate interval rotations for the samples used.

Conclusion

The CRA was enacted in response to concerns that banking institutions were not allocating sufficient capital to neighborhoods in their service areas that had been historically underserved. As part of the evolution of the CRA, starting in 1995, banking institutions were required to report on the geographic distribution of their small business lending activity, both in terms of numbers of loans and the total volume of lending in dollars. The hope was that greater transparency in actual bank activity would trigger scrutiny of the lending sector and trigger changes in practices that would lead to increased small business lending in targeted geographies.

This article reviews how small business lending activity has evolved since the small business data reporting requirement was introduced. Between 1996 and 2015, the number of small business loans increased dramatically, but the total dollar volume of small business lending in 2015 was largely unchanged from 1996. Thus, the size of the average small business loan was smaller in 2015 than in 1996. The data also show that 75 to 80 percent of all small business lending occurred in upper- and middle-income census tracts, and this share was consistent throughout the entire period.

Regarding the effect of the CRA, analyses using the pooled sample suggest that the CRA has had minimal effect on the geographic distribution of small business lending activity since the introduction of the data-reporting requirement. However, subsequent analysis shows that this initial conclusion is a function of three different trends. We observe significant positive associations between small business lending activity and being a CRA-covered census tract from 1996 to 2002 and from 2012 to 2014. These periods are marked by steady economic growth. By contrast, we observe a negative relationship between small business loan dollar volume and being a CRA-covered census tract during the 2003-to-2011 period. During the same period, however, we find no significant relationship between the number of small business loans and CRA designation.

The positive relationships observed in the 1996-to-2002 period support the view that the CRA has influenced the distribution of small business credit, as does the relationship in the 2012-to-2014 period. In the latter case, the relationship is significant for loan dollars but not for the number of loans, which could reflect a desire for reinvestment by businesses that had survived the Great Recession and were positioned to become larger and more mature, coupled with weakened aggregate demand by small businesses generally in the wake of the Great Recession. The pattern of the relationships in the 2003-to-2011 period is interesting and suggests that banks may have responded to the more turbulent economic period by sustaining loan numbers so as not to trigger CRA concerns but reducing loan volumes to limit their exposure to perceived higher risks posed by businesses in CRA-designated neighborhoods. The insignificant result for number of loans could also be a function of fewer applications for loans, as businesses might have been less likely to seek financing in the midst of a deep recession.

These results have some interesting implications. First, they suggest that banking institutions respond affirmatively to CRA incentives during times of economic growth. At least two possible dynamics might be at work. First, periods of economic growth will be times when banking institutions might be considering making strategic moves, such as acquisitions and expansions, that will

be subject to CRA scrutiny, so banking institutions will have an incentive to score well along CRA dimensions. Second, it is during periods of economic growth that conventional notions of marginal borrowers might no longer hold, such that borrowers who might not have been deemed good prospects might be viewed in a different light. In such an instance, we might observe experimentation and a willingness to expand the margin such that loans in geographies that were previously "off limits" become acceptable. Our results suggest that the CRA establishes markers about where the thresholds for acceptability might lie. The significant break in small business lending activity that occurs at the 80-percent threshold established by the CRA strongly suggests that lenders view the CRA cutoff as a clear delineation of where such experimentation should occur.

Another important implication of our results is that broader macroeconomic forces swamp the specific social incentives introduced by the CRA. During times when economic performance is particularly uncertain, we observe that banking institutions "flee to safety," and retrench their lending activity such that places that are widely viewed to be marginal, whether that perception is legitimate or not, receive significantly less lending. Thus, market and risk perceptions trump social purpose when economic uncertainty is broader.

It is important to emphasize that this study tests only indirectly whether the CRA influenced decisionmaking at an institutional level. We examine whether small business lending activity was elevated in CRA-covered census tracts, which is different from examining whether institutions covered by the CRA increased their lending activity in CRA-covered census tracts. Future research should conduct this more direct test of the CRA's effect on small business lending activity, as well as the effects of this investment on the revitalization of LMI neighborhoods.

Authors

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Using Credit Reporting Agency Data To Assess the Link Between the Community Reinvestment Act and Consumer Credit Outcomes

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Abstract

We use a regression discontinuity design to investigate the effect of the Community Reinvestment Act (CRA) on consumer credit outcomes, using data from the Federal Reserve Bank of New York's Consumer Credit Panel database (hereafter, CCP/Equifax data) for the years 2004 to 2012. A bank's activities in census tracts with Median Family Incomes (MFIs) that are less than 80 percent of the metropolitan statistical area (MSA) MFI count toward a lending institution's compliance with CRA rules. Discontinuous changes in consumer credit outcomes at this threshold—assuming census tracts with MFIs at 79.9 percent of the MSA median are the same as census tracts at 80.0 percent, except for CRA eligibility—are evidence of the CRA's impact. We find no statistically significant effects of the CRA on mortgages or foreclosures, either before or after the financial crisis. We do, however, find evidence that the CRA expanded broad measures of credit market activity; at the CRA threshold, the total number of loans increased 9 percent, the number of people covered by the CCP/Equifax data increased, and the fraction of individuals with a valid risk score increased. Despite expanded credit activity, which may increase consumers' risk for adverse outcomes, delinquencies did not significantly increase, nor did credit risk score worsen at the CRA threshold.

Introduction

Access to credit is critical to a well-functioning economy. It enables consumers to smooth their consumption over good and bad times, businesses to invest and expand, and individuals to become homeowners. Consumers and businesses in lower-income areas tend to have less access to credit than their higher-income counterparts. Although it may make sense that lenders are more willing to lend to those whom they have high confidence will be able to repay the loan, it is possible that, from a societal perspective, access to credit is less in low-income areas than is optimal for economic growth. If market failures occur in low-income areas such that lenders do not serve individuals who are nonetheless "credit worthy," then policy intervention has a role in increasing lenders' incentives to lend in those areas. The Community Reinvestment Act[1] (CRA), enacted in 1977, is an example of such a policy. The goal of the CRA was to encourage depository institutions to help meet the credit needs of their local communities, including low- and moderate-income (LMI) neighborhoods.

Over the years, the CRA has attracted broad interest from researchers and policymakers. We seek to determine if it has been effective in expanding access to credit in lower-income areas.

Much of the research on the CRA has focused on mortgage lending. This article adds to the literature by examining broad measures of consumer credit market activity available in the Federal Reserve Bank of New York's Consumer Credit Panel (CCP). The longitudinal database, comprising individual credit records maintained by Equifax, is a nationally representative 5-percent sample of individuals with consumer credit records (hereafter, CCP/Equifax data). The database allows for us to examine a rich set of consumer credit outcomes, including mortgages and foreclosures, total number of trades (accounts), delinquencies, and credit risk scores.

The main challenge in determining whether a policy like the CRA has had a salutary or adverse effect is that people living in LMI areas who are the targets of the policy are likely to have different outcomes from people living in higher-income areas, for reasons that have nothing to do with the policy. We need a way to compare outcomes in areas that are likely to be the same, with the sole exception being that one group is affected by the CRA and one is not. In this study, we use a feature of the CRA eligibility rules to create only such comparisons. A census tract is considered LMI, and activity in that census tract will count toward a depository institution's CRA activities, if the MFI in that census tract is less than 80 percent of the Area Median Family Income (AMFI).[2] This creates the potential for using a regression discontinuity design; we can examine whether a discontinuous change in consumers' outcomes exists for those in neighborhoods that are slightly below that 80-percent cutoff—which are thus in CRA-eligible areas—compared with those in neighborhoods at or above 80 percent , which are not in CRA-eligible areas. If we assume that people in neighborhoods where MFI is at 79 percent of the AMFI are unlikely to be very different from people in neighborhoods where MFI is at 80 percent of AMFI, this comparison gives insight

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.

[2] For census tracts in metropolitan areas, the AMFI is the median for the metropolitan area. For census tracts outside of metropolitan areas, the AMFI is the median for all tracts outside of metropolitan areas.

into the causal effect of the CRA on credit outcomes. Further, we can use this methodology to examine whether the effect of CRA eligibility is different before and after the financial crisis.[3]

We find evidence that the CRA expanded access to credit in LMI neighborhoods. Neighborhoods (census tracts) that barely meet the CRA-eligibility criteria have 9 percent more accounts overall than do neighborhoods that are immediately outside the eligibility threshold. Further, more people in the CCP/Equifax data are in neighborhoods that barely meet the CRA eligibility threshold, and the data are of higher quality with fewer missing values. We see no statistically meaningful increase in delinquencies, mortgages or risk of foreclosures, or changes in credit risk scores in census tracts at the CRA eligibility threshold. Additionally, no evidence emerges of an adverse *change* in foreclosures at the CRA eligibility threshold with the financial crisis in 2007.

The next section presents background on the CRA. The section that follows describes the CCP/Equifax data and presents summary statistics. We then discuss the regression discontinuity methodology. The subsequent section presents the results, followed by a discussion and conclusion section.

Background

The CRA was enacted in 1977 to encourage depository institutions to help meet the credit needs of their local communities, including LMI neighborhoods.[4] The CRA created an affirmative obligation for banks to provide credit in LMI communities without establishing minimum targets of lending or investment.[5] Institutions that are regulated by the federal government are affected by CRA rules.[6] The CRA is enforced through regulators' periodic examination of banks' records, and an institution's CRA rating is taken into account when it applies for deposit facilities, including for mergers and acquisitions. Thus, an institution's CRA compliance has an effect on its future business options.[7]

The CRA has gone through three major changes over the past three decades. In 1989, Congress required regulators to prepare a detailed written evaluation of lenders' CRA performance and mandated public disclosure[8] of CRA ratings and evaluation, making it easier for the public to observe whether banks were compliant. Further, regulatory changes in 1995 (effective in 1997) revised CRA examination of banks, establishing a three-pronged test for large institutions based on performance in the areas of lending, investments, and services, a change intended to make the examinations more objective. As part of the CRA reform, the spatial emphasis was modified to include in

[3] Note that CRA eligibility applies to both LMI individuals and individuals who live in LMI census tracts. In this study, we focus only on the latter because the CCP/Equifax data do not include information on family income, only on the current census tract.

[4] The CRA was enacted in response to claims of *redlining* practices: that is, banks' refusal to lend to potential borrowers living in low-income, minority communities (Barr, 2005).

[5] Congress argued that the CRA would be a reasonable quid pro quo for the federal benefits that banks receive, such as federal deposit insurance and the Federal Reserve's discount window (Bernanke, 2007).

[6] In addition, six states have enacted CRAs at the state level: Connecticut, Massachusetts, New York, Rhode Island, Washington, and West Virginia. Connecticut and Massachusetts have also enacted similar laws that apply to credit unions. Massachusetts is the only state that, since 2007, has also had CRA-like exams for residential mortgage lenders.

[7] In the 1980s, 8 of 40,000 applications were denied due to CRA concerns (Essene and Apgar, 2009).

[8] Public disclosure of CRA ratings and evaluations began in 1990.

the evaluation loans to LMI *borrowers* regardless of the economic status of their neighborhoods (Friedman and Squires, 2005). In 2005, a new category of small banks, *intermediate small institutions*, was created; they are subject to a lending test and a new community development test.

Enforcement: CRA Examinations

Three federal agencies are responsible for enforcing the CRA. The Board of Governors of the Federal Reserve System (FRS) supervises banks with state charters that are members of the FRS; the Federal Deposit Insurance Corporation, or FDIC, supervises banks with state charters that are not members of the FRS; and the Office of the Comptroller of the Currency, or OCC, supervises banks with charters from the federal government. All three regulators follow nearly identical rules to implement the CRA.

Examiners review lenders' activities in lenders' assessment areas. Assessment areas consist of metropolitan statistical areas (MSAs), metropolitan divisions, or contiguous political subdivisions in which the institution has its main office, branches, or deposit-taking ATMs, as well as surrounding geographies in which the institution originated or purchased a substantial portion of its loans.[9]

Regulators evaluate the compliance of large institutions through tests of their lending, investments, and banking services.[10] Under the lending test, regulators look at the volume of each type of loan made or purchased by the institution within its assessment area. Examiners analyze the loans' geographic and income distribution, looking at the share of consumer and mortgage loans made in LMI geographies and the share of loans made to LMI borrowers whose median income is less than 80 percent of the median for their MSA, regardless of their neighborhoods' LMI status (Friedman and Squires, 2005). Examiners take into account mortgages, small business loans, and community development lending.

Under the investment test, examiners review the degree to which investments serve LMI areas or individuals. The service test determines whether the institution provides adequate services to LMI borrowers and in LMI areas by looking at the distribution of the institution's branches, its record of opening and closing branch offices, and the accessibility and use of alternative systems for delivering retail banking services.[11] Although much of the research on the CRA focuses on mortgage lending, keep in mind that large institutions get CRA credit for services provided to LMI borrowers and borrowers in LMI areas. There are reasons to think that the CRA may have effects beyond mortgage lending.

Based on the outcome of the review process, regulators give lending institutions a rating of "Outstanding," "High Satisfactory," "Low Satisfactory," "Needs to Improve," or "Substantial Noncompliance." According to the Federal Financial Institutions Examination Council (FFIEC) database, of the 69,792 banks examined between 1990 and 2012, 15.3 percent were rated Outstanding and 80.7 percent were rated either High Satisfactory or Low Satisfactory. The vast majority of banks were in compliance with CRA rules.

[9] Pub. L. 95–128, 91 Stat. 1147, Title VIII, § 228.41, assessment area delineation, as amended effective January 1, 2010.
[10] Large institutions are defined as those with $250 million or more in assets. Small banks are assessed on lending activities. More information on examination procedures is available at the CRA examination overview page on the Federal Financial Institutions Examination Council (FFIEC) website, http://www.ffiec.gov/cra/exam_overview.htm.
[11] Examples of alternative delivery systems for services include proprietary and nonproprietary ATMs, loan production offices, banking by telephone or computer, and bank-at-work programs.

Effects of the CRA

The effect of the CRA on neighborhoods, consumers, and banks has been a topic of controversy. If the credit market is fraught with market failures, then private banks that seek to maximize profits will not supply the optimal amount of credit; thus, government intervention has an important role to play.[12] Theoretically, it is reasonable to believe that credit markets bear many of the traits of markets that would be plagued by market failures; information is incomplete and asymmetric, for example, about consumers' ability to pay back a loan. If information is difficult to gather and analyze, then banks may end up using rules of thumb about the likelihood of a consumer being able to pay back a loan, and those practices may result in "statistical discrimination," whereby, because individuals belong to a race or ethnic group, for example, that is statistically more likely to default and less likely to be able to pay back a loan, they are less likely to get a loan, despite the fact that if their own circumstances were fully understood, they would be deemed creditworthy. Proponents of the CRA and other interventions argue that these policies help to address these market failures and lead to better economic outcomes. Critics say government intervention in the credit markets, including (but not limited to) the CRA, played a major role in the financial crisis (see, for example, Leibowitz, 2008). These critics suggest that government policies, like the CRA, gave banks an incentive to adopt unsafe lending practices in the name of extending credit to underserved communities. Criticism from another perspective suggests that the CRA has had little impact on access to credit because bank lending may simply crowd out lending that would have taken place through other institutions, resulting in little overall increase in lending to LMI neighborhoods and consumers. These two streams of criticism suggest two important and basic questions for research to answer; first, does the CRA actually expand access to credit, and second, if so, does it do so in a way that contributed to the financial crisis that preceded the Great Recession?

Empirical research on the second question suggests that the CRA had little to do with the subprime crisis. Kroszner (2009: 11), for example, writes—

> Two key points emerge from all of our analysis of the available data. First, only a small portion of subprime mortgage originations are related to the CRA. Second, CRA-related loans appear to perform comparably to other types of subprime loans. Taken together … we believe that the available evidence runs counter to the contention that the CRA contributed in any substantive way to the current mortgage crisis.

Of course, if the CRA had no real effect on the supply of credit, then it would be unlikely to have been part of the reason for the mortgage crisis and ensuing financial crisis.

The few papers that attempt to empirically examine the effect of the CRA on housing outcomes show mixed results. In particular, three papers use similar methodology to this article: Berry and Lee (2007), Gabriel and Rosenthal (2009), and Bhutta (2011). All three papers used a regression discontinuity design to examine the effect of the CRA on homeownership, mortgage applications, and mortgage originations, respectively, for example.

Berry and Lee (2007) found that the CRA had very little effect on outcomes in Home Mortgage Disclosure Act (HMDA) data on loan applications for the 1993-to-2003 period. However, they

[12] See Barr (2005) for a discussion of the credit market failures the CRA was designed to address.

focused on pairs of census tracts that are geographically adjacent, as well as having MFIs slightly less or more than 80 percent of AMFI. Their sample was is relatively small, and the estimated impacts have large standard errors and are statistically insignificant.

Gabriel and Rosenthal (2009) found some evidence that the CRA expanded home lending in the nonconforming[13] loan sector, but not in the conforming sector, and that the CRA had a small positive impact on homeownership. Finally, Bhutta (2011) used HMDA data to examine mortgage originations in CRA-eligible neighborhoods and to CRA-eligible consumers. He focuses on two different periods: 1994 to 2002 and 2004 to 2006. The CRA may have had a different effect in these different periods because of both regulatory changes and changes in the economy. Bhutta also performed the analysis separately by metropolitan area size, because regulatory enforcement (or market forces that make it more or less likely that regulations have an impact) may differ depending on area population. Bhutta found that mortgage originations and applications were both higher in CRA-eligible neighborhoods in large metropolitan areas during the 1994-to-2002 period. Further, he found that this increase was not simply among regulated institutions, suggesting that the effect might be one of "crowding in" rather than "crowding out."[14] He found little evidence that the CRA affected housing-related credit outcomes in other areas or time periods.

In this article, we build on this prior research and similarly use a regression discontinuity design to measure the CRA's effects. Following Bhutta's findings, we focus on the effects in large metropolitan areas (that is, metropolitan areas with a population of at least 2 million) and allow the results to differ by time period.[15] This article adds to the existing research by shifting the focus from outcomes solely in the home lending market to the broader set of consumer credit outcomes available in the CCP/Equifax data.

Data and Descriptive Statistics

The CCP/Equifax data contains data beginning in 1999; the database reports information on loan performance and consumer debt on a quarterly basis. Although the data are anonymous, individuals can be tracked over time using a unique individual identification code. CCP/Equifax is updated every quarter adding individuals who have entered the credit report database using the same randomized sampling methods to maintain the representativeness of the sample as new people enter the Equifax database.[16] Keep in mind that this data set is not representative of the entire U.S. population; it is representative of individuals with a credit report. Thus, simply being in the data set may be an outcome of interest.

[13] *Nonconforming* loans are those that either do not conform to the Fannie Mae or Freddie Mac guidelines, typically because the dollar amount is more than the purchasing limit—so-called *jumbo* loans—or because they do not conform to loan-to-value guidelines.

[14] A *crowd-in* effect can happen in the following manner: if one lender is induced by regulation to make loans to individuals or areas that nonregulated lenders have been reluctant to serve, due to lack of sufficient information for wise lending decisions, then one lender's actions may provide the information necessary to make it worthwhile for the nonregulated institutions to extend credit in those areas or to those individuals as well.

[15] Appendix exhibit A-2 provides results for all metropolitan areas regardless of population for completeness.

[16] One can get information not only on those in the 5-percent sample (primary individuals), but also on individuals with credit reports who share a household with a primary individual. In this article, we focus only on the primary individuals.

Limitations of the CCP/Equifax Data Set

The data set contains richly detailed information on individuals' credit records and the status of their loans, which can be tracked quarterly. However, the data contain very little information about the actual individuals; we know the years of their birth and their geographic locations each quarter, including the metropolitan area and census tract, but no other personal characteristics.[17] Knowing the geographic information, however, makes it possible to merge the CCP/Equifax data with information on each census tract's characteristics, including the ratio of tract MFI to AMFI.

For this analysis, we use information from the first quarter of 2004 through the second quarter of 2012 (the latest information available when the project began). We merge the CCP/Equifax data with information on census tract characteristics that the FFIEC puts together from census or American Community Survey data. The FFIEC creates LMI census tract designations using census information on the relative Median Family Income (RMFI) in the census tracts, updated after each census.[18] The LMI designations were updated in 2004 to reflect the 2000 census. Note that in our final data set, being an LMI census tract is a fixed characteristic of each tract in the time period we analyze. The LMI designation does not change between 2004 and 2012.

The CCP/Equifax data contain about 409 million quarterly observations from the first quarter of 2004 through the second quarter of 2012. In the regression discontinuity analysis, we keep all individuals who are in census tracts that have MFIs between 75 and 85 percent of the AMFI. Recall that the CRA cutoff is at 80 percent of the AMFI, so this focuses our analysis on neighborhoods that have MFIs close to the cutoff. Within that narrow band, nonlinearities are less likely in the relationship between RMFI and the consumer credit outcomes of interest that might adversely affect the regression discontinuity estimates.[19] We aggregate the individual-level data to census tract-level for each quarter.

Summary Statistics on Consumer Credit Outcomes

In this section, we present summary statistics describing how consumer credit outcomes changed over time by MFI, relative to the AMFI, which is helpful to know as groundwork for considering the impact of the CRA on consumer credit outcomes. We focus on a 10-percent random subset of the individuals who are 18 to 85 years old.[20] We present outcomes by year and by six categories of RMFI: less than 50 percent, 50 to 80 percent, 80 to 110 percent, 110 to 140 percent, 140 to 170 percent, and more than 170 percent of AMFI.

Exhibit 1 shows how the average number of primary individuals—that is, individuals represented in the CCP/Equifax data—in a census tract varies by RMFI. The average number of primary

[17] If individuals move, their credit outcomes move with them. An individual's location is mapped to the address associated with current loan activity, which could cause problems for our estimation strategy if credit activity induces geographic mobility. Two points mitigate our concerns about this strategy. First, our estimation strategy is valid if mobility across census tracts generally differ with different income levels; it is only if differential mobility occurs right at the CRA threshold that our estimates could be affected. Second, research using census data examining whether mobility at the CRA threshold differs finds no evidence of this (Johnson, 2012).

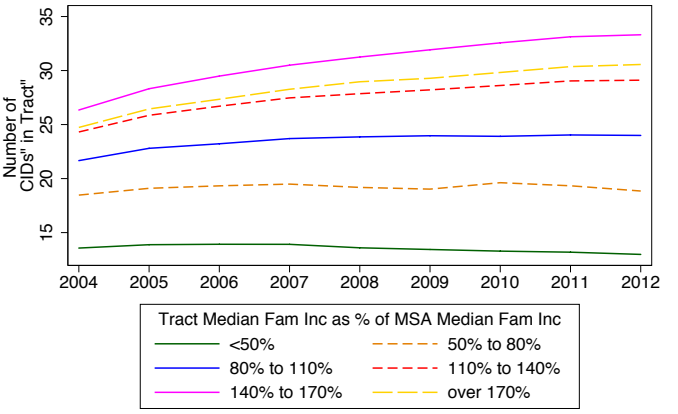
[18] Until 2012, the FFIEC classifications were updated every 10 years using the decennial census data. Starting in 2012, classifications have been updated every 5 years using the American Community Survey.

[19] When we examine whether the estimates are robust to nonlinear specifications, we find they are when we limit the analysis to this narrow band of RMFI.

[20] Because the data set contains repeated observations on individuals, we take a 10-percent random subset of the individuals, not the observations.

Exhibit 1

Average Number of Primary Individuals in Tract



CID = primary individuals in the data set. MSA = metropolitan statistical area.
Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data

individuals in the data set for the top three RMFI categories—those above 110 percent of AMFI—ranges between 25 and 35. On average, fewer than 15 primary individuals are in in the lowest-income census tracts (those with MFIs less than 50 percent of AMFI). Because census tracts were originally constructed to have similar-sized total populations, and lower-income neighborhoods tend to have a lower adult-to-child ratios, this result is possibly driven by demographic differences across these neighborhoods.[21] On the other hand, an individual must have a certain amount and type of economic activity connected to him or her in order to be included in the CCP/Equifax data. It makes sense that census tracts with higher income levels would be more likely to have more people with the type of economic activity that Equifax monitors and thus be more likely to be in the CCP/Equifax data.[22] When we turn to the regression discontinuity analysis, the methodology will implicitly control for differences in the adult-to-child ratio across CRA-eligible and CRA-ineligible tracts, enabling us to see whether the CRA has an effect on individuals' presence in the credit data. As credit report data are used for purposes other than to determine one's risk of defaulting on a loan—for example, many employers request credit reports as part of the employment screening process—simply being in the data may be an important outcome.

The top-line information on credit activity in the CCP/Equifax data is the total number of trades. A *trade* is defined as activity associated with an account (for example, an automobile loan, a mortgage, or a student loan), and *all trades* is an aggregate measure of all the different types of activity captured in the CCP/Equifax data. Exhibit 2 shows how the all trades measure changes over time; the decline in all trades is stark with the beginning of the Great Recession, consistent with the decline in overall economic activity during a recession. Exhibit 2 also shows the average number of trades or accounts (from the all trades information) by RMFI by year. In all years, trades, on average, are more numerous

[21] In exhibit 4, we examine whether the fraction of adults in a census tract changes abruptly at the CRA-eligibility threshold and find that it does not.

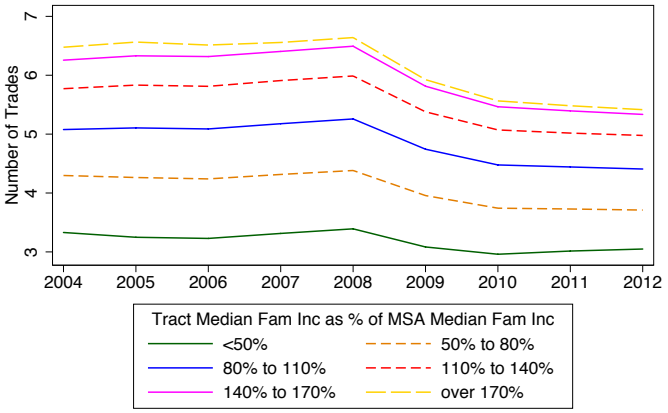
[22] We also find that the fraction missing the top line information on "all trades" is lower in the higher-income census tracts (Muñoz and Butcher, 2013).

in census tracts with higher RMFIs. Further, in results not shown, we find the fraction of individuals missing information on all trades is higher in lower-income census tracts as well. In census tracts with MFIs above 110 percent of AMFI, missing values for all trades are relatively rare, generally less than 5 percent. However, as MFI falls, the incidence of missing data on all trades increases. In neighborhoods below 50 percent of AMFI, the incidence is about 15 percent (Muñoz and Butcher, 2013).

Exhibit 3 provides further evidence on how the data vary by MFI and over time. The CCP/Equifax data are turned into a risk score by FICO and other credit score organizations.[23] Although the precise

Exhibit 2

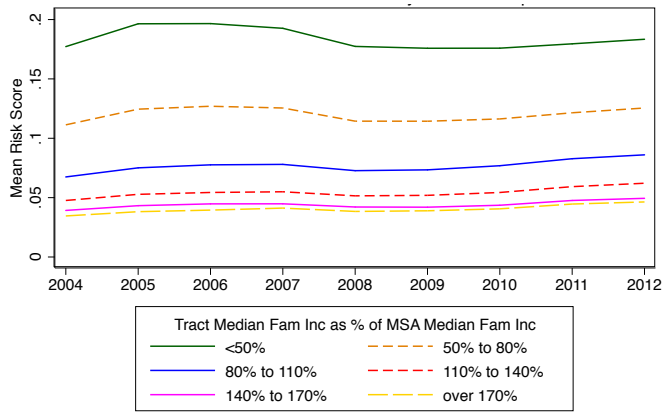
Average Number of Trades



MSA = metropolitan statistical area.
Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data

Exhibit 3

Fraction Missing Risk Score by Year



MSA = metropolitan statistical area.
Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data

[23] The risk score in the CCP/Equifax data is not the official FICO score, but it has the same range and behaves in a similar way.

methodology used to arrive at credit scores is proprietary, it is known to use information collected on outstanding credit activity to predict the probability that an individual would be more than 60 days late on a loan. Because not all individuals' information is equally easy to find, some individuals have patchier records in the CCP/Equifax data than others. For example, some individuals have missing risk scores, presumably indicating that not enough information was available for them for the methodology to produce a reliable risk score.[24] Exhibit 3 shows the fraction of individuals in a census tract who are missing their risk scores.[25] For census tracts in the highest three categories of RMFI (at or above 110 percent of AMFI), about 5 percent or fewer are missing risk scores. For those in census tracts with MFIs less than 50 percent of AMFI, between 15 and 20 percent of the individuals are missing risk scores.

Keep in mind then, that MFI is correlated with being in the CCP/Equifax data at all and with the amount of actual information in the data set about one's economic activities. In the sections that follow, we will look at these as outcomes and examine whether a neighborhood being eligible for the CRA has an effect on these margins, as well as on other consumer credit outcomes.

Methodology

We would like to estimate the causal effect of the CRA on consumer credit outcomes. By *causal effect*, we mean those changes in consumer credit outcomes that are due to CRA regulations. A starting point is the following linear regression.

$$Y_{\text{int}} = \beta_0 + \beta_1 LMI_n + X_{\text{int}}\beta_2 + e_{\text{int}}\,, \tag{1}$$

where Y_{int} is a given credit market outcome for individual i in neighborhood n at time t. LMI_n is a variable indicating whether the individual lives in an LMI neighborhood or not, X_{int} is a vector of individual and neighborhood characteristics that may vary over time, and e_{int} is the error term. The error term contains all the factors not explicitly included in the regression that affect Y. If these factors are correlated with whether one lives in an LMI neighborhood, then the estimated impact of LMI on consumer credit outcomes from equation (1) will be biased and will pick up many differences between consumers in LMI and non-LMI neighborhoods that have nothing to do with CRA.

Because individuals in LMI and non-LMI neighborhoods are likely to differ on many dimensions that will affect their credit outcomes, to estimate the causal effect of CRA on consumer credit outcomes, we exploit the discontinuity in the way banks get CRA credit, based on the legislated definition of an LMI neighborhood. Neighborhoods will be deemed LMI, and banks will receive CRA credit for activities in that neighborhood, if they are below the 80-percent threshold on the ratio of MFI in that census tract to AMFI in the MSA. Thus, we define LMI as in equation 2.

[24] This finding is consistent with the results on missing information on all trades discussed previously (Muñoz and Butcher, 2013).

[25] The denominator here, and in all the other fraction outcomes, is the number of individuals in the CCP/Equifax data in the census tract, not a measure of the tract population from the census.

$$LMI_{nc} = 1 \text{ if } ((medianfamilyincome_{nc} / medianfamilyincome_{c}) * 100) < 80.0, \quad (2)$$

$$LMI_{nc} = 0 \text{ if } ((medianfamilyincome_{nc} / medianfamilyincome_{c}) * 100) \geq 80.0,$$

where *n* indexes the census tract (or neighborhood) and *c* the metropolitan area. This equation is the source of the discontinuity; as RMFI in the census tract passes from slightly less than 80 percent to 80 percent or more, its designation flips from LMI to not LMI (or from 1 to 0 in our data categories).

We also define a scaled version of the census tract's RMFI.

$$\text{RMFI}_{nc} = ((medianfamilyincome_{nc} / medianfamilyincome_{c} * 100) - 80). \quad (3)$$

We scale the variable by the 80-percent threshold for ease of interpretation. When RMFI is 0, LMI is 0, so in the following analyses, we can center the data on 0.

Using the variables LMI and RMFI, we have the following regression equation.

$$Y_{inct} = \beta_0 + \beta_1 LMI_{nc} + \beta_2 RMFI_{nc} + e_{inct}. \quad (4)$$

One would expect consumer credit outcomes to increase with RMFI—so β_2 is expected to be positive (for good outcomes). The question posed in this study is whether the response of credit outcomes to income right at the LMI boundary is discontinuous, which would suggest something special about the CRA designation, as no other reason exists to expect a discontinuous change in the relationship between credit outcomes and RMFI at that threshold.[26] If no discontinuity exists, then β_1 will be estimated to be 0, implying no estimated effect of the CRA on individuals' credit outcomes. If β_1 is estimated to be a positive (negative) number, then this indicates that outcomes in LMI neighborhoods are better (worse) than in neighborhoods that are incrementally better off in terms of RMFI.

The assumption that must hold for a regression discontinuity design to give insight into the impact of the CRA on consumers' credit outcomes is that nothing else that might affect credit outcomes changes discontinuously at the 80-percent RMFI threshold. Exhibit 4 examines whether observable characteristics change at the LMI threshold, holding constant RMFI. We use the same sample restrictions as in the main analysis using the consumer credit data.[27] Columns 1 through 5 use tract-level data from the 2000 census to examine whether a discontinuous change occurs in tract characteristics at the LMI threshold for the following:[28] population, fraction of the population that is more than 25 years old, fraction of the population with a college degree, fraction of the population that reports being Hispanic, and fraction of the population that reports being African-American (non-Hispanic). No change in these tract-level characteristics is statistically significant at the LMI threshold. Previous research using regression discontinuity to study effects of the CRA has also presented evidence that the regression discontinuity design is valid by examining characteristics at the CRA eligibility threshold (Berry

[26] In the regression discontinuity framework, the continuous variable—in our case, RMFI—is referred to as the "running variable."
[27] We focus on census tracts with MFIs between 75 and 85 percent of AMFI; further, we focus on large MSAs with populations greater than 2 million.
[28] The data are from the 2000 census, with one observation per census tract.

Exhibit 4

Estimated Regression Coefficients for Census Tract Characteristics

	(1) Population	(2) Fraction of Population Older Than 25	(3) Fraction of Population College Degree	(4) Fraction of Population Hispanic	(5) Fraction of Population African-American	(6) Median Age in Tract
LMI tract	145.7	0.00387	0.000638	0.00150	– 0.0110	0.058
(Standard error)	(171.8)	(0.00615)	(0.00365)	(0.0123)	(0.0171)	(0.3934)
p-value	0.397	0.530	0.861	0.903	0.521	0.884
RMFI	60.43	0.00291	0.00204	– 0.00647	– 0.00615	0.111
(Standard error)	(29.51)	(0.00106)	(0.000627)	(0.00212)	(0.00295)	(0.0681)
p-value	0.0407	0.00598	0.00116	0.00226	0.0368	0.102
Observations	2,518	2,518	2,518	2,518	2,518	85,221
R-squared	0.137	0.193	0.236	0.555	0.203	0.1981

LMI = low- and moderate-income. RMFI = relative Median Family Income.
Notes: The regressions in columns 1 through 5 use census tract-level data, available from the Federal Financial Institutions Examination Council from 2009 (based on the 2000 census and revisions made to LMI tract definitions in 2004). Columns 1 through 5 are estimated including metropolitan statistical area (MSA) fixed effects. Observations are at the tract level, with one observation per census tract. Columns 1 through 5 include census tracts where the Median Family Income (MFI) is between 75 and 85 percent of the MSA median; only large MSAs are included. Column 6 reports results of a regression using Consumer Credit Panel/Equifax data, and the same specification used for the main results in exhibit 5. The outcome is median age in the census tract. Column 6 includes census tracts where MFI is between 75 and 85 percent of the MSA median; only large MSA are included. Column 6 includes MSA fixed effects and quarter fixed effects. In Column 6, standard errors clustered at the census tract level.

and Lee, 2007;[29] Bhutta, 2011; Gabriel and Rosenthal, 2009; Johnson, 2012[30]).[31] The last column of exhibit 4 uses median age in the census tract in the CCP/Equifax data, which similarly shows no discontinuous change in median age at the CRA threshold.[32]

Although the regression discontinuity design is rigorous and has the potential to establish causal relationships, it is not without drawbacks. It is a "data hungry" methodology; it needs a large number of observations in order to get an estimate that is precise enough to be able to determine an effect with some certainty.[33]

[29] Berry and Lee (2007) show no discontinuity at the CRA threshold in percent female, percent Black, percent Hispanic, percent Asian, or income.

[30] Johnson's (2012) undergraduate honors thesis at Wellesley College examined evidence of an impact of the CRA on demographic characteristics of a neighborhood. As Johnson points out, changes in credit outcomes in a neighborhood could generate changes in neighborhood demographic and real estate characteristics. However, Johnson's findings indicate no statistically significant difference at the threshold in mobility rates or home values; she found some evidence for a change in college education and commute times.

[31] Note that, under these conditions, a regression discontinuity design is similar to a randomized controlled trial and can give sound insight into the causal effects of the CRA on credit outcomes (Lee, 2008).

[32] Appendix exhibit A-1 investigates the robustness of results to alternative specifications. Columns 3 and 4 show the results with and without controlling for median age in the census tract. The results are robust; in the main results, we include median age as a control.

[33] We need enough data around the threshold to allow for this estimation strategy. In results not shown, we estimated a kernel density function and showed good support in the data in the 75- to 85-percent range of AMI (Muñoz and Butcher, 2013: 24).

Finally, this technique focuses on changes at the LMI threshold—and the neighborhoods slightly below the 80-percent RMFI cutoff are the relatively better-off LMI neighborhoods. It is possible that the CRA has a different effect farther away from this threshold; this technique cannot tell us that.

Results

Our main results focus on data that are aggregated from the individual level to the census tract level for the years 2004 to 2012. We restrict the sample to census tracts between 75 and 85 percent of AMFI and model the relationship between credit outcomes and RMFI as linear.[34,35] We further restrict our analysis to large metropolitan areas, those with at least 2 million people (Bhutta, 2011).[36,37] Our main analysis data set consists of the 85,221 quarterly census-tract observations that fall within this range.

Equation 4 enables us to hold RMFI constant and ask whether a discontinuous jump occurs in the relationship between each consumer credit outcome in question, Y, and being in a neighborhood that barely passes into CRA eligibility. Our regression discontinuity design will also enable us to test whether the relationship between the consumer credit outcomes and LMI is different before and after the financial crisis, as in equation 5. Estimates of β_4 in equation 5 will show whether the discontinuous jump at the LMI threshold is significantly different after the financial crisis.

$$Y_{inct} = \beta_0 + \beta_1 LMI_{nc} + \beta_2 RMFI_{nc} + \beta_3 PostCrisis_t + \beta_4 LMI_{nc} * PostCrisis_t + \beta_5 RMFI_{nc} * PostCrisis_t + e_{inct} \quad (5)$$

The Regression Estimates of the Discontinuity at the LMI Threshold

Exhibit 5 presents the results of estimating the regression discontinuity for different consumer credit outcomes[38] and enables us to see whether the size of the jump at the CRA threshold is statistically different from 0. We control for MSA fixed effects, quarter effects, and median age in the census tract, and we cluster the standard errors at the census tract.[39] The results in column 1 of exhibit 5 hold constant MSA fixed effect, quarter effects, and median age in the census tract. The estimated jump in all trades at the CRA eligibility threshold is about 9 percent, which is statistically significantly different from 0 at the 10-percent level, suggesting that the CRA has expanded access to credit in LMI neighborhoods.

[34] Regression discontinuity estimates can be sensitive to functional form. We tested different functional forms, including allowing the slope to differ on either side of the discontinuity, and a cubic in RMFI. When the data are limited to RMFIs within 5 points of the cutoff, a linear functional form fits the data, and the results are robust to other choices of functional form.

[35] Recall that RMFI is based on information from the 2000 census and does not vary within a census tract from 2004 to 2012.

[36] Results that include other areas are in appendix exhibit A-2. We find no statistically significant effects at the CRA threshold in this sample.

[37] The analysis includes 42 metropolitan areas.

[38] Appendix exhibit A-1 shows that the results for the sum of all trades are robust to various functional form assumptions about the relationship between the sum of all trades and RMFI and to the inclusion of different controls.

[39] We cluster the standard errors at the census tract-level, as tracts may have systematically correlated shocks in their consumer credit outcomes. This sample includes 2,509 different census tracts. Results are robust to clustering standard errors at the MSA level.

Exhibit 5

Estimated Regression Coefficients for Selected Consumer Credit Outcomes: Large Metropolitan Areas

	(1) log(Sum of All Trades)	(2) log(Number of People in Tract)	(3) Fraction Missing Risk Score	(4) log(Sum of Mortgages)	(5) log(Sum of Auto Loans)	(6) log(Sum of Delinquencies)	(7) Average Risk Score
LMI tract	0.0899	0.0714	– 0.00526	0.0275	0.0604	0.0566	1.742
(Standard error)	(0.0466)	(0.0426)	(0.00261)	(0.0478)	(0.0456)	(0.0478)	(1.775)
p-value	0.0539	0.0938	0.0443	0.565	0.185	0.236	0.327
RMFI	0.0376	0.0262	– 0.00230	0.0356	0.0338	0.0158	1.429
(Standard error)	(0.00814)	(0.00751)	(0.000447)	(0.00855)	(0.00805)	(0.00832)	(0.306)
p-value	0.0000	0.000487	0.0000	0.0000	0.0000	0.0570	0.0000
Standard errors clustered	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Median age in census tract	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	85,203	85,221	85,221	84,924	85,021	84,940	85,207
R-squared	0.207	0.204	0.223	0.354	0.396	0.219	0.447

LMI = low- and moderate-income. MSA = metropolitan statistical area. RMFI = relative Median Family Income.
Notes: The dependent variable is the indicated consumer credit outcome in a census tract in a given quarter. LMI tract is a dummy variable equal to 1 if the Median Family Income (MFI) in the census tract is less than 80 percent of the Area Median Family Income (AMFI), indicating the census tract is eligible for the Community Reinvestment Act, and 0 otherwise. RMFI is MFI in the census tract divided by AMFI, multiplied by 100 to obtain the percentage, then scaled by subtracting 80, so that at RMFI = 0, LMI turns from 1 to 0. All regressions include a constant. Standard errors are in parentheses and are clustered at the census tract level; the clusters numbered 2,509.

In columns 2 through 7 of exhibit 5, we examine additional consumer credit outcomes: the log of the number of individuals in the CCP/Equifax data in each census tract in each quarter, the fraction of individuals in a census tract in a quarter who are missing their risk scores, the log of the sum of mortgages in a census tract in a quarter, the log of the sum of auto loans in a census tract in a quarter, the log of the sum of delinquent loans in a census tract in a quarter, and finally the average credit risk score in a census tract in a quarter. Although other credit outcomes are available in the CCP/Equifax data, we believe these measures capture a broad set of interesting outcomes.

The estimates in column 2 of exhibit 5 indicate that 7 percent more individuals are represented in the CCP/Equifax data set in census tracts that are only barely eligible for the CRA than are in census tracts that are only barely ineligible. Recall from the discussion of exhibit 1 that more individuals in the CCP/Equifax data are in higher-income census tracts, possibly because those tracts have a higher adult-to-child ratio, leading to more people with credit records, or possibly because more of the types of economic activities that generate a credit market footprint are in higher-income neighborhoods. The regression discontinuity methodology controls for potential differences in demographic makeup of the tracts, adult-to-child ratios should not differ significantly between tracts that are barely below and above the CRA threshold (and, as presented in exhibit 4, no direct

evidence was found of a change in the fraction of the population that is more than 25 years old). A marginally statistically significant 7-percent discontinuous jump emerged in the data at the eligibility threshold, suggesting that CRA eligibility has expanded credit market activity in these areas.

Column 3 of exhibit 5 presents coefficient estimates for the fraction of individuals in a census tract or quarter who are missing a risk score. As discussed previously, in order to generate a risk score for an individual, the scoring companies need to have enough information about a person's interaction with the credit markets to predict his or her risk of default. Thus, a missing risk score is an indication that an individual has a relatively thin record (or that the person's activities were difficult to track for some reason). We see a statistically significant discontinuous -0.0053 jump in the fraction of individuals who are missing their risk scores at the CRA eligibility threshold. The mean of the fraction that represents missing risk scores is about 9.5 percent. The coefficient indicates that going from non-LMI to LMI status (controlling for RMFI) reduces this by about 0.5 percentage point, or by about 5 percent of the mean. We take the results for these three outcomes—total number of trades, the number of individuals in the CCP/Equifax data, and the fraction of individuals with a missing risk score—to show that, in general, more credit market activity is present among individuals who live in areas that barely meet the criteria for CRA eligibility.

In columns 4 through 7 of exhibit 5, we examine some specific credit outcomes: the sum of all mortgages, sum of automobile loans, sum of delinquencies, and the average credit risk score. The results[40] in column 4 indicate that the estimated size of the jump in mortgages at the CRA eligibility threshold is about 2.75 percent, but although this estimate is positive it is not statistically different from 0. Recall from the background section that Bhutta (2011) found a statistically significant 4-percent increase in mortgage originations using a regression discontinuity methodology and focusing on a similar sample from large metropolitan areas.

Why the difference in results? First, note that our 95-percent confidence interval ranges from -6.6 percent to 12.1 percent, which includes Bhutta's estimate. In addition, the measures and the time periods of the two studies differ substantially. Our measure should be thought of as a measure of the stock of mortgages—the number of existing mortgages—in a given census tract in a given quarter, whereas Bhutta's measure is a measure of mortgage originations or flows—new mortgages in census tract in a given year.[41] In any given time period, no reason exists to think that the effect on the stock of mortgages and the flow of mortgages will be the same. In addition, our study begins in 2004, during the housing boom, when many mortgages were being extended and thus being on the correct side of the CRA threshold may not have been a determining factor in lending institutions' decisions to extend credit for housing. It may not be surprising that we do not find a statistically significant effect at the CRA threshold for mortgages during this period.

Column 5 of exhibit 5 presents evidence for the log of the sum of auto loans in a census tract in a quarter. The coefficient on LMI indicates that about 6 percent more automobile loans are made in areas that cross the threshold of CRA eligibility, but—as with the estimate for mortgages—although it is positive, this coefficient is not statistically different from 0.

[40] The sample size varies across the columns because not all census tracts have all outcomes. For example, not all census tracts have mortgages in the CCP/Equifax data in all quarters and, because we are taking the log of the sum of mortgages and the log of 0 is undefined, the sample size is different for mortgage outcomes and for the number of people in a census tract.
[41] HMDA data used by Bhutta reports the number of new mortgages issued in a given year.

The results so far suggest that the CRA expands some types of credit market activities in LMI neighborhoods. If credit activity increases, does the CRA put more consumers at risk of undesirable outcomes? Column 6 presents evidence for one adverse outcome: delinquencies. The dependent variable is calculated as the log of the sum of all delinquencies in a census tract in a quarter. Delinquencies are defined as the total number of trades on record minus the total number of trades that are defined by Equifax as being current (that is, not more than 30 days past due). Thus, the sum of delinquencies in a neighborhood can be higher if more people have a single delinquency, a single person has many delinquencies, or both. As the number of people and the number of trades in a census tract increase, the risk of a delinquency will increase, and we know from the results in columns 1 and 2 that both of these variables are higher at the CRA threshold. However, the evidence in column 6 shows that the total number of delinquencies in a census tract at the CRA threshold did not have a statistically significant change.

Finally, column 7 of exhibit 5 presents estimates for the impact of CRA eligibility on the average risk score in a census tract in a quarter. A higher credit risk score indicates that the individual is considered more likely to pay back a loan. It is unclear how the CRA, if it were to increase credit supply in a neighborhood, might affect risk scores. If the CRA encourages lenders to make loans to individuals with poor credit histories, drawing more marginal borrowers into to the credit market, then one might expect the coefficient on LMI to be negative. On the other hand, if CRA encourages lenders to *find* individuals who are no riskier than other customers but who happen to live in a CRA-eligible neighborhood, then individuals' credit scores may not be affected. Finally, it is possible that the CRA could improve individual credit scores if it made appropriate loans available to relatively low-income individuals such that they were able to keep up with the payments and establish healthy credit records.

The estimate in column 7 of exhibit 5 is inconclusive; the point estimate is a positive 1.74, but it is not statistically different from 0. The 95-percent confidence around the point estimate ranges from –1.74 to 5.22. Because the mean of the average risk score in a census tract and year is 671.5, the range of estimates implies that we can rule out large changes in average credit risk score at the CRA threshold.

In sum, the results from exhibit 5 suggest that CRA eligibility expanded LMI neighborhoods' access to credit markets in the 2004-to-2012 period. Census tracts that barely qualify for CRA eligibility by virtue of having RMFI slightly below 80 percent of the AMFI have 9 percent more total trades, 7 percent more people in the CCP/Equifax data, and are 0.5 percentage points less likely to have missing risk score information (about a 5-percent reduction) compared with census tracts that have slightly *higher* RMFI.

In the next section, we look more closely at housing-related credit outcomes and examine whether the effect of the CRA was different before and after the beginning of the financial crisis and Great Recession.

Housing Outcomes Before and After the Financial Crisis

Exhibit 6 uses the same basic regression discontinuity framework to investigate the impact of the CRA on housing-related consumer credit outcomes: mortgages and foreclosures. Because the financial crisis arguably began with the bursting of the housing bubble, and because government

Exhibit 6

Estimated Regression Coefficients for Housing-Related Consumer Credit Outcomes, Before and After the Financial Crisis: Large Metropolitan Areas

	(1) log(Sum of Mortgages)	(2) log(Sum of Mortgages)	(3) log(Sum of Foreclosures)	(4) log(Sum of Foreclosures)	(5) log(Sum of Foreclosures in Past 2 Years)	(6) log(Sum of Foreclosures in Past 2 Years)	(7) Fraction Foreclosures	(8) Fraction Foreclosures
LMI tract	0.0275	0.0399	0.00231	0.0335	0.00798	0.0336	0.00110	– 0.00551
(Standard error)	(0.0478)	(0.0482)	(0.0402)	(0.0508)	(0.0290)	(0.0393)	(0.00297)	(0.00393)
p-value	0.565	0.408	0.954	0.510	0.783	0.393	0.710	0.161
LMI * Post 2007		– 0.0191		– 0.0450		– 0.0336		0.0102
(Standard error)		(0.0175)		(0.0519)		(0.0485)		(0.00470)
p-value		0.275		0.387		0.488		0.0296
RMFI	0.0356	0.0362	0.00774	0.0122	0.00685	0.00954	– 0.000840	– 0.00129
(Standard error)	(0.00855)	(0.00850)	(0.00700)	(0.00878)	(0.00519)	(0.00694)	(0.000476)	(0.000612)
p-value	0.0000	0.0000	0.269	0.167	0.187	0.169	0.0780	0.0352
RMFI * Post 2007		– 0.000998		– 0.00636		– 0.00352		0.000697
(Standard error)		(0.00307)		(0.00914)		(0.00866)		(0.000733)
p-value		0.745		0.487		0.684		0.342
Standard errors clustered	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Median age in census tract	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	84,924	84,924	66,576	66,576	45,180	45,180	84,924	84,924
R-squared	0.354	0.354	0.292	0.292	0.225	0.225	0.225	0.226

LMI = low- and moderate-income. MSA = metropolitan statistical area. RMFI = relative Median Family Income.

Notes: The dependent variable is the indicated consumer credit outcome in a census tract in a given quarter. In each of the paired columns (1 and 2, 3 and 4, and so on), the first set of results is from estimating equations as in column 4 of exhibits 4 and 5, and the second set comes from estimating equation 5. LMI is a dummy variable equal to 1 if the Median Family Income (MFI) in the census tract is less than 80 percent of the Area Median Family Income (AMFI), indicating the census tract is eligible for the Community Reinvestment Act, and 0 otherwise. RMFI is MFI in the census tract divided by AMFI, multiplied by 100 obtain the percentage, then scaled by subtracting 80, so that at RMFI = 0, LMI turns from 1 to 0. Post2007 is an indicator that equals 1 if the observation is from 2007 or later, 0 otherwise. It interacts with both LMI and RMFI. The postcrisis main effect on the outcome is controlled for with the quarter indicators. All regressions include a constant. Standard errors are in parentheses and are clustered at the census tract level.

interventions in the credit markets related to housing have come in for particular criticism as exacerbating (or creating) the financial crisis, it is worthwhile to examine whether the estimated impact that living in a CRA-eligible neighborhood has on housing outcomes differs before and after the financial crisis. Exhibit 6 presents two sets of results for each housing outcome. The first set of results is from estimating equations, as in exhibit 5. The second set comes from estimating equation 5, enabling interactions between the LMI indicator and an indicator variable for the postcrisis period (as well as an interaction between RMFI and the postcrisis indicator).

We will focus on the estimates of β_1 and β_4: β_1 tells us whether a discontinuous jump occurred at the CRA threshold prior to the crisis, and β_4 tells us whether the jump at the LMI threshold is *different* after the crisis begins. If the estimate of β_4 is not statistically different from 0, then the data indicate that the jump is not statistically different in the two time periods. The estimated size of the jump at the CRA threshold in the postcrisis period is given by adding the estimates of β_1 and β_4.[42] As in the previously stated results, we control for quarter, for metropolitan area, and for median age in the census tract.

The housing outcomes we examine are the log of the sum of mortgages in the census tract in a quarter, the log of the sum of foreclosures in a quarter, the log of the sum of foreclosures within the past 2 years, and the foreclosure rate. Recall that the sum of mortgages in a census tract in a year is a measure of the stock of mortgages among individuals in that tract. Foreclosures are similarly a stock, but an individual would be coded as having a foreclosure on his or her record if a foreclosure had occurred in the past 7 years. Also, the CCP/Equifax data have a measure of foreclosures initiated in the past 2 years, so these can be thought of as a stock of recently initiated foreclosures. Finally, the foreclosure rate measure is the stock of foreclosures initiated in the past 7 years divided by the stock of mortgages on record. Given that the CRA may increase mortgages, and one needs to have a mortgage in order to be at risk of foreclosure, we are interested in whether the fraction of foreclosures is affected by CRA eligibility. However, getting the timing right for these measures, especially in terms of what we would have expected to change (and when) after the financial crisis, is difficult. Perhaps we should investigate only newly initiated foreclosures and whether that changed in 2007. However, if outcomes were worse earlier in LMI neighborhoods, limiting to newly initiated foreclosures might miss that. We think the measures we have chosen are a sensible starting point. We consider all the years from 2007 to 2012 to be postcrisis years, so if housing outcomes got relatively worse on average during that period in neighborhoods that are at the CRA eligibility threshold, our measures should pick that up.

Columns 1 and 2 of exhibit 6 show the results for the log of the sum of mortgages. No change was statistically significant in mortgages at the CRA threshold (results in column 1 are a repetition of exhibit 5, column 4). In column 2, we see that the interaction between LMI and the postcrisis period is negative but not statistically different from 0. In the discontinuity at the CRA eligibility threshold after the financial crisis, the change is not statistically significant. Overall, no evidence of a change in mortgage stock is present in the 2004-to-2012 period due to CRA eligibility.

Columns 3 and 4 present results for the log of the sum of foreclosures in a census tract in a quarter. Column 3 indicates CRA eligibility has no statistically meaningful relationship with the

[42] Any year after 2006 (2007 and later) is a postcrisis year.

stock of foreclosures. Column 4 also indicates no statistically meaningful change in the relationship between the precrisis and postcrisis years. Results using the log of the sum of foreclosures in the past 2 years follow a similar pattern. Finally, the estimated impact of CRA eligibility on foreclosure rate (column 7) is a small, imprecisely estimated, positive number (a coefficient of 0.0011, and the mean of the dependent variable is 0.051) for all time periods combined. When we allow the effect of CRA eligibility to differ by precrisis and postcrisis period (column 8), we see an estimated change in the size of the jump at the CRA threshold. The coefficient on LMI is negative but not statistically different from 0 for the precrisis period. The interaction term between LMI and the postcrisis period is positive and statistically different from 0, indicating a statistically meaningful change in the size of the jump, and that change was toward a higher fraction of foreclosures in CRA-eligible neighborhoods in the postcrisis period. However, the estimated size of the jump in the postcrisis period is small, 0.005,[43] and is not statistically different from 0.[44] Thus, no evidence exists that being in a CRA-eligible neighborhood affected the housing market either beneficially or adversely in the 2004-to-2012 period.[45]

Discussion and Conclusions

The research presented here uses CCP/Equifax credit data to examine the effect of the CRA on consumer credit outcomes. These data enable us to expand on previous research by focusing on a broad set of consumer credit outcomes for which little prior evidence of the CRA's impacts exists. Using a regression discontinuity design, we find evidence that the CRA expanded consumers' credit market footprint: a 9-percent increase in all trades, or accounts, at the CRA threshold. Also, the number of people who have a record in the CCP/Equifax data at the CRA threshold increased 7 percent, and the incidence of individuals missing a risk score—a likely indication of a thin record of activity in the CCP/Equifax data—at the CRA threshold decreased 0.5 percentage point (around 5 percent of the mean). These results suggest that the CRA is having an effect on consumer credit market activity. As credit reports are becoming broadly used—for example, by employers as a screening method during the hiring process—it is possible that even having a presence in the

[43] To see the size of the jump in the postcrisis period, one must add the coefficient on LMI (-0.0055) and the coefficient on the LMI*postcrisis interaction term (0.0102), to get 0.0047. Although this number is positive, it is not statistically significantly different from 0.

[44] The regression in column 8, and in the rest of the table, restricts the effects of the other variables in the regression—the MSA codes and the median age in the census tract—to be the same in the precrisis and postcrisis era. To ensure that this is not somehow affecting the coefficient on LMI, we also ran the regressions separately for the precrisis and postcrisis periods. When we do this, the coefficients (*p*-values) for LMI pre- and post-2007 are -0.0055 (0.141) and 0.0047 (0.177), respectively, which are very similar to the estimates in column 8.

[45] If CRA generated mortgages that were more likely to be foreclosed on, which then generated additional mobility to neighborhoods with RMFIs farther away from the CRA eligibility thresholds, our methodology would not pick up the increased foreclosure activity because we are measuring whether, in a tract in a given quarter, more people in the CCP/Equifax data have a foreclosure on their records. Evidence against this potential problem is that direct measures of mobility at the CRA threshold are no different (Johnson, 2012) and that we find more people in the CCP/Equifax data at the CRA threshold. Nonetheless, future research might fruitfully use the CCP/Equifax data to track individuals over time and examine whether those who are initially observed in neighborhoods at the CRA threshold have different long-term outcomes. Similarly, using the panel data during long periods to examine whether changes in the LMI designation that occur with releases of new census or American Community Survey data generate changes in outcomes for individuals may shed new light on these issues.

credit report data is an outcome with potential implications for individuals' well-being. We find no evidence that adverse outcomes, such as loan delinquencies, poor credit risk scores, or foreclosures, increase at the CRA threshold.

Although we find broad evidence of the CRA's impact on consumers' interactions with credit markets, we do not necessarily see these effects where one might have expected them. For example, because mortgages are an important piece of what regulators consider in assessing compliance with the CRA, one might expect to see an impact on housing-related outcomes. Indeed, much of the research on the CRA has focused on its impact on housing market outcomes. That research finds that the estimated impacts are sensitive to the sample's geographic area and time period, and the time frame we examine is one in which many mortgages were being extended by many types of lending institutions not subject to the CRA, so perhaps it is unsurprising that we find no effect on the stock of mortgages at the CRA eligibility threshold. However, we also find no adverse effects; we find no evidence of a significant jump in foreclosures at the CRA threshold, whether we focus on the time period before or the period during and after the financial crisis.

Our finding of a change in broad measures of consumer credit market activity at the CRA threshold suggests a role for CRA beyond the housing market. This finding does, of course, beg the question of what the mechanism might be. Large institutions, at least, are examined for CRA compliance in terms of services extended in LMI neighborhoods. Our results are consistent with institutions proffering expanded services in areas at the CRA eligibility threshold, leading to more overall credit market activity.

Finally, keep in mind that the regression discontinuity methodology does have drawbacks. In particular, it only tells us what happens right at the threshold where we cross over from CRA eligibility to CRA ineligibility. If the CRA gives regulated lending institutions an incentive to extend credit to individuals in the highest-income neighborhoods among the CRA-eligible neighborhoods, then the effects could be large at the threshold but zero elsewhere. On the other hand, the CRA could drive institutions to create products that are appropriate for LMI consumers (loans that receive CRA credit), many of whom can be found in neighborhoods with MFIs at 80 percent, 81 percent, and so on of the AMFI. This would tend to erode any differences between neighborhoods right below and above the thresholds. In short, the fact that the CRA eligibility threshold in our broad measures of consumer credit market activity jumps suggests an effect of the CRA, but the magnitudes should be interpreted with caution.

Appendix

Exhibit A-1 shows that results for the log(sum of all trades) are robust to the inclusion of controls for metropolitan statistical area fixed effects, quarter fixed effects, and median age in the census tract. Further, the point estimates are similar when we allow for a cubic in relative Median Family Income (RMFI). Column 5 shows results when we use a cubic model. The coefficient on low- and moderate-income (LMI)—the estimate of the break at the Community Reinvestment Act (CRA) eligibility threshold—is still very similar to the coefficient in column 4 (9-percent increase in trades versus an 8-percent increase for columns 4 and 5, respectively). The coefficients in columns 4 and 5 are not statistically different from one another; however, the estimated break at the LMI threshold

Exhibit A-1

Estimated Regression Coefficients for log(Sum of All Trades in Census Tract): Large Metropolitan Areas

	(1)	(2)	(3)	(4)	(5)	(6)
LMI tract	0.0803	0.0803	0.0900	0.0899	0.0799	0.0910
(Standard error)	(0.00931)	(0.0515)	(0.0466)	(0.0466)	(0.0622)	(0.0467)
p-value	0.000	0.119	0.0535	0.0539	0.200	0.0516
RMFI	0.0380	0.0380	0.0378	0.0376	Cubic in RMFI	0.0469
(Standard error)	(0.00160)	(0.00896)	(0.00811)	(0.00814)		(0.0123)
p-value	0.000	0.000	0.000	0.000		0.000139
LMI * RMFI						– 0.0181
(Standard error)						(0.0163)
p-value						0.267
Standard errors clustered	No	Yes	Yes	Yes	Yes	Yes
Quarter indicators	No	No	Yes	Yes	Yes	Yes
MSA fixed effects	No	No	Yes	Yes	Yes	Yes
Median age in census tract	No	No	No	Yes	Yes	Yes
Observations	85,203	85,203	85,203	85,203	85,203	85,203
R-squared	0.013	0.013	0.207	0.207	0.207	0.207

LMI = low- and moderate-income. MSA = metropolitan statistical area. RMFI = relative Median Family Income.
Notes: The dependent variable is the natural log of the sum of all consumer credit trades in a census tract in a given quarter. The sample includes metropolitan areas with populations of 2 million or more. LMI is a dummy variable equal to 1 if the Median Family Income (MFI) in the census tract is less than 80 percent of the Area Median Family Income (AMFI), indicating the census tract is eligible for the Community Reinvestment Act, and 0 otherwise. RMFI is MFI in the census tract divided by AMFI, multiplied by 100 to obtain the percentage, then scaled by subtracting 80, so that at RMFI = 0, LMI turns from 1 to 0. All regressions include a constant. Standard errors are in parentheses and are clustered at the census tract level where indicated; the clusters numbered 2,509.

in column 5 is not statistically different from 0. Although the coefficients for the cubic in RMFI are not shown in the table, the estimates suggest that a linear relationship fits the data as well as the cubic.

Another possible way in which the relationship between RMFI and the *Y* variable may differ from linear is that the relationship may be different on either side of the LMI threshold. For example, it is possible that the relationship between the Median Family Income and the total number of trades is steeper in lower-income census tracts than in higher-income tracts. If that is the case, then the data may indicate a jump at the threshold, not because of the effect of the CRA but because of a naturally occurring difference in the linear relationship between RMFI and *Y* on either side of the threshold.

Column 6 allows for this possibility. We have interacted the continuous variable RMFI with the dummy variable LMI, which allows for the coefficient on RMFI to take on a different value when LMI = 1 and when LMI = 0. If the coefficient on this interaction term is statistically different from 0, it suggests a different slope to the relationship between RMFI and Y on either side of the threshold. However, this coefficient is not statistically different from 0 (*p*-value = 0.267). Further, the coefficient on LMI still indicates about 9 percent more trades or accounts in census tracts that are

CRA eligible. Columns 5 and 6 suggest that the simple linear relationship between log(sum of all trades) and RMFI does not violate the assumptions under which a regression discontinuity design provides an unbiased estimate of the effect of the CRA on consumer credit outcomes. We use the specification in column 4 of exhibit A-1 to investigate the relationship between CRA eligibility and consumer credit outcomes going forward.[46]

Other Geographic Areas

Like Bhutta (2011), we focused on large metropolitan areas (those with populations of 2 million or more) for our research. Bhutta's research found statistically significant effects of CRA eligibility on mortgage originations in these larger areas but not in others. Bhutta argued that CRA enforcement activities may be greater in larger cities and thus one may see a greater effect there. It is also plausible that the differences in lenders' responses to the CRA are driven by something other than enforcement. For example, if lenders have to do more outreach to potential borrowers in order to fulfill their responsibilities under the CRA, it is likely less costly to do that in more densely populated areas.

For completeness, we repeat the preceding analysis for all areas, not only those in large metropolitan areas. The results, which are presented in exhibit A-2, follow closely the outcomes presented in exhibit 5. Our results are similar to those of Bhutta (2011); we find no statistically significant jumps in credit outcomes at the CRA threshold when we consider all areas combined, despite the fact that the sample size is considerably larger.

Two studies, to our knowledge, find an impact at the CRA threshold when focusing on large metropolitan areas. Although investigating why the CRA has a different effect depending on the size of the metropolitan area is beyond the scope of this particular project, the question deserves further attention.

[46] For the other outcomes in exhibit 5, we have performed the same robustness checks and linearity, combined with the narrow 75- to 85-percent band, seems to fit the data and return results that are not sensitive to functional form.

Exhibit A-2

Estimated Regression Coefficients for Selected Consumer Credit Outcomes: All Areas

	(1) log(Sum of All Trades)	(2) log(Number of People in Tract)	(3) Fraction Missing Risk Score	(4) log(Sum of Mortgages)	(5) log(Sum of Foreclosures)	(6) Fraction Foreclosures	(7) Average Risk Score
LMI tract	0.0349	0.0252	– 0.0018	0.0197	0.0312	0.0029	– 0.2268
(Standard error)	(0.0293)	(0.0275)	(0.0018)	(0.0319)	(0.0245)	(0.0019)	(1.0876)
p-value	0.233	0.358	0.311	0.537	0.203	0.121	0.835
RMFI	0.0254	0.0166	– 0.0020	0.0306	0.0093	– 0.0004	1.2028
(Standard error)	(0.0050)	(0.0047)	(0.0003)	(0.0055)	(0.0042)	(0.0003)	(0.1884)
p-value	0.0000	0.0000	0.0000	0.0000	0.0280	0.142	0.0000
Standard errors clustered	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Median age in census tract	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	240,554	240,679	240,679	239,697	179,529	239,697	0.4568
R-squared	0.2399	0.2074	0.2139	0.3104	0.2709	0.1694	0.447

LMI = low- and moderate-income. MSA = metropolitan statistical area. RMFI = relative Median Family Income.
Notes: The dependent variable is the indicated consumer credit outcome in a census tract in a given quarter. The sample includes all areas. LMI is a dummy variable equal to 1 if the Median Family Income (MFI) in the census tract is less than 80 percent of the Area Median Family Income (AMFI), indicating the census tract is eligible for the Community Reinvestment Act, and 0 otherwise. RMFI is MFI in the census tract divided by AMFI, multiplied by 100 to obtain the percentage, then scaled by subtracting 80, so that at RMFI = 0, LMI turns from 1 to 0. All regressions include a constant. Standard errors are in parentheses and are clustered at the census tract level; the clusters numbered 7,088.

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Bridging the Gap to Scalable Community Reinvestment Lending Programs

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Abstract

The Community Reinvestment Act requires commercial banks and savings institutions to help meet the credit needs of borrowers in their communities, including low- and moderate-income neighborhoods. The CRA has been controversial since its enactment, with calls for both repealing and expanding it. One rationale for expanding CRA lending activities is the distinction between conforming and nonconforming CRA lending, and the fact that a large secondary market exists for the former but not the latter, essentially creating a dual market. In this market, marginal borrowers potentially face higher borrowing costs that may be disproportionate to their actual credit riskiness, can only obtain loans with alternative features that may increase default risk, and may suffer from predatory lending practices. However, not much is known about the lending risks associated with the nonconforming CRA segment of the market. In this article, we summarize the lessons learned from one large nonconforming community reinvestment mortgage program and provide insight into how the challenges associated with special community reinvestment lending might potentially be managed on a larger scale, via increased capital reserves, a mortgage insurance mechanism, and enhanced market liquidity in the special community reinvestment product space.

Introduction

Community Reinvestment Lending in Context

A substantial mortgage finance infrastructure is available to low- and moderate-income households in the United States (Nothaft and Surette, 2001). This infrastructure includes initiatives supported by federal, state, and local governments, as well as initiatives in the nonprofit and for-profit sectors.

One such initiative is the Community Reinvestment Act[1] (CRA),which was enacted in 1977 in response to concerns about *redlining*, a form of geographically based credit rationing. The CRA requires depository institutions to provide credit in a "safe and sound manner" to the communities in which they collect deposits, including low- and moderate-income households and neighborhoods. Institutions subject to the CRA are periodically evaluated on the extent to which they meet this goal, and the results of the evaluation are considered by regulators when reviewing bank applications for mergers or changes in the location of branches (Ardalan, 2006; Ardalan and Davis, 2006; Hossain, 2004). Since 1996, CRA-regulated banks are estimated to have lent more than $973 billion in small business loans and $883 billion in community development loans to support affordable housing and economic development projects.[2]

Two other federal government initiatives amplify the potential impacts of the CRA: the housing goals of the government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, and the work of the Federal Housing Administration (FHA). Under the Federal Housing Enterprises Financial Safety and Soundness Act[3] of 1992, as amended by the Housing and Economic Recovery Act[4] of 2008, Fannie Mae and Freddie Mac are subject to affordable housing goals covering their purchases of single-family and multifamily mortgages, including CRA-eligible loans. These mandates are intended to provide liquidity and a secondary mortgage market for prime, conforming mortgages made to low- and moderate-income households, as well as those in underserved geographic areas and markets (DiVenti, 2009).[5] Therefore, greater involvement by the GSEs may lead to the origination of more CRA-eligible prime, conforming loans. The GSEs are currently under the conservatorship of the Federal Housing Finance Agency (FHFA). In addition, the FHA insures nonconforming mortgages and thereby provides credit enhancements for borrowers who may have impaired credit history or liquidity constraints (Nothaft and Surette, 2001); these same borrowers are often served by CRA lending efforts. A secondary market for FHA loans exists through Ginnie Mae, which is a government corporation. Thus, the FHA may amplify the impacts of the CRA through its insurance programs.

The definition of a conforming mortgage has varied over time but generally reflects GSE guidelines stipulating loan and borrower characteristics, such as loan amount, downpayment as a fraction of the property value, credit score, debt-to-income ratio, loan-to-value ratio, and the extent of supporting documentation required.[6] These guidelines are intended to standardize both loan and borrower characteristics, thereby reducing or eliminating informational asymmetries for investors and permitting very accurate prediction of default and prepayment risks (Green, 2008). CRA-eligible loans, namely those for which institutions that are subject to the CRA regulations can receive low- and moderate-income lending credit during their CRA assessments, can be either conforming or

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.
[2] See http://www.ffiec.gov/craadweb/aggregate.aspx for data on community development lending and small business lending by year.
[3] Pub. L. 102–550, 106 Stat. 3941, Title XIII.
[4] Pub. L. 110–289, 122 Stat. 2654.
[5] The 2015–2017 housing goals are described at https://www.fhfa.gov/Media/PublicAffairs/Pages/FHFA-Adopts-Final-Rule-on-2015-to-2017-Housing-Goals-for-Fannie-Mae-and-Freddie-Mac.aspx.
[6] For example, see Fannie Mae's 2016 eligibility matrix at https://www.fanniemae.com/content/eligibility_information/eligibility-matrix.pdf.

nonconforming (Avery, Bostic, and Canner, 2000). During the 1990s, approximately 40 percent of prime, conforming loans purchased by the GSEs were made to low- or moderate-income borrowers, and about two-thirds of those loans were also CRA eligible (Nothaft and Surette, 2001).[7]

What little available evidence exists regarding nonconforming CRA-eligible mortgage lending suggests that, historically, this segment of the market has been relatively small and is served through special CRA lending programs (Quercia and Ratcliffe, 2009). Such programs have been adopted by CRA-regulated institutions for the purpose of enhancing CRA assessment ratings and primarily target low-income borrowers living in low-income neighborhoods. Special CRA loans typically carry nonconforming features that are designed to relax credit constraints or underwriting standards and thereby make credit available to marginal borrowers who would not qualify for a conforming mortgage. Such loans may permit higher loan-to-value ratios, higher debt-to-income ratios, lower borrower credit scores, or a combination of the three, and they may carry lower interest rates. A survey of large retail banking institutions conducted by the Federal Reserve Board of Governors suggests that special CRA mortgage lending represented about 5.6 percent of total CRA mortgage lending in 1999 (Avery, Bostic, and Canner, 2005, 2000). A more recent estimate suggests that special CRA programs originate about 20,000 to 30,000 loans per year (Herbert, 2009).

Loans made via such special programs are often referred to as "prime" mortgages, despite the facts that many of the borrowers served have subprime credit ratings and the flexible underwriting features of such mortgages cause them to carry somewhat higher default risk than prime, conforming mortgages (LaCour-Little, 2007). The borrowers who receive nonconforming loans also tend to be more heterogeneous than borrowers who receive prime, conforming loans, thus complicating the management of associated mortgage termination risks (Green, 2008). Special CRA loans can, however, be distinguished from subprime loans, due to the fact that they do not carry alternative loan features, such as prepayment penalties, balloon payments, reverse amortization, teaser rates, or high-cost interest rates, which tend to increase default risk irrespective of borrower credit quality (Aalbers, 2009; Ding et al., 2011). Subprime loans have tended to be favored by investors, higher-income households, and borrowers who are able to provide substantial downpayments but are unable or unwilling to provide complete documentation due to self-employment or temporary adverse financial shocks (Aalbers, 2009; LaCour-Little, 2007).

Innovation in Community Reinvestment Lending

Numerous proposals have been put forward over the years concerning how CRA lending in general, and special CRA lending in particular, could potentially be expanded. One such proposal that surfaced in the late 1990s involved the creation of a secondary market for special CRA-eligible mortgages, which did not exist at that time (Quercia, Freeman, and Ratcliffe, 2011). In the absence of such an outlet, primary lenders must keep marginal CRA loans in portfolio (Bhutta, 2011), where they can cause an increase in required capital reserves, because higher default rates and higher economic capital requirements are associated with loans that have high loan-to-value ratios, are made to borrowers with lower credit scores, are geographically concentrated, or a combination

[7] Note that the GSE housing goals have historically used higher income thresholds for targeted low- and moderate-income borrowers and communities than those specified by the CRA, so some loans purchased by the GSEs in satisfaction of their housing goals were not CRA eligible. See An et al. (2007) for a discussion.

(Calem and LaCour-Little, 2004). Some evidence suggests that the existence of a secondary mortgage market can increase loan originations and that this effect may be particularly pronounced for loans made to low-income borrowers (Gabriel and Rosenthal, 2007).

Thus, the proposal was to involve the GSEs in providing liquidity for special CRA lending activities and to reduce the need for lending institutions to hold special CRA loans on their books. Such a secondary market would essentially expand conforming loan criteria to include the type of nonconforming loan features that are typical of special CRA-eligible lending programs and thus potentially permit many more such loans to be made. It could also reduce the risk of lending to the special CRA borrower population by standardizing underwriting practices and providing geographic diversification. As a test of this idea, a targeted lending program, the Community Advantage Program (CAP), was implemented in 1998 as a demonstration of how a secondary mortgage market for special CRA-eligible mortgages might function in practice. The demonstration was intended to address concerns about whether such loans were too risky for investors and whether the borrowers receiving such loans would be financially better off as renters, given the relatively higher costs and personal financial risks associated with homeownership.[8]

To date, the performance of CAP mortgages and the housing experiences of CAP borrowers have been documented at length. CAP loans tend to have somewhat higher default risk than prime, conforming mortgages but substantially lower default risk than subprime loans made to similar borrowers (Ding et al., 2011). Most CAP borrowers have sustained homeownership, accumulated home equity, and characterized their decisions to become homeowners as positive (Quercia, Freeman, and Ratcliffe, 2011). In the years since CAP started, the GSEs have also implemented other special secondary market programs that provide an outlet for special CRA-eligible loan products. Examples include Fannie Mae's Community Home Buyer's Program and Freddie Mac's Affordable Gold Alt 97 program (LaCour-Little, 2007), which were in place in 2002; Fannie Mae's HomeReady mortgage program, which was implemented in 2015;[9] and Freddie Mac's Home Possible mortgage program, which was implemented in 2016.[10] Research from CAP was taken into consideration during the design of the more recent programs.

Current Policy Challenges

Despite these changes in the secondary mortgage market, some researchers continue to believe that special CRA lending activities need to be greatly expanded. In particular, one rationale for expanding special CRA lending activities that has been proposed in the aftermath of the financial crisis is that the distinction between conforming and nonconforming CRA lending, and the fact that a large secondary market exists for the former but not the latter, essentially creates a dual market. In this market, marginal borrowers potentially face higher borrowing costs that may be disproportionate to their actual credit riskiness, can only obtain loans with alternative features that may increase

[8] Although some lending programs targeted to low- and moderate-income households have historically been associated with objective increases in average wealth and higher standards of living among the program participants, considerable outcome variability exists, which has raised questions about the suitability of such lending (Galster and Santiago, 2008).
[9] See the HomeReady product matrix at https://www.fanniemae.com/content/fact_sheet/homeready-product-matrix.pdf. See also general information about Fannie Mae's flexible lending programs at https://www.fanniemae.com/content/tool/flexibilities-for-creditworthy-borrowers.pdf.
[10] See an overview of Home Possible at http://www.freddiemac.com/homepossible/.

default risk, and may suffer from predatory lending practices (Levitin and Ratcliffe, 2014; Quercia and Ratcliffe, 2009). Concerns about this dual market structure reflect the observation that a number of low-income and minority homeowners took out subprime loans during the housing market expansion of the early 2000s and might have faced lower default risk from more traditional mortgage products (Bostic and Lee, 2008; Ding et al., 2011). An expansion of special CRA lending through GSE secondary market programs would potentially serve this segment of the market.

In addition, the public mortgage finance infrastructure that supports lending to low- and moderate-income households has come under increasing scrutiny since the housing market slump that began in 2006 and the associated recession from 2007 to 2009. The CRA has always been controversial due its ambiguous wording, subjective implementation, limited mortgage market coverage, and tendency to prevent banks from achieving economies of scale through specialization (Hossain, 2004; Hylton and Rougeau, 1999; Marsico, 2005; Richardson, 2001). Assessing the effectiveness and adequacy of the CRA has proved difficult due to its lack of quantitative compliance criteria and its interaction with other financial regulations in determining lender incentives (Getter, 2015). Another longstanding controversy concerns the impact of the GSE housing goals with respect to housing market liquidity (Ambrose and Thibodeau, 2004; Bostic and Gabriel, 2006; Gabriel and Rosenthal, 2010). However, additional questions have recently been raised as to the extent to which the CRA, the GSEs, and the FHA may have contributed to economic volatility through the relaxation of underwriting standards (Nichols, Hendrickson, and Griffith, 2011). In particular, the contribution of the CRA (or lack thereof) to the financial crisis has been debated at length (Aalbers, 2009; Reid, 2013). Moreover, given that the GSEs currently remain in conservatorship, various proposals have been made for how to reorganize the U.S. housing finance system (Duca, Muellbauer, and Murphy, 2016; Seidman et al., 2013).[11] Thus, the future of the secondary market for special CRA-eligible lending activities remains unclear.

Roadmap

We contribute to the ongoing policy discussion by reviewing some of the information that has been gathered from CAP and providing insights as to how the challenges associated with special CRA-eligible lending may be managed. We believe that any expansion or reorganization of the housing finance system that seeks to incorporate special CRA-eligible lending on a significant scale should be carefully designed with risk management in mind. In brief, the design and outcomes of CAP, combined with our reading of the relevant literature, suggest that increasing the scale of special CRA lending would require increased capital reserves, a mortgage insurance mechanism, and enhanced market liquidity in the special CRA product space.

The remainder of the paper is divided into four sections. First, we briefly discuss the historical background and implementation of the CRA. Second, we describe CAP and the data collection associated with the evaluation of this program. Third, we describe the demographic profile of CAP borrowers, the program's underwriting considerations, and the mortgage performance and wealth-building experiences of participating borrowers. Finally, we discuss implications for the scalability of special CRA lending.

[11] See also a synthesis of proposed reforms at http://www.urban.org/policy-centers/housing-finance-policy-center/projects/housing-finance-reform-incubator/jim-parrott-clarifying-choices-housing-finance-reform.

Community Reinvestment Act Background

The CRA was passed in 1977 in response to beliefs that lenders were rationing mortgage credit in low- and moderate-income and minority neighborhoods. Such credit rationing was believed to result from racial discrimination, statistical discrimination, informational asymmetries, the inability of lenders to achieve economies of scale, or some combination thereof (Ardalan, 2006; Ardalan and Davis, 2006; Avery, Bostic, and Canner, 2005; Hossain, 2004; Hylton and Rougeau, 1999; Klausner, 1995). In particular, economic theory suggests that an equilibrium in which profit-maximizing lenders rationally engage in credit rationing can exist as a result of either thin markets or imperfect information about the credit risks of heterogeneous borrowers (Lang and Nakamura, 1993; Stiglitz and Weiss, 1981). Further motivation for the CRA was provided by the belief that access to credit tended to carry positive community-level externalities that were not internalized by lenders and that the level of mortgage lending in the relevant neighborhoods might thus be socially suboptimal (Lang and Nakamura, 1993; Richardson, 2001). Some proponents of the CRA have also argued that banks benefit from the public sector with respect to deposit insurance and should therefore be required to provide credit broadly as a public service (Levitin and Ratcliffe, 2014).

In light of these beliefs, the CRA was intended to induce depository institutions to provide more credit in the locations in which they received deposits and particularly to induce such institutions to expand lending activity in low- and moderate-income and minority neighborhoods. The CRA reaches beyond existing fair lending laws by not only prohibiting discrimination in lending but also creating an obligation to proactively make credit broadly available to the target population groups (Ardalan and Davis, 2006; Levitin and Ratcliffe, 2014). The intention was that CRA loans might be less profitable than mainstream lending activities, but they should not undermine lender solvency (Avery, Bostic, and Canner, 2005).

The CRA was revised in 1995 in an effort to address concerns of both lenders and community groups with respect to the challenges of CRA assessment and enforcement (Hossain, 2004). In its current form, the CRA provides for a government assessment of lenders that varies based on institutional size and involves up to three tests—namely a lending test, an investment test, and a service test. The lending test consists of an evaluation of how loans are distributed across neighborhoods and income groups within the assessment area; loan frequencies, amounts, and product mixes are considered. The investment test evaluates lender investments in local economic development activities. The service test considers lender systems and processes for providing credit to various constituencies within the assessment area (Ardalan and Davis, 2006). The lending test is more heavily weighted than the other tests (Quercia and Ratcliffe, 2009). Lenders can meet their CRA obligations in a variety of ways,[12] including by providing funding for low-income housing initiatives, small businesses or farms, disaster recovery and neighborhood revitalization projects, and community services that are specifically targeted to lower income households or residents of distressed areas. Lenders can receive credit by lending directly or by purchasing qualifying loans originated by other lenders.

The CRA assessment assigns each bank a rating on a four-point scale, and this rating is taken into consideration during the approval process when bank applications are submitted for "new charters;

[12] See a fact sheet describes the many activities for which banks can receive CRA credit at https://www.occ.treas.gov/topics/community-affairs/publications/fact-sheets/fact-sheet-cra-loans.pdf.

new branches or relocation of an existing branch; bank mergers and consolidation; and other similar corporate activities" (Office of the Comptroller of the Currency, 2014: 2). Small banks are evaluated primarily based on their lending activities. Larger banks are assessed based on lending, investment, and service activities. In each case, a given lender can opt to submit a strategic plan for meeting CRA objectives; if approved by the assessor, this strategic plan can provide context for the assessment so that it takes into consideration the unique characteristics of the lending institution in relation to its service area. The results of each assessment are made available to the public, which allows for secondary enforcement of CRA compliance and encourages collaboration with community groups via the pressure to maintain a favorable public image (Marsico, 2005).[13]

Community Advantage Secondary Market Demonstration Program

The CAP is a secondary mortgage market demonstration program initiated in 1998 via a partnership among the Ford Foundation, Fannie Mae, and Self-Help, a nonprofit lender with headquarters in Durham, North Carolina. Under CAP, Self-Help purchased qualifying loans from the originating lenders and resold them to Fannie Mae while retaining recourse for an agreed period of time. Qualifying loans were those made to households with annual incomes of no greater than 80 percent of the Area Median Income (AMI) at the metropolitan statistical area level, or to minority households with annual incomes of no greater than 115 percent of AMI. CAP was designed to provide policy-relevant insights with respect to community reinvestment lending, as defined by the CRA, and to inform future housing policy.

The risk associated with CAP lending was managed in several ways. First, because it was acknowledged that special CRA mortgage lending posed a higher risk of default than prime, conforming mortgage lending, the Ford Foundation provided a $50 million grant for the purposes of underwriting CAP loans and providing capital reserves that could compensate Fannie Mae in the event of unexpected losses. Second, Self-Help added a small risk fee to the mortgage interest rate; this risk fee ranged between 0 and 150 basis points and took the place of mortgage insurance. Third, the recourse arrangement of Self-Help permitted the return of loans with low credit quality; if a loan became delinquent very shortly after purchase, Self-Help returned it to the originator. Self-Help also retained recourse on each loan for a given period of time after reselling it to Fannie Mae, an arrangement that provided additional default risk protection for the GSE.

More than 46,000 loans totaling more than $4 billion were purchased through CAP. Purchased loans were primarily 30-year, fixed-rate, low-downpayment mortgages. Origination dates range from 1983 to 2010, with 95 percent originated after 1995. CAP loans had a median original loan-to-value ratio of 97 percent and were originated at a median interest rate of 7 percent. The median original loan balance was $79,000. In some cases, Self-Help purchased qualifying loans that had already been originated, and in other cases Self-Help collaborated with originating lenders to create a program-specific lending channel that would permit the future origination and resale of qualifying loans.

[13] See also a presentation from the Federal Deposit Insurance Corporation at https://www.fdic.gov/regulations/resources/director/presentations/cra.pdf.

With further funding from the Ford Foundation, a subset of approximately 3,700 CAP borrowers who received loans between 1999 and 2003 were surveyed annually beginning in 2003. The survey collected information about homeownership experiences for the purposes of academic research and program evaluation. In 2004, a comparison group of about 1,500 renter households was also recruited and interviewed. These renter households were selected to be in the same metropolitan areas as the CAP homeowners and to be similar with respect to an income ceiling. The comparison panel was primarily intended to provide a point of reference from which to evaluate the wealth accumulation of the CAP owners. Details about the wealth accumulation and asset holdings of survey participants were collected by surveys administered in 2005, 2009, and 2012. The last year of survey data collection was 2014. Altogether, the survey data collected between 2003 and 2014 constitute the Community Advantage Panel Survey (CAPS).

Like other panel surveys, CAPS has experienced some attrition of participants over time. As of 2014, the final sample sizes were approximately 1,800 owner sample members and 800 renter sample members. Male and Hispanic respondents were the most likely to drop out during the survey period (Riley et al., 2015).

Sample Characteristics

Exhibit 1 presents demographic and underwriting summary statistics for CAP participants and both CAPS samples. At the time of loan origination, the median CAP borrower was 32 years old and had an annual income of $31,000 (or 60 percent of AMI), a credit score of 681, and a debt-to-income ratio of 37 percent. The median CAP property was valued at $84,000 at the time of purchase, and the median CAP borrower's original equity in the property was approximately $2,500. About 40 percent of borrowers were members of a racial or ethnic minority group, with about 19 percent Black and about 14 percent Hispanic representation. Thus, much of the sample comprises households from groups that have traditionally been underserved by financial markets. At the time of loan origination, about 14 percent of CAP properties were in rural areas, about 32 percent were in low-income census tracts, and about 30 percent were in minority census tracts. Nearly 70 percent of CAP properties were in the South, with approximately 30 percent in North Carolina. The subset of CAP borrowers who participated in CAPS presents a similar profile overall, except that survey participants were more likely to be in the Midwest and less likely to purchase a property in a minority tract.

The CAPS renters sample differs from the CAPS owners sample with respect to both demographic and geographic characteristics at survey baseline. Compared with the CAPS owners sample, survey participants in the CAPS renters sample had a higher median age at the survey baseline (39 versus 32) and had a lower median household income ($19,000, or 30 percent of AMI, versus $31,000, or 54 percent of AMI). In addition, renters were more likely to be Black (33 versus 20 percent) or Hispanic (19 versus 16 percent). Renters were also less likely to be married (28 versus 46 percent), less likely to have completed education beyond high school (25 versus 39 percent), and less likely to be employed (63 versus 92 percent). Finally, renters were more likely to be in the South (74 versus 62 percent). Because of these differences, existing analyses comparing the financial outcomes of these two samples have tended to employ selection models or matching methods as a means of correcting for sample imbalance on key respondent attributes.

Exhibit 1

Owner and Renter Characteristics by Sample

	CAP Portfolio	CAPS Owners Sample	CAPS Renters Sample
	N = 46,547	N = 3,743	N = 1,529
Age (median, years)	32	32	39
Income (median, $)	30,792	30,672	19,000
Income (median, % of AMI)	60	58	33
Male (%)	57	54	30
Race (%)			
White	61	61	44
Black	19	20	33
Hispanic	14	16	19
Other	6	3	4
Marital status (%)			
Married	—	46	28
Widowed/divorced/separated	—	20	32
Never married	—	35	40
Educational attainment (%)			
Less than high school	—	9	20
High school diploma or GED	—	51	55
Associate's or trade school degree	—	14	8
Bachelor's degree	—	19	13
Graduate degree	—	6	4
Employment status (%)			
Working	—	92	63
Unemployed (looking for work)	—	3	12
Out of labor force	—	3	20
Retired	—	2	5
Geographic region (%)			
Midwest	16	26	14
Northeast	4	3	0
South	69	62	74
West	12	10	12
Rural (%)	14	18	—
Low-income tract (%)	32	30	—
Minority tract (%)	30	25	—
Purchase price (median, $)	84,000	77,500	—
Loan amount (median, $)	79,000	74,775	—
Loan-to-value ratio (median, %)	97	97	—
Debt-to-income ratio (median, %)	37	37	—
Credit score (median)	681	673	—

AMI = Area Median Income. CAP = Community Advantage Program. CAPS = Community Advantage Panel Survey. GED = general equivalency diploma.

Differences also exist between CAPS participants and the larger population of low-income households. Compared with similar low-income participants in the 2003 Current Population Survey, CAPS respondents tend to be much more likely to live in the South; they also appear to be somewhat more educated and more attached to the labor force. Compared with low-income homeowners in the Current Population Survey, the CAPS owners sample also tends to be younger and exhibit greater representation of males. However, these two groups appear to be similar with respect to distributions of race, income, and household size. Compared with low-income renters in the Current Population Survey, the CAPS renters sample demonstrates higher representation of Black and female participants but similar distributions of income and household size (Riley, Ru,

and Quercia, 2009). These differences between CAPS participants and the general low-income population should be kept in mind when considering the generalizability of analyses based on CAPS data.

Mortgage Performance

As of the end of 2016, approximately 17 percent of the CAP loan portfolio remained active. An additional 71 percent had prepaid, 5 percent had been returned to the originator, and 7 percent had been terminated via foreclosure sale. With respect to worst-ever payment delinquency status, more than 80 percent of CAP loans had never been 90 or more days delinquent. Approximately 62 percent had never been delinquent at all, an additional 15 percent had been at most 30 days delinquent, and about 4 percent had been more than 30 but at most 60 days delinquent.

When compared with the broader mortgage market, CAP rates of serious delinquency (that is, at least 90 days late on payments or in foreclosure) during the financial crisis generally fell between those for fixed-rate prime loans and those for other mortgage products. This relationship is illustrated in exhibit 2; CAP serious delinquency rates over time are compared with those for prime fixed-rate loans, prime adjustable-rate loans, subprime fixed-rate loans, subprime adjustable-rate loans, and FHA loans. Exhibit 2 covers the period from the second quarter of 2006, when the housing market peaked, to the end of 2009, when subprime serious delinquency rates reached their maximum. In the fourth quarter of 2009, active CAP loans exhibited a serious delinquency rate of about 10 percent. By contrast, prime fixed-rate loans exhibited a serious delinquency rate of about 5 percent, whereas prime adjustable-rate loans, subprime fixed-rate loans, and subprime adjustable-rate loans exhibited serious delinquency rates of 18, 22, and 43 percent, respectively.[14]

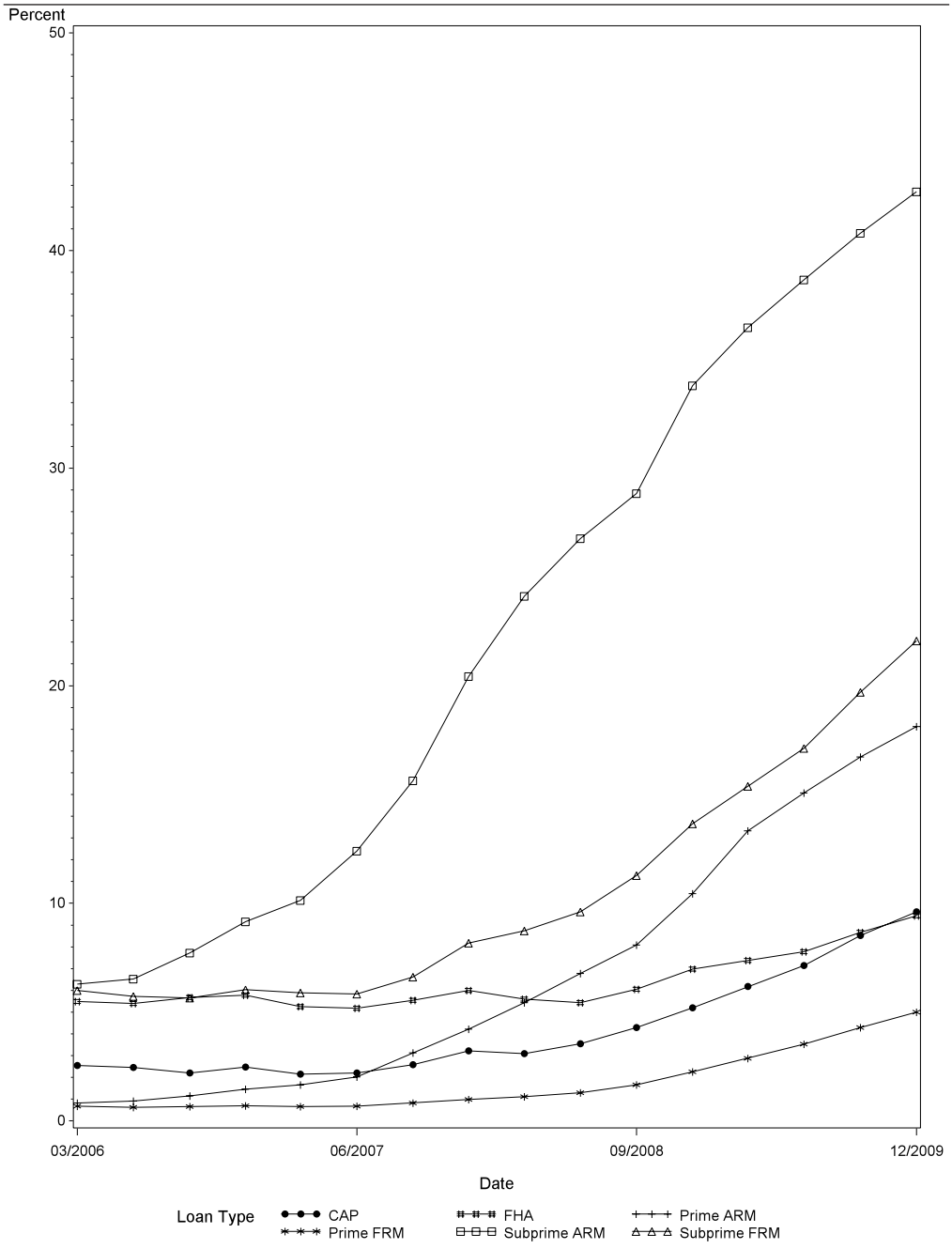
CAP loans thus exhibit default risk that is higher than that of fixed-rate prime loans but lower than that of adjustable-rate prime loans or subprime loans. The intermediate risk profile of CAP mortgages reflects the similarities between CAP borrowers and subprime borrowers with respect to credit characteristics but also the differences in loan products received. The former received loans at fixed rates, high loan-to-value ratios, and near-prime interest rates, whereas the latter received subprime or adjustable-rate loans that could generate mortgage payment shocks. In consequence, CAP mortgage performance reflects less risk layering than that of subprime loans. The mortgage product can mediate the relationship between borrower origination credit profiles and observed mortgage performance (Ding et al., 2011; Pennington-Cross and Ho, 2010). This pattern is consistent with the idea that special CRA lending may pose somewhat higher costs to lenders than conforming prime lending and may thus require higher loss reserves or subsidization, either from other business lines or from external organizations, in order to be viable.

However, CAP mortgage performance does generally reflect the effect of standard underwriting factors, including household income, credit score, loan-to-value ratio, and debt-to-income ratio (Quercia, Pennington-Cross, and Tian, 2012). Thus, lower incomes, lower credit scores, higher loan-to-value ratios, and higher debt-to-income ratios are all associated with increases in default risk for CAP loans, as they are for other loan products.

[14] See the Mortgage Bankers Association's National Delinquency Survey at https://www.mba.org/news-research-and-resources/research-and-economics/single-family-research/national-delinquency-survey.

Exhibit 2

Serious Delinquency (90+ or Foreclosure) Rates by Mortgage Product, 2006–2009



ARM = adjustable-rate mortgage. CAP = Community Advantage Program. FHA = Federal Housing Administration. FRM = fixed-rate mortgage.
Sources: CAP database; Mortgage Bankers Association

Appreciation and Return on Equity

Exhibit 3 shows the real FHFA purchase-only house price index for the period of 1991 to 2017. All nominal index values are adjusted to 1991 values using the Consumer Price Index for all urban consumers less shelter. As illustrated, national house prices exhibited considerable volatility during the period of CAP program evaluation. Thus, many of the CAP borrowers who sold their homes during the study period experienced historically high rates of house price appreciation and return on equity. Among those CAPS owners who sold their CAP properties during the survey period, 89 percent sold their houses for at least what they initially paid, and the remaining 11 percent incurred a loss from sale. Those who experienced a gain from the sale reported a median nominal gain of nearly $26,000, whereas those who experienced a loss from sale reported a median nominal loss of about $10,000.

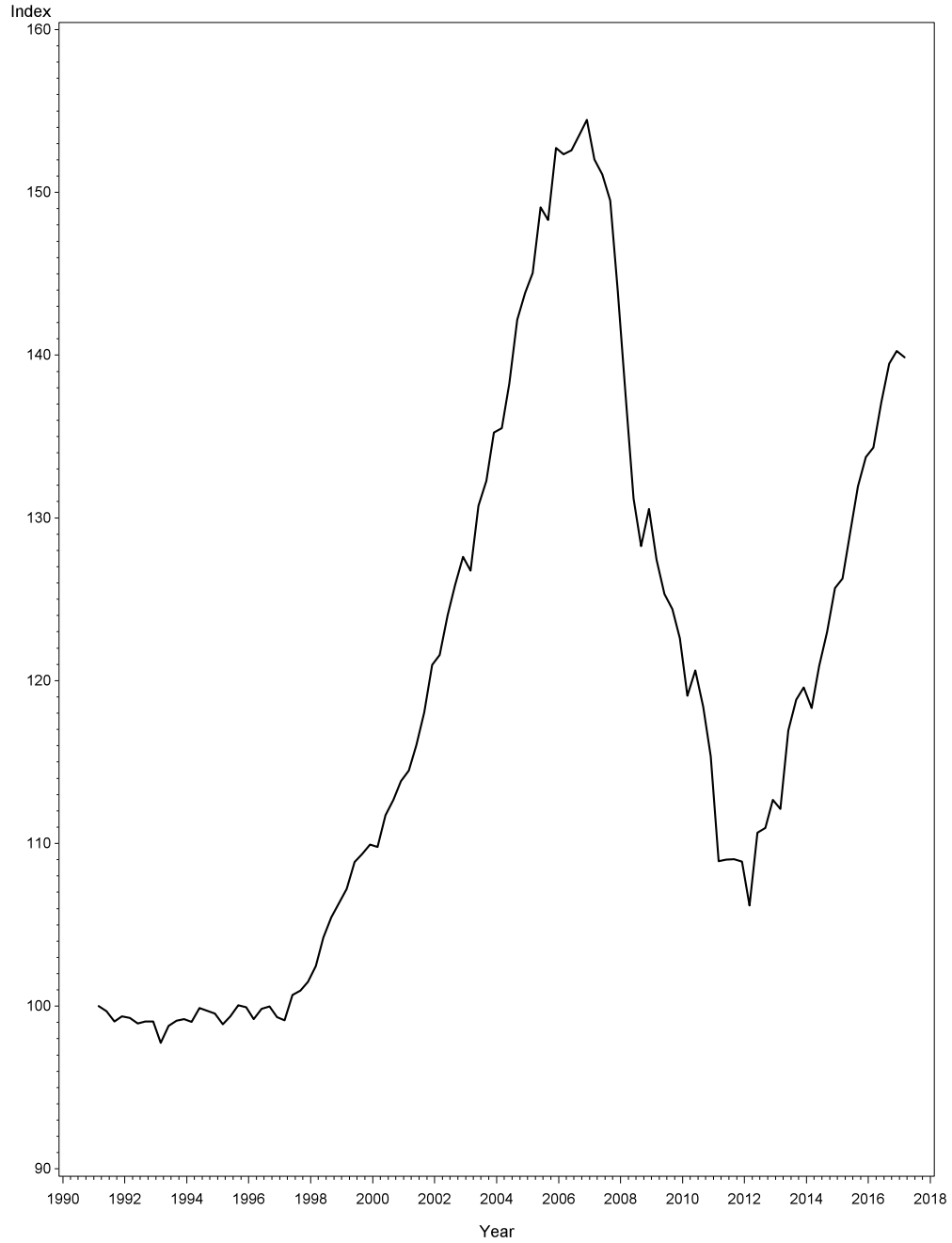
The CAP borrowers who retained their CAP properties experienced modest gains more consistent with long-term rates of market appreciation. As of the fourth quarter of 2016, CAP properties had appreciated at a nominal annualized rate of about 2 percent since loan origination, which corresponds to a potential annualized return on equity of approximately 19 percent. This latter leveraged rate of return on equity compares favorably with returns on alterative unleveraged investment vehicles, as the Dow Jones Industrial Average returned a nominal annual return of about 4 percent during the study period, and the 10-year Treasury bill rate was about 5 percent at the time of CAP loan origination.

More specifically, exhibit 4 illustrates the potential gains in home equity that CAP borrowers remaining in their CAP properties could have achieved as a result of the evolution of house prices between CAP property purchase and the end of 2016. We calculate potential home equity as the difference between the market value of the property[15] and the most recent observed unpaid principal balance on the CAP mortgage. At the median, CAP borrowers potentially experienced nominal equity growth of about $44,000 after loan origination; including the original equity held in the property at the time of purchase, the median CAP borrower would have accumulated about $46,000 in home equity. The upper 75th percentile represents accumulated total equity of about $76,000, whereas the lower 25th percentile represents accumulated total equity of about $25,000. This variation across CAP properties primarily reflects geographic differences in local and regional housing market conditions.

[15] We use the FHFA metropolitan-level housing price indices to calculate market value for the CAP properties based on the original purchase price.

Exhibit 3

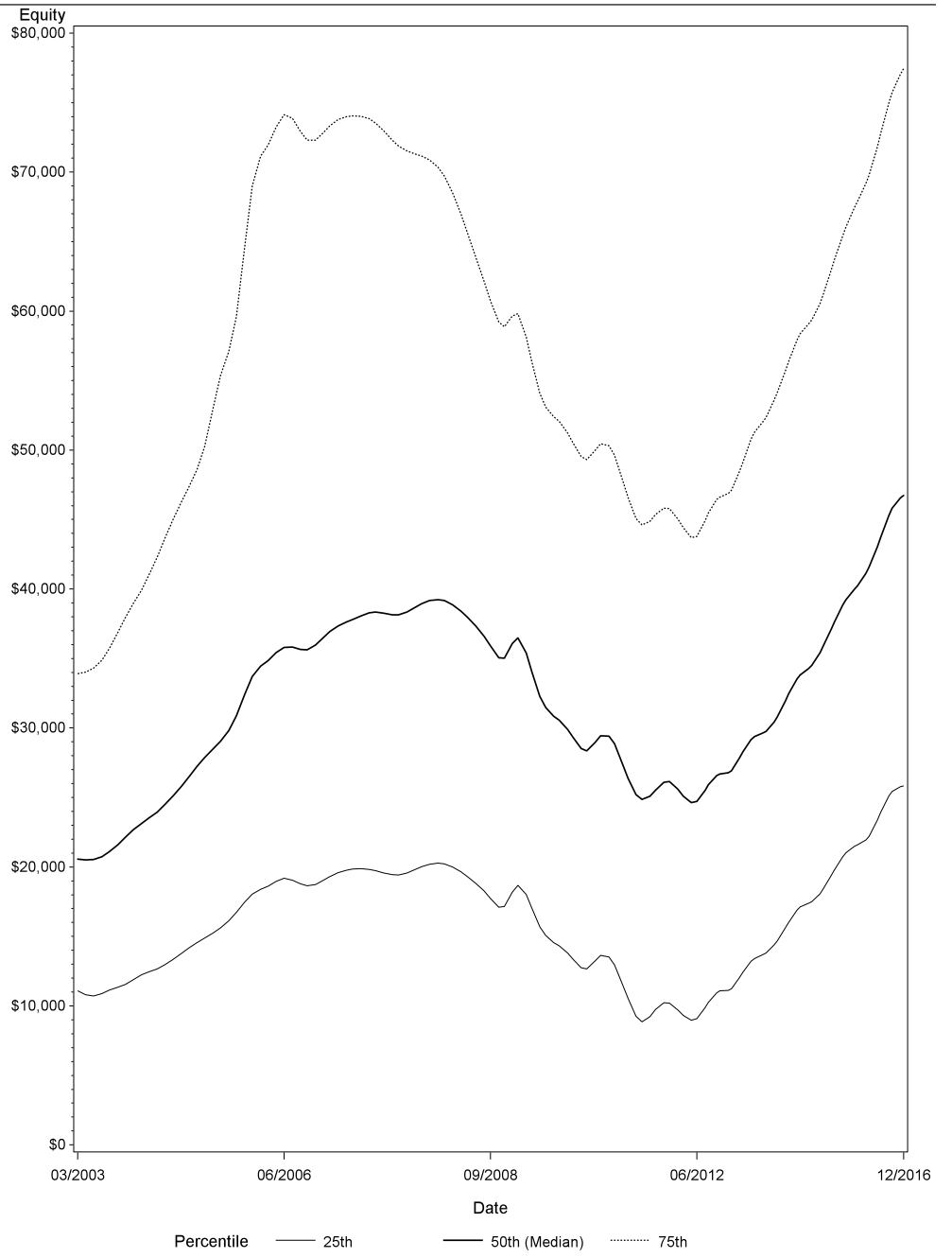
FHFA Purchase-Only House Price Index, 1991–2017



FHFA = Federal Housing Finance Agency.
Notes: Adjusted for inflation to 1991 values. Data as of the first quarter of 2017.
Sources: Bureau of Labor Statistics; FHFA

Exhibit 4

Home Equity Potentially Accumulated by CAP Participants, 2003–2016



CAP = Community Advantage Program.
Sources: CAP database; Federal Housing Finance Agency

Wealth Accumulation

As of the end of 2012, which was the most recent year in which comprehensive wealth accumulation and asset holdings information was collected from CAPS participants, the owners sample reported a median net worth of approximately $70,000. This wealth represents primarily the value of home equity and retirement accounts, with liquid assets and the value of vehicles making secondary contributions. As of the end of the survey period, home equity represented about 23 percent of total net worth for the CAPS owners sample as a whole, and retirement account balances represented about 40 percent; net liquid assets (that is, liquid assets less unsecured debt) contributed an additional 20 percent, followed by the net value of vehicles, at 7 percent. More than 70 percent of CAPS owners reported having retirement accounts during the study period. In contrast, the renters sample reported median net worth of approximately $11,000 in 2012, and about 40 percent reported having retirement accounts. In addition, when differences in 2005 wealth are considered in conjunction with tenure status during the period of the survey, the wealth gap between the two samples is particularly pronounced. For example, when those CAPS participants with less than $10,000 in net worth in 2005 are considered, CAPS owners who remained owners reached a median net worth of about $41,000 in 2012, whereas CAPS renters who remained renters accumulated less than $1,500 at the median (Freeman and Quercia, 2014). Thus, CAP homeowners accumulated considerably more wealth than similar renters during the study period and were more likely to hold investment assets other than home equity.

These differences in wealth across the owners and renters samples in CAPS reflect the fact that the user cost of owning compared with renting a comparable property was lower for most of the study period. The user cost for owners reflects not only mortgage principal payments, but also mortgage interest, taxes, insurance, maintenance expenses incurred, opportunity costs, and house price appreciation. The user cost for renters is the monthly rent. The primary driver of the user cost for owners is house price appreciation, and therefore market house price trends determine whether owning is preferred to renting during any given period of time. Thus, the observed pattern in the relative user costs of CAPS owners and renters samples reflects the high levels of house price appreciation toward the beginning of the study and the fact that the CAP mortgages carried very low downpayments; the latter feature of these mortgages tended to reduce the opportunity cost of owning and to increase the benefit from even small amounts of house price appreciation (Riley, Ru, and Feng, 2013). A second factor contributing to difference in wealth gains between CAPS owners and renters involves gains in equity markets, as those CAPS participants with retirement savings have experienced increases in net worth as a result of appreciation in nonhousing investments.

Implications for the Scalability of Special CRA Lending

Overall, the accumulated evidence from CAP suggests that many borrowers who take out special CRA loans can sustain mortgage payments and build home equity and that they will tend to accumulate more wealth than similar renters. In addition, it suggests that the default risks associated with special CRA mortgage lending can be managed. The key features of CAP that contributed to program viability were mechanisms for credit risk management and borrower credit enhancement, combined with a functional secondary market (Ding et al., 2011; Quercia, Freeman, and Ratcliffe, 2011).

First, CAP was made possible largely due to an underwriting grant from the Ford Foundation that was designed to bridge the gap between the projected default risks of CAP borrowers and those of more conventional prime borrowers. Self-Help also managed the elevated risks associated with CAP lending by adding a risk fee to the interest rate in lieu of mortgage insurance. Although CAP borrowers have demonstrated that they are of lower risk than similar borrowers who received subprime loans, they remain somewhat higher risk than prime borrowers who receive prime, conforming loans. Therefore, in order to serve the special CRA population, lenders must generally either cross-subsidize special CRA lending activities using profits from other business lines, increase their internal capital reserves, or receive external capital as a means of underwriting the increased risk associated with making special CRA loans.

Second, CAP was made possible through the collaboration of Fannie Mae, which agreed to purchase CAP loans from Self-Help and thereby create a secondary market for special CRA mortgages. This arrangement created greater liquidity in the special CRA lending space and permitted originating lenders to make many more CRA loans than would have been possible if they had kept these loans on their books. The ability of lenders to make special CRA loans on a rolling basis requires that they be able to sell the loans to external investors, such as the GSEs or buyers of mortgage-backed securities, from whom they can recover their initial capital. In addition, a centralized secondary market facilitates geographic risk pooling and the standardization of mortgage product offerings, which can reduce informational asymmetries for investors and the costs of lending to the target population.

These two pillars of program success suggest that any significant expansion of special CRA lending activities among depository institutions would likely require increased capital reserves, a mortgage insurance mechanism, and enhanced market liquidity in the special CRA product space. These implications are consistent with prior evidence from the broader literature suggesting that capital requirements for nonconforming loans made to lower-income borrowers may be substantial (Calem and LaCour-Little, 2004; Deng, Quigley, and Van Order, 1996), that lenders may be more willing to lend in lower-income neighborhoods when loans carry mortgage insurance (Ross and Tootell, 2004), and that lenders may increase loan supply in the presence of a secondary market (Ambrose and Thibodeau, 2004; Gabriel and Rosenthal, 2007).

Within the context of the current policy discussion concerning the uncertain future of the GSEs, one possible means of achieving these goals may be to leverage the existing integrated mortgage insurance and secondary market infrastructure provided by the FHA and Ginnie Mae. In practice, special CRA loan products and FHA-insured mortgages tend to serve a similar clientele and share many of the same loan features (LaCour-Little, 2007; Nothaft and Surette, 2001; Spader and Quercia, 2012). Thus, consolidating these lending activities has the potential to reduce administrative overhead by eliminating redundancy in program administration. It could also permit economies of scale, product standardization, and more accurate prediction of mortgage termination risks. This consolidation could be achieved by broadening the mortgage insurance function of the FHA to cover the special loan products that GSEs currently purchase to provide liquidity for special CRA loans and by transferring the secondary market function for these mortgages from the GSEs to Ginnie Mae.

Along these lines, note that FHA insurance activities expanded significantly in response to the subprime crisis (Immergluck, 2011); this expansion suggests that the integration of special CRA lending activities into the FHA insurance framework may be a natural extension of its historical function. Although FHA loans tend to be somewhat more expensive for borrowers than some special CRA loan products, they are arguably less expensive than many of the subprime loans that were issued during the early 2000s. Thus, if one is concerned about nonprice credit rationing or the existence of a dual mortgage market, in which the special CRA target population has access only to alternative and significantly more risky mortgage products, then the former type of loan product would seem to be preferable to the latter (Karikari, Voicu, and Fang, 2011).

Nevertheless, a key question for future research concerns the optimal scale of special CRA lending. With the exception of the Federal Reserve Board of Governors' 2000 survey of special CRA lending programs and the insights obtained from CAP, relatively little is known about the actual scale of special CRA lending at the national level, the features of such programs, how loan volume evolves in response to changes in economic conditions, or how much such activities can or should be expanded in practice. Moreover, the language of the CRA provides little quantitative or systematic guidance as to what level of lending in this space should ideally be achieved. A socially optimal level of special CRA lending would reflect and balance the tradeoffs inherent in lending to marginal borrowers, and identifying this social optimum should be a key priority for regulators before any large-scale expansion of special CRA lending activities. Further data collection concerning the demand for credit that exists among low- and moderate-income borrowers who would not qualify for conforming mortgages, the factors that influence their ability to manage credit, and the broader economic costs and benefits associated with lending to this population would facilitate this process.

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Commentary: Encouraging Housing Equity

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On the 40th anniversary of the Community Reinvestment Act (CRA)[1], it is worth thinking about how federal regulations have worked to address inequities in housing markets. The civil rights movement launched a period of activism and optimism for government intervention into housing discrimination, leading to the passage of The Fair Housing Act (FaHA)[2] of 1968 and the 1977 CRA. FaHA and CRA share some common traits; they are both federal regulatory tools that rely on a notion of minimum obligation and encourage innovations that promote greater access by lower-income and protected-class households to housing and economic opportunities. In addition, both statutes employ sanctions to motivate regulated entities toward nondiscriminatory behavior and help establish standards for what is considered responsible behavior in housing markets.

This article reviews the similarities and differences between one significant component of FaHA, the 2015 Affirmatively Furthering Fair Housing (AFFH) rules, and CRA. Substantial evidence suggests that CRA has had a positive impact on home lending practices (Apgar and Duda, 2003; Bhutta, 2008), despite the fact that it has often been laxly implemented over the years (Immergluck, 2004; Silver, 2016). It is too early to say definitively whether or not the 2015 AFFH regulations will generate such an impact. By examining AFFH alongside CRA, however, it is possible to identify a number of structural and design characteristics of the rules that may limit their effects.

Most critically, AFFH is limited by the fact that its primary potential sanction—the withholding of funding from the U.S. Department of Housing and Urban Development (HUD)—may not prove much of a consequence to the local governments against which it is most likely to be applied, a problem exacerbated by continual declines in HUD funding. It is unclear whether such a sanction would ever be exercised, and it is unclear whether the offending localities would be likely to care much if it was. Conversely, CRA's main sanctions—the possible delay or denial of a bank merger or acquisition and also the risk to a bank's reputation for being socially responsible—are significant, if underutilized, consequences that can be used to encourage compliance from most banks and savings institutions.

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.
[2] 42 U.S.C. § 3601–3619.

Background

The AFFH provision, originally part of FaHA, has often been viewed as a dead letter. Until the 2015 AFFH rule was produced, the provision was criticized for weak implementation and enforcement. In particular, the Analysis of Impediments (AI) process, which was supposed to identify barriers to fair and affordable housing in a jurisdiction, has been characterized as ineffective (GAO, 2010; National Commission on Fair Housing and Equal Opportunity, 2008). AIs frequently were issued with minimal critical oversight and effectively no community engagement. AIs were not required to be submitted to or reviewed by HUD, and compliance with the AI process was weak. GAO (2010) examined more than 400 AIs and found that 29 percent of entitlement communities' AIs were more than 5 years old. Many AIs did not include timeframes for implementation, and top officials did not sign off on others. More fundamentally, the sense that the AI process generated improvements in fair housing across the U.S. is scarce.

With the advent of the new AFFH rules in July 2015, the idea that local jurisdictions might take the AFFH provision more seriously holds some promise. However, the AFFH rules suffer from a variety of limitations, some of which are the creatures of the FaHA statute, the result of the structure and design of the regulations, or derived from fundamental issues of power relations between the regulator and the regulated party. Comparing the AFFH process with that of CRA serves to illustrate some of these limitations.

In a general sense, FaHA and CRA have some similarities. Arguably, both statutes have helped promote a more socially responsible business culture that has influenced housing markets in important ways. In the case of FaHA, most real estate agents understand what is considered acceptable or not acceptable under the law. The National Association of Realtors®—despite its historic opposition to FaHA and the 1988 improvements—regularly offers a wide variety of training and programs related to the law (Burke, 2016; NAR, 2016). Although some real estate agents may prefer that the law not exist, and some may overtly flout it, most have generally accepted the norms of fair housing that FaHA introduced and helped standardize. Fair housing is an area in which large segments of the private sector generally accept the law as good business practice.

CRA raised the consciousness of financial institutions, in terms of their responsibilities to serve the banking and credit needs of lower-income communities and households. Arguably, the change to CRA under the Financial Institutions Reform, Recovery, and Enforcement Act[3] of 1989—in which CRA exams and ratings were made public—was the most important policy driver of that change. Large banks, especially, are not only at risk of having a merger delayed or having their reputations damaged if they do not do well on their CRA exams, but they often strive for "outstanding" ratings to maintain their profile as socially responsible corporate citizens.

In addition, both types of law can be seen as *social contract* regulation, in which parties benefiting from federal government support (not necessarily direct financial aid) are held to a set of standards and are subject to evaluation under these standards. The AFFH rules specify the process by which recipients of federal housing and community development funding assess their own efforts at

[3] Pub. L. 101–73, 103 Stat. 183.

affirmatively furthering fair housing by completing an Assessment of Fair Housing (AFH; HUD, 2015). HUD is then required to review the AFH for completeness and for whether the recipient is making adequate steps to further fair housing. The AFH can be seen as very roughly equivalent to the CRA performance evaluation.

In the case of AFFH, the receipt of federal housing and community development monies is the benefit accruing to state and local governments that are subject to AFFH rules. In the case of CRA, banks and savings institutions benefit from deposit insurance and a host of other federal benefits—access to the Federal Reserve System, Fannie Mae, Freddie Mac, the Federal Housing Administration (FHA), and the Home Loan Banks; the support and credibility of the federal bank supervisory system; and, as evidenced since 2007, access to many potential emergency assistance programs. In fact, CRA historically was viewed as a specification of banks' responsibilities to serve the credit needs of their communities, with a particular focus on underserved neighborhoods and communities (Immergluck, 2004).[4]

Despite the similar goals of the AFFH and CRA regulations, they have fundamental differences, including whom is being regulated, the power of the sanctions to change behavior, and the data and metrics that are used to measure progress.

Differences in the Regulated Parties and Their Roles in the Assessment-and-Evaluation Process

The first key difference between the AFFH and CRA regulations relates to the regulated parties. CRA covers federally insured depository institutions, whereas the AFFH rules apply to state and local governments who are "entitlement communities" (that is, receive HUD funding) and public housing authorities (PHAs). The motivations, political power, and context of banks and savings institutions (most of which are small institutions) are quite different from those of local governments and PHAs, which influences the degree to which these regulations may induce positive actions. Although the financial industry holds a great deal of political power, the typical bank, especially if it is not large, tends to have limited ability to call on its congressional representatives to defend it if it receives a poor CRA rating. Federal banking regulators are also arguably more insulated from local political pressure than is a line agency like HUD. Moreover, a poor CRA rating may put the bank at odds with voters in the bank's service area, especially when local advocacy organizations are involved in critiquing the bank's practices, and further constrain its access to political power. Conversely, many local governments found to perform poorly under the AFFH rules might find their congressional representatives or political constituencies quite willing to take their side against HUD.

[4] In fact, since at least the early 2000s, community reinvestment advocates have called on federal policymakers to expand CRA to a much broader array of financial institutions, because most receive some form of significant federal support (Immergluck, 2004). Most nonbank mortgage companies, for example, utilize Fannie Mae, Freddie Mac, FHA, or a combination of the three for a significant share of their home lending. Many finance companies rely on large federally insured banks for their warehouse lines of credit, without which they could not make business or other types of loans. Investment banks, even if they are not affiliated with insured depositories, rely heavily on a federally regulatory infrastructure, without which they could not attract many investors.

The Value of the Sanctions to the Regulated Parties

A second, and closely related, difference between AFFH and CRA is the value of the potential sanctions. A weak CRA rating—a rating of "substantial noncompliance" (SNC) or "needs to improve" (NTI)—may imperil or delay current or future plans to merge with or acquire another bank, which could be costly. In contrast, an "outstanding" CRA rating can work as a sort of immunization from the risk of having a merger or acquisition delayed on CRA grounds. Even during times when banks are less likely to engage in mergers or acquisitions, a strong CRA rating serves as a signal to the bank's customers and investors that it is a socially responsible corporate citizen. Institutional investors, including pension funds, religious institutions, state and local governments, and large nonprofit organizations, may be less likely to do business with banks that do not maintain strong CRA ratings.[5] A bank receiving a rating of SNC or NTI is especially likely to suffer from significant reputational risk. The evidence suggests that, when faced with a poor CRA rating, most banks are motivated to improve that rating. Exhibit 1 shows that of the 357 banks receiving a SNC or NTI CRA rating since 2000, only 85 (less than 25 percent) received two or more such ratings in a row. This finding suggests that most banks are motivated to shed poor CRA grades.

In contrast, in the case of AFFH, the value of the potential sanction is likely to vary widely, based on the socioeconomic and political context of the entitlement community or PHA. In large central cities or suburbs that greatly value HUD funding (for example, the Community Development Block Grant and HOME programs), the risk of losing such funding will comprise a substantial sanction. In some other communities, however, especially ones that are not very reliant on HUD funding and where political leadership may not be greatly concerned with issues of affordable housing or community development, the value of the sanction is much less clear.[6] Some communities may not want to be sanctioned by HUD for fear of being labeled exclusionary, but in other contexts it is conceivable that some local political leaders may be rewarded politically by residents who are unwelcoming of housing or community development subsidies.

More fundamentally, the question remains of whether HUD will have the political will or ability to withdraw funds from localities, even on an infrequent basis. Two systematic attempts have been

Exhibit 1

NTI and SNC Ratings From CRA Performance Evaluations Published January 1, 2000—July 1, 2016

	Number of Banks	Number of Exams
CRA rating of NTI or SNC	357	539
Repeated CRA rating of NTI or SNC	85	161
Percent of CRA NTI or SNC ratings or banks that increase to satisfactory or outstanding rating by next exam	76.2	70.1

CRA = Community Reinvestment Act. NTI = needs to improve. SNC = substantial noncompliance.
Note: Author's calculations for all bank CRA ratings from January 1, 2000, through July 1, 2016.
Source: Federal Financial Institutions Examination Council Interagency CRA Ratings Database (http:// www.ffiec.gov/%5C/craratings/Rtg_spec.html)

[5] For example, several large cities have passed "responsible banking ordinances" in recent years, and many of these ordinances look to CRA ratings as a part of their evaluation of socially responsible banking (Holeywell, 2012).
[6] If the loss of a broader array of federal funding were brought to the table as a sanction—as in George Romney's Open Communities proposal—then AFFH would contain a much more powerful sanction, but that has not been proposed.

made to deny funding to localities on fair housing grounds, but both were met with substantial resistance. George Romney's Open Communities plan—in which federal funding would be withheld from exclusionary localities—was key to his eventual exit from the Nixon Administration (Hannah-Jones, 2015). In 1998, HUD Secretary Andrew Cuomo briefly suggested denying HUD funding to communities that did not comply with AFFH, but he met swift resistance from the local government lobby (Hannah-Jones, 2015). In general, HUD has never consistently held back funding based on fair housing grounds in any systematic way.

Specificity of Quantitative Indicators and Comparability Across Assessments

The third difference between CRA and AFFH is in their approaches to data collection and performance metrics. Federal regulators evaluate banks every 2 to 5 years on their CRA performance. Regulations and procedures governing CRA performance evaluations ("exams") specify the sorts of measures that bank examiners should use in conducting an exam. An examiner develops an analysis of the "performance context" of the bank being evaluated, which situates the bank's CRA activities within the local area's economic conditions and needs. Using the performance context, examiners have significant discretion in what a particular exam might emphasize or precisely what indicators or ratios it might display.

Despite the flexibility to take into account local conditions, the regulations and associated guidelines specify a good deal of common approaches to evaluating key data on lending patterns. For example, examiners are generally instructed to calculate an "institution's share of reported loans made in low- and moderate-income geographies versus its share of reported loans made in middle- and upper-income geographies within the assessment area(s)" (OCC, FRB, and FDIC, 2014: p. 7). Exhibit 2 is an excerpt of a table from a "large bank" CRA exam conducted by the Office of the Comptroller of the Currency (OCC) in 2014. It examines the geographic distribution of home purchase loans across census tracts of different income levels. The table examines the bank's home lending in the Greenville, South Carolina metropolitan area, where the bank is based.

Exhibit 2 shows that the bank made 0.81 percent of all home purchase loans in upper-income census tracts but only 0.48 percent of all loans in moderate-income census tracts and 0 percent in low-income census tracts. Thus, the bank's market share in higher-income neighborhoods was much larger than its market share in lower-income neighborhoods. The ratio of the market share in

Exhibit 2

Excerpt From a Table in a Large Bank CRA Performance Evaluation, 2014

Table 2. Geographic Distribution of Home Purchase Loans

Geographic Distribution: Home Purchase | Geography: South Carolina | **Evaluation Period**: January 1, 2012 To December 31, 2013

Assessment Area:	Total Home Purchase Loans		Low-Income Geographies		Moderate-Income Geographies		Middle-Income Geographies		Upper-Income Geographies		Market Share (%) by Geography*				
	#	% of Total**	% Owner Occ Units***	% BANK Loans****	% Owner Occ Units***	% BANK Loans	% Owner Occ Units***	% BANK Loans	% Owner Occ Units***	% BANK Loans	Overall	Low	Mod	Mid	Upp
Full Review:															
Greenville	324	79.22	3.37	0.62	14.95	7.41	47.78	36.11	33.91	55.86	0.72	0.00	0.48	0.69	0.81
Limited Review:															
Anderson	27	6.60	2.08	0.00	19.37	0.00	47.91	66.67	30.64	33.33	0.19	0.00	0.00	0.34	0.10
Spartanburg	58	14.18	1.73	0.00	17.16	12.07	53.25	55.17	27.86	32.76	0.18	0.00	0.00	0.27	0.08

CRA = Community Reinvestment Act.
Source: Reproduced from OCC (2014)

higher-income neighborhoods to the market share in lower-income neighborhoods is not necessarily the dominant criterion on which a bank's CRA lending is judged, but it is one commonly used indicator. More importantly, these sorts of measures are specified in the regulations and operating procedures of the regulatory agencies.

In the case of the AFFH process, the local governments complete the AFH document. The guidebook for preparing an AFH is on the order of 200 pages long (HUD, 2015). The guidebook does instruct localities to conduct certain common measurements, such as the level of segregation within the metropolitan area. In terms of measuring local government activities and determining how well they further fair housing, however, the guidebook is quite vague; it provides a variety of data and a mapping tool but very little guidance on what measures should be constructed with such data. In this aspect, the AFH involves more discretion on the part of the authors than does a CRA exam. Moreover, because AFHs are performed by the localities and not by trained examiners, the variability in indicators and methods across AFHs is likely to be much greater than the variability across CRA exams. The ability to generate AFHs that are consistent across 4,600 entitlement communities and PHAs could be a major challenge, one that might severely tax HUD staff.

CRA exams also focus on outcomes that are largely (although not completely) under a bank's control. That is, whereas lending to lower-income neighborhoods may be limited by the demand for homeownership in such neighborhoods (although demand is partly a function of mortgage availability), the CRA examiner compares the bank with its peers (or the "aggregate" market), through the market share comparison described previously and by comparing a bank's lending with various proxies for potential demand (for example, the number of owner-occupied homes in lower-income and higher-income census tracts).

In the case of AFFH, localities are being assessed for their actions across a much wider range of governmental activities—including funding decisions and local regulations—that may affect fair housing outcomes. The rules also call for them to be assessed for whether levels of segregation within their communities have improved or worsened. Arguably, some localities—especially ones with predominantly minority or lower-income populations—have limited influence over these broader governmental activities or the ultimate outcomes. Perhaps understandably, the rules are vague on the extent to which localities should focus more on end outcomes or on intermediate objectives such as distributing housing subsidies in a desegregated fashion.

The Staffing and Resources of HUD Compared With Bank Regulators

Finally, CRA and AFFH differ in terms of evaluative capacity and the scale of review that is required. Approximately 6,000 commercial banks and savings institutions are regulated for CRA. Most banks fall under the "small bank" CRA evaluation process, which is much less detailed and extensive than the "large bank" CRA exam. Some CRA exams—especially of banks that serve multiple states—can run into the hundreds, in terms of page count. Moreover, a bank is evaluated for CRA by one of three federal bank regulators—the OCC, the Federal Reserve, or the Federal Deposit Insurance Corporation—none of which has a budget subject to annual congressional appropriations. These regulatory agencies devote hundreds of high-level staff to the CRA evaluation process.

Although HUD does not need to conduct AFHs in the same way that regulators evaluate banks under CRA, with more than 4,600 entitlement communities and PHAs, HUD may need to review 900 or more AFHs per year.[7] HUD has 60 days to notify a locality whether it is or is not accepting the AFH. The two classes of reasons for not accepting the AFH are (1) that it is inconsistent with fair housing or civil rights requirements, or (2) that it is substantially incomplete. Obviously, these two grounds for rejection of an AFH leave a great deal of uncertainty. One might expect that the second class of reasons for not accepting an AFH would be the most common, at least in the first 5 years of the new rule, so the interpretation of "substantially incomplete" is likely to be a critical one. It may also be possible that some AFHs will go through more than two iterations before being deemed acceptable. These issues suggest that the administrative and staffing challenges for HUD will be substantial, especially because HUD is subject to congressional appropriations and its available resources to review and direct thousands of AFHs will likely pale in comparison to resources commanded by the bank regulators.

Conclusion

The differences between CRA and AFFH regulations reveal some key limitations in the AFFH regulatory structure. Although the new AFFH rules and data tool may prove to be an improvement over the previous AI process, they suffer from a number of key challenges, some of which are evidenced in comparing the AFFH rules with the CRA regulatory process. These include issues involving intergovernmental regulation and related power structures, the lack of consistency and specificity of the quantitative measures in the AFH, the unclear focus of the assessment measures, and the staffing and resource challenges that lie ahead for HUD.

The most important flaw in the AFFH structure, however, is the likelihood that some localities—especially those most likely to merit critical action under the AFFH process—may also be those least worried about any loss of HUD funding. Therefore, the AFFH regulations may have limited power to break down barriers to fair housing in the very places where those barriers are the highest.

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[7] Joint or regional AFHs are possible, which may reduce the number of AFHs that HUD needs to review, but such AFHs may also be more complex.

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Community Reinvestment Act and Local Governance Contexts: Advancing the Future of Community Reinvestment?

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Abstract

One main goal of the Community Reinvestment Act (CRA) of 1977 is to stimulate reinvestment by increasing CRA-regulated lending activity in low-income and minority communities. CRA has been applauded for democratizing credit (Barr, 2005) however, its regulatory shortcomings, namely the need to strengthen and expand federal enforcement, have also been acknowledged (Fishbein, 1992; Immergluck, 2004). The design of CRA actively encourages community-based groups and coalitions to participate in regulation and oversight. In many cities across the country, organized nonprofit networks and community-based groups have played pivotal roles in making the goals of community reinvestment a reality. Community mobilization can be a positive externality, as it allows for the public and the local community to provide input and participate in CRA governance. However, reliance on mobilization at the local level can also produce negative externalities, particularly in places that lack the capacity to mobilize around CRA or as this capacity changes over time.

This article suggests that a changed governance context at the local level may be associated with the achievement of community reinvestment goals. We conducted a longitudinal analysis (from 2007 to 2014) of the case of St. Louis, Missouri, a city that experienced a change in community governance around CRA in 2009. Historically, St. Louis could be characterized as a city in which CRA mobilization was lacking; however, in 2009, a reinvestment coalition formed and took actions such as negotiating agreements with

Abstract (continued)

lenders, providing public comments to regulators, and building partnerships and relationships with lenders. The results of the analysis suggest that community mobilization around CRA is associated with some positive outcomes—such as increases in the likelihood of loan approvals in the post-CRA governance context and by lenders with CRA agreements. However, we also find that the post-CRA governance context is associated with differential effects in terms of which racial and ethnic groups benefit from the CRA agreements. Community mobilization around CRA appears to be associated with a stimulation of community reinvestment activity and may be a positive part of CRA design; however, alone, it may not be enough to achieve the broader ideals of community reinvestment. We conclude with a discussion of future policy implications.

Introduction

The Community Reinvestment Act[1] (CRA) of 1977 is designed to stimulate reinvestment by increasing lending and investment activity in low-income and minority communities. Previous studies have recognized CRA as democratizing credit (Barr, 2005), but others have acknowledged its regulatory shortcomings (Fishbein, 1992; Immergluck, 2004). Organized community-based groups have been identified as a driving force behind CRA regulation, and in this article we provide empirical evidence that mobilization around CRA continues to be a critical factor in community reinvestment. We utilize a quantitative case study research design to analyze how lender and applicant behavior changes when community mobilization around CRA is present. We find that community mobilization around CRA changes the behavior of lenders and applicants; however, these changes are not confined to areas or lenders covered by a CRA agreement. Rather, these changes expand to minority applicants throughout the city. We also find differential effects in terms of which racial and ethnic groups benefit from CRA mobilization. Mobilization around CRA appears to stimulate community reinvestment activity; however, not all applicants benefit equally. We conclude that mobilization around CRA can stimulate reinvestment activity and can be a positive part of CRA design; however, alone it may not be enough to achieve the broader ideals of community reinvestment.

Our analysis is framed from a governance perspective, which assumes that formal governmental agencies rarely administer policies in a neutral state (Salamon and Elliott, 2002). Rather, policies and resulting outcomes are embedded in dynamic social and political contexts at the local level. As such, we argue that recommendations on regulation or the design of public policies must take into consideration the broader, institutional context in which policies and regulations are enacted, the different institutional arrangements through which policy objectives are pursued, and the influence of the actors included in governance.

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.

It can be argued that the response at the local level is the result of a lack of regulatory enforcement or attributable to the vague nature of the CRA, which provides lenders with many ways to meet regulatory requirements. The purpose of this article is not to debate what has prompted organizing around CRA, but rather to understand the effects of regulation from outside, or from below, influence community reinvestment outcomes. We analyze a case in which CRA governance has recently changed—a city that was once nearly devoid of mobilization around CRA but has recently formed a coalition to address reinvestment needs throughout the city. This change allows us to better understand how governance structures, particularly those that include local community-based organizations, around CRA can influence reinvestment.

We consider two community reinvestment outcomes in our analysis: loan approvals and the type of lender to whom applicants apply. The first outcome represents a direct source of reinvestment, the provision of access to credit to borrowers or areas that have historically been the targets of redlining. The second outcome is critical to understanding the role of CRA mobilization in the new financial institution landscape. Federal bank regulation policy has created a financial marketplace no longer dominated by conventional or traditional savings institutions, but that now includes mortgage brokers and financial service providers that are not subject to CRA regulation (Temkin, Johnson, and Levy, 2002), many of which specialize in offering subprime credit. Research suggests that lenders not regulated by CRA originate a higher percentage of loans and higher percentage of subprime loans in minority communities (Courchane, Surette, and Zorn, 2004; HUD, 2000). Thus, as the financial institution landscape has changed, it has produced new ways in which communities are redlined. Areas once starved for access to credit are now flush with a supply of higher-priced, riskier loan opportunities. However, mobilization around CRA may, in effect, discourage applicants from pursuing credit from alternative or non-CRA-regulated lenders. Increased loan approvals and increases in applicants applying for loans from CRA-regulated lenders are considered indicators of increased community reinvestment activity.

The primary research question we ask is, does a change in the governance around CRA—namely, increased community-based mobilization—improve community reinvestment outcomes along these two dimensions? We find that the presence of agreements is associated with an increase in loan approvals. However, we also find that the benefits are not necessarily limited to a spatial, geographic level but may occur at a broader level. Furthermore, not all races and ethnicities may benefit equally. Although regulation from below provides a number of positive externalities, CRA's current design also leads to a number of negative externalities that must be addressed to enhance the functioning of the law across all assessment areas to ensure equal opportunity to access to banks for all.

Formal and Informal Regulation Under the Community Reinvestment Act

CRA is intended to encourage depository institutions to help meet the credit needs of the communities in which they operate. It was enacted in response to concerns over *redlining* practices, which can be defined as banks penalizing or refusing to lend to borrowers based on the characteristics of the community to which they belong. Redlining not only has consequences for individuals, but it

also has place-based, spatial consequences. It can trigger a cycle of spatial disinvestment as access to credit within a geographic boundary becomes difficult or impossible for individual homeowners and businesses to obtain (Immergluck, 2004; Squires, 2003, 1992). The current design of CRA addresses this spatial component by requiring lenders to define a geographical assessment area, commonly referred to as a *CRA assessment area*. CRA assessment areas generally refer to the geographies in which a bank has its main office, its branches, and its deposit-taking automated teller machines, or ATMs.[2]

Formal regulation under CRA is divided among three federal agencies responsible for regulatory oversight in the financial industry—the Federal Reserve Board (FRB), the Federal Deposit Insurance Corporation (FDIC), and the Officer of the Comptroller of Currency (OCC). Originally, four agencies handled regulatory oversight; however, effective July 21, 2011, the Office of Thrift Supervision merged with OCC. In addition, in 2008, the Consumer Financial Protection Bureau (CFPB) was formed (CFPB, 2017). The CFPB has power to enforce existing laws against discrimination in consumer finance and was formed with the intent to provide a single point of accountability for enforcing federal consumer financial laws. The CFPB has taken action around CRA. For example, in 2015, the CFPB joined with the Department of Justice (DOJ) to take action against a bank headquartered in New Jersey alleged to have engaged in illegal redlining based on the manner by which the bank delineated its CRA assessment area (Davenport and Epstein, 2015).

Formal agencies responsible for CRA oversight have interpreted CRA as holding lenders accountable in four areas: lending, investment, community development, and service. Regulators review the performance of the lender based on an established exam schedule and can impose costs on lenders when their performance is deemed to be suboptimal. The regulatory agency considers a bank's CRA rating when the bank applies to open or close a domestic branch, seeks to merge with another lending institution, consolidates, acquires assets, or assumes liabilities. If a bank has a less-than-satisfactory CRA rating, a regulator could deny or delay a merger application, an acquisition request, or the opening of a new branch. In general, satisfactory ratings for CRA are high.

However, the other side to CRA regulation, which can be argued to be the more powerful source of CRA enforcement, has expanded the nature of governance around community reinvestment. Regulation—and, arguably, progress—under CRA cannot solely be attributed to formal regulatory channels, but must recognize the important role that local community-based groups and nonprofit organizations have played in its enforcement. In many cities across the country, strong nonprofit networks and community-based groups have played a pivotal role in achieving the goals of community reinvestment. This involvement can be a positive externality, as it allows for local knowledge and the local community to inform lenders' behavior. In some cases, such as in Cleveland, Ohio, local governments have also stepped in to enhance CRA regulation. Under CRA regulation, community-based groups and other public entities are encouraged to challenge or inform the behavior of lenders under CRA—efforts that may lead to a negotiated agreement.

In a number of cities across the country, community-based and local groups have used CRA as a lever to negotiate agreements with lenders for programs or policies intended to increase access to minority borrowers and to pressure regulatory agencies to review the lenders' activity in certain

[2] 12 C.F.R. §228.41(a).

communities (Immergluck, 2004; JCHS, 2002; Squires, 2003, 1992; Williams and Nesiba, 1997). Over time, the scale of CRA negotiations has changed, moving away from smaller neighborhood efforts and protests to larger collaborative efforts among multiple groups (JCHS, 2002). In a number of cases, actors include active organizing and advocacy groups, development corporations, and support groups to coordinate community-based efforts and often forge a larger coalition (JCHS, 2002; Squires, 2003, 1992; Taylor and Silver, 2003). Agreements have also expanded in some cases to cover a larger geographic area, beyond a lender's CRA assessment area, or to provide provisions for targeted groups and populations of borrowers.

The Community Reinvestment Act Governance Context and Community Reinvestment

Understanding the relationship between community investment outcomes and the local CRA governance context is important for several reasons. Applying a governance perspective to understand reinvestment outcomes raises questions about the relationship between the local capacity to mobilize and its influence on those regulated. Pluralistic theories suggest that public policy outcomes are realized largely through the political process, whereby interests inform policy preferences, these interests are representative of the racial and ethnic makeup of the residents in a community, public officials enact policy in response to these interests, and responsible agencies neutrally administer policies through the use of rules and standard operating procedures that create the desired conditions (Dahl, 1961). Conversely, a governance perspective recognizes the potential for policies at the federal level to be shaped or characterized by local interests and the values espoused by these interests, and, in turn, the involvement of these interests may shape not only policy preferences and implementation, but also outcomes and behaviors of targeted groups (Salamon and Elliott, 2002; Schneider and Ingram, 1997). As such, governance perspectives suggest that different reinvestment outcomes and levels of community reinvestment activity might emerge in an environment governed by different interests and perspectives. Furthermore, as the governance context changes, so too might reinvestment outcomes and community reinvestment activity. As it applies to CRA, in cities where mobilization around CRA is greater, the governance context might result in increased community reinvestment activity.

Previous support exists for this argument; however, it does not allow for a before-and-after assessment. Casey, Glasberg, and Beeman (2011) found that minority applicants living in an area with a history of organizing around CRA were more likely to seek mortgage credit from CRA-regulated lenders than non-CRA-regulated lenders. The analysis focused on two cities, Cleveland and St. Louis, Missouri, which were identified as similar along a number of economic, demographic, and socioeconomic dimensions. The authors tested whether disadvantaged applicants have a greater likelihood of pursuing access to credit from traditional lending institutions in a context where local capacity around CRA exists. The empirical results suggested that access to credit from CRA-regulated lenders was more likely in a place with local capacity around CRA.

The aforementioned study is limited in that it relies on a cross-sectional analysis of governance contexts and is unable to capture the before and after effects of mobilization around CRA. In 2009, the CRA governance context in St. Louis changed, creating the opportunity to conduct a

longitudinal analysis of the effects of a changed governance context on community reinvestment. The St. Louis Equal Housing and Community Reinvestment Alliance (SLEHCRA) formed in 2009 with a focus on building local capacity around CRA. The coalition effort was led by the Metropolitan St. Louis Equal Housing Opportunity Council (EHOC), with a primary objective to hold lenders more accountable to CRA. Since SLEHCRA's launch in 2009, the coalition has negotiated 46 contracts with lenders, the first of which went into effect by 2010. This change in the governance context around CRA provides the opportunity to analyze the effect of CRA on community reinvestment in St. Louis.

The Community Reinvestment Act Governance Context in St. Louis

Mobilization around CRA in St. Louis was virtually nonexistent between the 1990s and SLEHCRA's formation in 2009. Justine Petersen, who began advocating for banks to increase lending to low- and moderate-income communities, largely spearheaded some CRA mobilization in the 1980s and 1990s. She successfully negotiated the first CRA agreements in St. Louis, and as Sherraden (1996: 7B) said —

> … was one of the nation's path breaking organizers in community reinvestment. Working for ACORN [the Association of Community Organizations for Reform Now] in the 1980s and early 1990s, she negotiated hundreds of millions of dollars in lending packages for low-income and minority home ownership in St. Louis. She believed that the large banks, which had abandoned the poorest neighborhoods, could learn to serve these areas and also make a profit in doing so.

One of the major community development corporations (CDCs) in St. Louis bears Petersen's name today.

However, between the late 1990s and 2009, no other CRA organizing efforts were in place (Casey, 2009). SLEHCRA was formed in response to the same concerns expressed by Peterson in the 1980s, that many low-income and minority communities in St. Louis did not have equal access to mainstream financial services and that redlining was still a major issue in the area. Community disinvestment remains a problem in St. Louis 40 years after the enactment of CRA. EHOC took the lead on building and developing the coalition. EHOC, a nonprofit fair housing organization, focuses on enforcing fair housing laws and the obligation to affirmatively further fair housing among financial institutions, as required by the federal Fair Housing Act.[3] EHOC spearheaded the formation of SLEHCRA and identified its mission as a new coalition to hold banks accountable for CRA and fair lending performance. The mission of EHOC integrates the principles of CRA and fair lending laws—to promote investment in low- and moderate-income communities, regardless of race, and in minority communities, regardless of income (SLEHCRA, 2012).

SLEHCRA has grown since its inception and includes over 25 organizations as of 2017 (SLEHCRA, 2017). SLEHCRA is a broad-based coalition, with members representing diverse

[3] 7 C.F.R. §1901.203.

interests, missions, and purposes, who work on community development issues at various scales; that is, from within the city of St. Louis only across county boundaries and throughout the state of Missouri. Members include organizations that are focused on policy advocacy and civil rights, such as the Coalition of Concerned Citizens and Ready, Aim, Advocate! Committee. Members also include CDCs and housing service providers. The coalition also includes members representing the interests of racial and ethnic groups, such as the NAACP St. Louis City and the Latinos Ex Axion. Coalition membership also includes interests representing business and the workforce.

SLEHCRA has focused on engaging all banks active in the St. Louis area on matters relating to CRA and the Fair Housing Act. SLEHCRA adds to formal regulation and oversight of CRA in a number of ways. SLEHCRA conducts analysis of banks' CRA activities, writes public comment letters to be considered by federal regulators in CRA evaluations and applications, and engages in dialogues and partnerships with banks about their performance in providing services to all communities. Since 2009, SLEHCRA has conducted more than 80 reviews of bank performance and has written more than 60 public comment letters, including the first public comment letter ever to be received by the St. Louis field office of OCC (SLEHCRA, 2015, 2012).

SLEHCRA (2015) identified a correlation between its work and enhanced regulation of CRA. For example, two banks received "Needs to Improve" CRA ratings, the first below-satisfactory CRA rating for an institution based in St. Louis since 1994. SLEHCRA's work has also led to increased scrutiny of lending institutions by the DOJ and the U.S. Department of Housing and Urban Development (HUD). SLEHCRA attributes these investigations and fair lending cases as originating from the efforts of their work.

SLEHCRA's work also expands beyond mere regulation and enforcement from below; it also aims to educate and inform borrowers and lenders about CRA lending opportunities. SLEHCRA also builds partnerships with other organizations to address issues borrowers in the community face, such as lack of financial education or awareness about banking products. Examples of these organizations include the Greater St. Louis Financial Education Collaborative and the St. Louis Regional Unbanked Taskforce. Likewise, SLEHCRA also works to educate lenders on the needs of the communities and valuable opportunities for CRA investments. An example of this outreach is the formation of the St. Louis Metropolitan CRA Association in 2012, which provides professional development and collaborative activities for CRA officers at banks or those engaged in relevant work (SLEHCRA, 2015).

As mentioned previously, SLEHCRA has negotiated 46 CRA agreements with banks serving potential borrowers in communities throughout the city of St. Louis. The CRA agreements often target the activities to low-income or minority census tracts throughout the city. The agreements are relatively standard and include provisions aimed at the following.

- Increasing lenders' commitment to providing support for community development activities.
- New bank branch openings.
- The development of new banking products, including new deposit products like second-chance checking accounts, new affordable mortgage products, and products such as small-dollar loans and credit-building products.

- Financial education resources and partnerships.
- Increased outreach to low-income communities and predominately minority communities, including increased marketing and advertising to African-American and Hispanic communities.
- Increased diversity and community development within bank staff and directors, including new positions created for CRA and community development, increased diversity among bank employees, and banks adding members to their board of directors.
- Increased partnerships with nonprofit and community organizations to provide financial support and investments, financial education resources, and partnership programs.

Anticipated Outcomes of a Changed Community Reinvestment Act Governance Context

The emergence of SLEHCRA provides the opportunity to evaluate the impact of this governance change on community reinvestment activity in St. Louis. How did this change in governance around CRA influence community reinvestment in the city of St. Louis? Has community reinvestment activity increased? If so, at what geographic level does this change occur and who benefits?

We anticipate the change in CRA governance to have a positive relationship with increased community reinvestment activity in St. Louis. As mentioned previously, we define increased community reinvestment activity in two ways: an increase in the likelihood of loan approvals and a decrease in the likelihood that applicants pursue credit from alternative or non-CRA-regulated lenders. Key subquestions include the following: do only lenders in negotiated agreements drive community reinvestment activity in the post-CRA governance context? Does community reinvestment activity occur only in the tracts covered by the agreements, or does a post-CRA governance effect stimulate community reinvestment activity that cuts across tracts and lenders? We utilize interaction terms to determine if these effects are equal across all races and ethnicities. The logic that informs the different expectations is discussed in the following sections.

The Changed CRA Context: Lenders With Negotiated Lending Agreements

The changed CRA governance context now includes lenders that have agreed to a negotiated CRA agreement with SLEHCRA. The most direct outcome from the post-CRA governance context is the negotiation of a lending agreement between the coalition members and targeted lenders in the city of St. Louis. We test the relationship between lenders with a CRA agreement and loan approvals. We test this relationship because a loan approval is one way a lender can fulfill its CRA obligation, increasing community reinvestment activity by increasing lenders' investments to fulfill the terms of the agreement. We anticipate that lenders with a CRA agreement will be more likely to approve loan applications in order to satisfy their CRA agreement requirements.

The Changed CRA Context: Tracts Covered by Negotiated Lending Agreements

The changed CRA governance context in the case of St. Louis also results in an increase in the number of census tracts covered by negotiated lending agreements. Our expectations related to the

relationship between the coverage of the CRA agreements and community reinvestment activity is informed by signaling theory and information externalities, which suggest the presence of effects of CRA agreements that extend beyond the lender involved in the agreement. Signaling theory addresses information asymmetries between two parties, whereby the sources of asymmetric information are mainly concerned with information about quality or intent (Stiglitz, 2000). The changed governance context may exert a signaling effect to other CRA-covered institutions and to applicants.

Two primary signaling effects are of interest in this analysis—those that influence the behavior of lenders and those that influence the behavior of applicants. First, the post-CRA governance context can improve the information lenders have about applicant characteristics and how regulators are going to evaluate their CRA performance. The mechanisms behind the signaling and lenders' responses to it are not of primary concern in this analysis, but rather the intent is to understand if any CRA governance effects extend beyond the parties and geographic areas subject to the agreement. We anticipate that some will, and that this signaling effect will exert an influence on the lender's behavior, resulting in increased loan approvals in tracts covered by the agreement.

Secondly, the post-CRA governance context can have a signaling effect on the behavior of applicants. It can also result in improved information for applicants as lenders engage in outreach or other activities to market to applicants or as the coalition and its partners improve the information flow to applicants about CRA and CRA-regulated institutions. We anticipate that this signaling effect can reduce the likelihood that applicants pursue credit from non-CRA-regulated lenders.

The Post-CRA Governance Context

Finally, we also aim to understand the geographic reach of a post-CRA governance context. Su et al. (2014) found that the strength of a signal, for example, the presence or absence of a coalition, may change for different institutional environments. In a context with an active coalition, we anticipate that the effects of the signal may not be limited only to the lenders or the geographic areas covered by the agreement but that it may be strong enough to change the overall lending environment. We anticipate that the post-CRA governance context may represent a changed institutional context that exerts a signaling effect that extends beyond the individual lenders involved in agreements or the geographic areas covered by CRA agreements. Rather, community reinvestment activity may reach across the city. The local coalition is involved in efforts beyond the negotiation of CRA agreements, such as providing public input on lenders' performance and informing regulators about the behavior of lenders in the area. Thus, it is plausible that this increased scrutiny has changed the response and behavior of lenders and that they have enhanced their efforts to meet the objectives of CRA. Likewise, CRA agreements can enhance information in a given context that improves the loan outcomes for applicants throughout the city.

SLEHCRA has also been engaged in educating potential borrowers about CRA, CRA lending products, and financial education. This community engagement can improve the information potential borrowers have about the opportunities available through CRA-regulated lenders, leading to a reduced likelihood of applying to non-CRA-regulated lenders.

Finally, although CRA does not have a specific race or ethnicity requirement, we anticipate that the composition of this particular coalition—and the socioeconomic and demographic characteristics

of St. Louis—will exert an effect, and hence agreements and outcomes will also be targeted toward minority borrowers. The historical correlation among race, ethnicity, income, and redlining in the city of St. Louis is strong (Gordon, 2008), so we anticipate that lending goals are also targeted toward minorities. Furthermore, as the *New York Times* reported in 2016, citing a National Community Reinvestment Coalition study, "only 3 percent of loans to low- and moderate-income borrowers were made in St. Louis neighborhoods where minorities made up 80 to 100 percent of the population" (Eavis, 2016: B3). Finally, the coalition, as mentioned previously, is led by EHOC, which has as its mission equal and fair housing and reducing discriminatory barriers.

Methods

We use Home Mortgage Disclosure Act (HMDA)[4] data, census data, and qualitatively coded data from CRA agreements for the analysis. We use the HMDA database to obtain data on loan applications in the city of St. Louis from 2007 to 2014, as it is the most comprehensive public database of mortgage loans and lenders. Loans are restricted to conventional loans, one- to four-family property types, home purchase loan types, and owner-occupied as a principal dwelling. We collect supplementary borrower data from the census 2000 Summary File 3 and the census 2010 Summary File 1, available via the U.S. Census Bureau. We use the census data from 2000 and 2010, as opposed to other data sources such as the American Community Survey, to align with the data used in the HMDA database. HMDA uses 2000 Census definitions through 2011 and does not apply the updated definitions (2010) until 2012. Census data are used to control for characteristics of the census tracts that could impact the analysis. The controls include the percentage of college education in a tract, African-American percentage in the tract, and number of housing units.

SLEHCRA provided copies of all CRA agreements negotiated since 2010. All the contracts provide the terms of the agreement, the targeted geographic location, the target demographic hoped to be reached, and the years of coverage. Although most contracts targeted lower-income borrowers, some specified all minorities and others predominantly targeted African-American borrowers, as we anticipated, given the coalition's focus on fair housing and lending and given the historic correlation in the city of St. Louis among race, ethnicity, and income (Gordon, 2008). Other provisions in the contracts include increasing promotion and lending education in minority areas and increasing the level of minority employee representation.

Dependent Variables

Two dependent variables are considered in the analysis: loan approval and type of lender. Loan approval is a binary variable that equals 1 if a loan is originated or is approved by the lender but not accepted. Loan denials are those applications that are denied by the financial institution and are coded with a 0.

Type of lender is a categorical variable that indicates if the loan application was made to a CRA-regulated lender, a credit union, or a non-CRA-regulated lender. A 1 indicates a loan application made to a CRA-regulated lender, defined as a lender subject to regulatory oversight by FRB, FDIC,

[4] Pub. L. 94–200, 89 Stat. 1124.

or OCC. A 2 indicates a credit union lender that is governed by the National Credit Union. A 3 indicates a lender that is not regulated as a depository institution, is not subject to CRA, and is governed by HUD.

Independent Variables

Three independent variables of interest are in the analysis, which are hereafter referred to as a group as "CRA variables." The first is the binary variable "lender with a CRA agreement," which represents a loan application made to a lender with a negotiated CRA agreement. A loan application to a lender with a CRA agreement is coded with a 1. All other loan applications are coded with a 0.

The second independent variable of interest is "CRA Agreement," which indicates if the loan application is for a home in a tract covered by a CRA agreement. A value of 1 is assigned to census tracts covered by a CRA agreement during a given year. Census tracts covered by CRA agreements in this study are those that were *majority-minority* or *low-income*, as specified in the original CRA agreement. *Majority-minority* is determined by the presence of 50 percent minority population (FFIEC, 2015). *Low-income* is defined as less than 50 percent of the Area Median Income (Brison, 2016). The definitions of low-income and minority are specified in many of the agreements, and for those not specified we applied the same definitions.

The third independent variable of interest is "post-CRA," which indicates a loan application made after the change in CRA governance occurred. The pre-CRA governance period included the 2007-to-2010 period. The post-CRA period was from 2011 to 2014. All loan applications made from 2011 to 2014 are coded with a "1" to represent those loans made after the first CRA agreement was enacted.

Data Analysis

We used logistic and multinomial regression the analysis; we estimated several specifications of each model for robustness purposes. We used interaction terms to understand how the relationship between minority borrower status and loan approvals and type of lender changes (1) when CRA agreements cover the tract in which the loan is made, (2) when applicants apply to a lender with a CRA agreement, and (3) in the post-CRA governance context. The presence of a significant interaction indicates that the effect of one predictor variable on the response variable is different for different values of the CRA variables. When adding the interaction term, the effect of a borrower's minority status will depend upon the value of the interaction term, and as such the interpretation of the coefficients is different. Model summary statistics are presented as applicable. A *p*-value of .05 is used to determine significance.

Results

Exhibit 1 presents the descriptive statistics for the sample overall (n = 14,483) and indicates the significant differences in means for the pre- and post-CRA governance context. A significant, positive increase in the percentage of applications approved in the post-CRA governance context (mean [M] = 89.91 percent, standard deviation [SD] = 0.30) emerges as compared with the

Exhibit 1

Characteristics of Loan Applicants in St. Louis, 2007–2014

Variables	2007–2014				Pre (2007–2010)				Post (2011–2014)				Post vs. Pre Difference
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	
Approved or approved not accepted (%)	83.35	0.37	0.00	1.00	80.02	0.40	0.00	1.00	89.91	0.30	0.00	1.00	9.89***
Loan amount ($ in 000)	147.59	105.14	1.00	1,460.00	140.81	100.28	1.00	1,360.00	160.99	112.96	1.00	1,460.00	20.18***
Approved (%)	76.57	0.42	0.00	1.00	71.43	0.45	0.00	1.00	86.71	0.34	0.00	1.00	15.27***
Approved not accepted (%)	6.78	0.25	0.00	1.00	8.59	0.28	0.00	1.00	3.21	0.18	0.00	1.00	– 5.38***
Denied (%)	16.65	0.37	0.00	1.00	19.98	0.40	0.00	1.00	10.09	0.30	0.00	1.00	– 9.89***
Lender with CRA agreement (%)	3.27	0.18	0.00	1.00	2.19	0.15	0.00	1.00	5.40	0.23	0.00	1.00	3.21***
Applicant income ($ in 000)	81.16	98.36	5.00	3,675.00	75.44	96.36	5.00	3,675.00	92.45	101.27	6.00	2,566.00	17.01***
Applicant sex (1=Male) (%)	62.0	0.49	0.00	1.00	60.5	0.49	0.00	1.00	64.8	0.48	0.00	1.00	4.3***
White, non-Hispanic (%)	75.77	0.43	0.00	1.00	70.02	0.46	0.00	1.00	87.14	0.33	0.00	1.00	17.12***
Asian (%)	3.47	0.18	0.00	1.00	3.16	0.17	0.00	1.00	4.07	0.20	0.00	1.00	0.91**
Other race (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
African-American (%)	18.77	0.39	0.00	1.00	24.80	0.43	0.00	1.00	6.86	0.25	0.00	1.00	– 17.94***
Hispanic (%)	1.99	0.14	0.00	1.00	2.02	0.14	0.00	1.00	1.93	0.14	0.00	1.00	– 0.09
CRA-regulated lenders (%)	72.46	0.45	0.00	1.00	77.81	0.42	0.00	1.00	61.89	0.49	0.00	1.00	– 15.92***
Credit union (%)	4.22	0.20	0.00	1.00	3.00	0.17	0.00	1.00	6.64	0.25	0.00	1.00	3.64***
Non-CRA-regulated lenders (%)	23.32	0.42	0.00	1.00	19.20	0.39	0.00	1.00	31.48	0.46	0.00	1.00	12.28***
Loans in tracts with CRA agreements (%)	8.72	0.28	0.00	1.00	0.00	0.00	0.00	0.00	25.95	0.44	0.00	1.00	25.95***
Tract population	3,937.69	1,675.75	865.00	9,154.00	3,999.39	1,815.43	865.00	9,154.00	3,815.80	1,350.09	1,006.00	9,154.00	– 183.59***
Housing units in the tract	2,121.47	883.66	358.00	4,925.00	2,103.83	957.75	358.00	4,925.00	2,156.32	713.84	358.00	4,925.00	52.50***
College in the tract (%)	24.98	15.75	0.00	71.10	23.72	15.26	0.50	65.50	27.46	16.42	0.00	71.10	3.73***
Tract-to-income ratio	79.51	28.44	14.64	153.71	74.09	25.96	17.10	143.65	90.21	30.04	14.64	153.71	16.12***
Minority population in the tract	41.68	29.23	4.33	99.69	45.45	31.19	4.33	99.69	34.24	23.17	4.33	99.69	– 11.21***
Lien status (0 = no lien) (%)	93.2	0.25	0.00	1.00	91.2	0.28	0.00	1.00	97.4	0.16	0.00	1.00	6.2***
Total loans (n)	14,483				9,616				4,867				

CRA = Community Reinvestment Act. SD = standard deviation.

** p ≤ .05. ** p ≤ .01. *** p ≤ .001.*

pre-CRA governance context (M = 80.02 percent, SD = 0.40); $p < .001$. Likewise, applications to lenders with CRA agreements are significantly higher in the post-CRA governance context (M = 5.4 percent, SD = 0.23) as compared with the pre-CRA governance context (M = 3.27 percent, SD = .15), $p < .001$. However, applications to CRA-regulated lenders significantly decline in the post-CRA governance context (M = 61.89 percent, SD = 0.49) from the pre-CRA context (M = 77.81 percent, SD = 0.42), $p < .001$, whereas loans to non-CRA-regulated lenders significantly increase (M = 31.48 percent, SD = 0.46) in the post-CRA governance context, $p < .001$.

White applicants account for the majority of the loan applications in the overall sample, 75.77 percent. African-American applicants account for the second largest group of applicants in the sample overall, 18.77 percent, followed by Asian applicants, at 3.47 percent. Hispanic applicants represent a very small percentage of the overall sample, about 2 percent. The percentage of applications from White borrowers significantly increases in the post-CRA context to 86.71 percent (SD = 0.34) from 71.43 percent (SD = 0.45), $p < .001$. However, African-American applications significantly decline in the post-CRA governance context (M = 6.86 percent, SD = 0.25) as compared with the pre-CRA governance context (M = 24.8 percent, SD = 0.43), $p < .001$. Conversely, Asian applicants have significantly higher loan activity in the post-CRA context by about 1 percent, $p < .001$. Hispanic applications also decline in the post-governance context; however, the decline is not significant.

Several significant changes occur in the characteristics of census tracts and applicant characteristics in the pre- and post-CRA context. The percentage of college-educated residents in census tracts increases significantly by 3.73 percent in the post-CRA context, $p < .001$. The mean tract population decreases significantly, $p < .001$. The mean percentage of minority population in census tracts significantly decreases in the post-CRA context by 11.2 percent, $p < .001$. To summarize, in the post-CRA context, the minority population in census tracts slightly decreases, and the percentage of college-educated residents increases.

Exhibit 2 summarizes the descriptive statistics of minority applicants in the sample (n = 3,509). Minority applicants experience a significant, positive increase in the percentage of applications approved in the post-CRA governance context (M = 76.2 percent, SD = 0.43), $p < .001$ as compared with the pre-CRA governance context (M = 61.2 percent, SD = 0.49). Likewise, the percentage of minority applicants applying to a lender with a CRA agreement is significantly higher in the post-CRA governance context (M = 7.5 percent, SD = 0.26), $p < .001$ as compared with the pre-CRA governance context ($M \leq 1$ percent, SD = 0.08). However, the percentage of minority borrowers applying to CRA-regulated lenders significantly declines in the post-CRA governance context (M = 70.5 percent, SD = 0.46), $p < .001$ when compared with the pre-CRA context (M = 76.34 percent; SD = 0.43).

Several differences are evident when comparing the tract and applicant characteristics of minority borrowers (exhibit 2) with characteristics of the sample overall (exhibit 1). The mean percentage of college-educated residents in the tracts where minority applicants apply (M = 16.5 percent, SD = 14.88) is lower than in the sample overall (M = 25 percent, SD = 15.75). Minority applicants apply for loans in tracts with a higher percentage of minority population (M = 67.35 percent, SD = 29.82) when compared with the sample overall (M = 42 percent, SD = 29.23). Loan amounts and incomes of minority applicants also tend to be lower than the sample overall.

Exhibit 2

Characteristics of Minority Loan Applicants in St. Louis, 2007–2014

Variables	2007–2014				Pre (2007–2010)				Post (2011–2014)				Post vs. Pre Difference
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	
Approved or approved not accepted (%)	63.89	0.48	0.00	1.00	61.22	0.49	0.00	1.00	76.20	0.43	0.00	1.00	14.98***
Loan amount ($ in 000)	118.96	87.51	1.00	1,292.00	117.21	80.56	1.00	1,000.00	127.00	113.93	1.00	1,292.00	9.79**
Approved (%)	53.78	0.50	0.00	1.00	49.84	0.50	0.00	1.00	71.88	0.45	0.00	1.00	22.04***
Approved not accepted (%)	10.12	0.30	0.00	1.00	11.38	0.32	0.00	1.00	4.31	0.20	0.00	1.00	– 7.06***
Denied (%)	36.11	0.48	0.00	1.00	38.78	0.49	0.00	1.00	23.80	0.43	0.00	1.00	– 14.98***
Lender with CRA agreement (%)	1.82	0.13	0.00	1.00	0.59	0.08	0.00	1.00	7.51	0.26	0.00	1.00	6.92***
Applicant income ($ in 000)	61.77	70.34	5.00	1,460.00	58.22	62.18	5.00	1,460.00	78.14	98.06	9.00	1,003.00	19.92***
Applicant sex (1=Male) (%)	50.8	0.50	0.00	1.00	49.8	0.50	0.00	1.00	55.1	0.50	0.00	1.00	5.3**
White, non-Hispanic (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asian (%)	14.31	0.35	0.00	1.00	10.54	0.31	0.00	1.00	31.63	0.47	0.00	1.00	21.08***
Other race (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
African-American (%)	77.49	0.42	0.00	1.00	82.73	0.38	0.00	1.00	53.35	0.50	0.00	1.00	– 29.37***
Hispanic (%)	8.21	0.27	0.00	1.00	6.73	0.25	0.00	1.00	15.02	0.36	0.00	1.00	8.29***
CRA-regulated lenders (%)	75.29	0.43	0.00	1.00	76.34	0.43	0.00	1.00	70.45	0.46	0.00	1.00	– 5.90***
Credit union (%)	3.65	0.19	0.00	1.00	2.32	0.15	0.00	1.00	9.74	0.30	0.00	1.00	7.42***
Non-CRA-Regulated lenders (%)	21.06	0.41	0.00	1.00	21.33	0.41	0.00	1.00	19.81	0.40	0.00	1.00	– 1.52
Loans in tract with CRA agreement (%)	8.75	0.28	0.00	1.00	0.00	0.00	0.00	0.00	49.04	0.50	0.00	1.00	49.04***
Tract population	3,712.39	1,424.97	865.00	9,154.00	3,769.28	1,457.49	865.00	9,154.00	3,450.38	1,232.04	1,006.00	9,154.00	– 318.89***
Housing units in the tract	1,879.20	745.01	358.00	4,925.00	1,868.75	752.10	358.00	4,925.00	1,927.34	710.01	358.00	4,925.00	58.59
College in the tract (%)	16.54	14.88	0.00	71.10	15.22	13.64	0.50	65.50	22.64	18.42	0.00	71.10	7.42***
Tract-to-income ratio	63.45	24.67	14.64	153.71	60.32	21.54	17.10	143.65	77.85	32.00	14.64	153.71	17.53***
Minority population in the tract	67.35	29.82	4.33	99.69	71.03	28.67	4.33	99.69	50.39	29.17	4.33	99.69	– 20.64***
Lien status (0 = no lien) (%)	93.7	0.24	0.00	1.00	93.3	0.25	0.00	1.00	95.4	0.21	0.00	1.00	2.1
Total loans (n)	3,509				2,883				626				

CRA = Community Reinvestment Act. SD = standard deviation.

** p ≤ .05. ** p ≤ .01. *** p ≤ .001.*

However, despite these differences, minority borrowers experience the same directional changes in tract, applicant, and loan characteristics in the post-CRA context as the sample overall. In the post-CRA context, the percentage of college-educated residents in census tracts where minority applicants apply increases significantly by 7.42 percent, $p < .001$. The mean percentage of minority population in census tracts decreases in the post-CRA context 20 percent, $p < .001$. In summary, in the post-CRA governance context, applicants tend to apply for loans in tracts with a higher percentage of college-educated residents and a lower percentage of minority residents. This suggests some demographic and socioeconomic shifts are possibly occurring throughout the census tracts in the city over the years, which are controlled for in the analysis by adding the relevant control variables and year controls.

Exhibits 3 and 4 present the results of the regression analyses, reporting the untransformed coefficients. Exhibit 3 presents the results of the analysis of the relationship between the CRA variables and loan approvals. Exhibit 4 presents the results of the analysis of the relationship between the CRA variables and type of lender to which applicants apply. As presented earlier, three main CRA variables of interest are in the analysis—loan applications to lenders with CRA agreements, loan applications in tracts covered by a CRA agreement, and the post-CRA governance context. For each dependent variable, five models are presented, which consider the different CRA variables and interaction terms.

Exhibit 3 illustrates the relationship between the three CRA variables and the likelihood of loan approvals. Overall, the results suggest that Asian, African-American, and Hispanic applicants are significantly less likely to be approved for a loan when compared with the base group of White borrowers. This fact is evidenced by the significant, negative coefficients across models 1a through 1e on the race variables, suggesting this relationship holds when adding all the variables of interest and when including the control variables. Model 1b includes the CRA variables of interest along with the race and control variables. Loan applications made in the post-CRA context ($ß = 0.583$, $p = .001$) and applications to lenders with a CRA agreement ($ß = 1.408$, $p < .001$) have a positive, significant relationship with loan approvals. This finding suggests that loan applications are more likely to be approved in the post-CRA context. However, loan applications for homes in a tract covered by a CRA agreement does not have a significant effect ($ß = 0.011$). This suggests that the odds of a loan approval, although greater in the post-CRA context, do not differ if the loan is made for a home in a tract covered by a CRA agreement. The direction and significance of the relationships stay consistent as additional variables and interaction terms are added, as evidenced in models 1c through 1e. Models 1c through 1e indicate the results when the CRA variables interact with race and ethnicity. None of the interaction terms are significant, which indicates that the CRA variables do not exert a mediating effect on minority applicant status and loan approvals.

Exhibit 4 illustrates the relationship between these variables and likelihood of applying to a CRA-regulated lender compared with a credit union or a non-CRA-regulated lender. The likelihood of applying to a certain type of lender differs by applicant race. As illustrated in model 2b, with the CRA variables and controls included, Asian applicants are less likely to apply to a credit union than White applicants ($ß = -0.992$, $p < .01$) and are less likely to apply to a non-CRA-regulated lender than White applicants ($ß = -0.845$, $p < .01$). Hispanic applicants do not significantly differ from White applicants in the likelihood of applying to a credit union versus a CRA-regulated lender or to a non-CRA-regulated lender versus a CRA-regulated lender. Also as evidenced in model 2c,

Exhibit 3

Loan Approvals in St. Louis by Governance Context, 2007–2014

	Coefficient				
	1a.	1b.	1c.	1d.	1e.
White, non-Hispanic	Base				
Asian	– 0.672 (0.120)***	– 0.654(0.120)***	– 0.698(0.127)***	– 0.537(0.148)***	– 0.653(0.120)***
African-American	– 1.257 (0.072)***	– 1.254(0.072)***	– 1.257(0.076)***	– 1.233(0.079)***	– 1.254(0.072)***
Hispanic	– 0.342 (0.166)*	– 0.368(0.166)*	– 0.448(0.169)**	– 0.305(0.190)	– 0.368(0.166)*
Pre-/Post-CRA governance	0.614 (0.105)***	0.583(0.115)***	0.584(0.115)***	0.617(0.118)***	0.584(0.115)***
Tract covered by agreement		0.011(0.111)	– 0.037(0.130)	0.031(0.119)	0.011(0.111)
Lender with CRA agreement		1.408(0.255)***	1.410(0.256)***	1.415(0.256)***	1.473(0.382)***
Interactions: Tract covered by agreement and race/ethnicity					
Asian			0.378(0.385)		
African-American			0.025(0.188)		
Hispanic			1.551(1.065)		
Interactions: Pre-/post-CRA governance and race/ethnicity					
Asian				– 0.337(0.249)	
African-American				– 0.086(0.159)	
Hispanic				– 0.229(0.381)	
Interactions: Pre-/post-CRA governance and lender with CRA agreement					
Lender with CRA agreement					– 0.115(0.514)
Pseudo R^2	0.122	0.125	0.126	0.125	0.125
N	14,483	14,483	14,483	14,483	14,483
Log pseudo likelihood	– 5,729	– 5,705	– 5,703	– 5,704	– 5,705
Control variables	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes
Applicant sex (1=Male)	– 0.121(0.051)*	– 0.119(0.051)*	– 0.120(0.051)*	– 0.119(0.051)*	– 0.119(0.051)*
Tract population	0.000(0.000)	0.000(0.000)*	0.000(0.00)	0.000(0.000)	0.000(0.000)
Housing units in the tract	0.000(0.000)	0.000(0.000)*	0.000(0.000)	0.000(0.000)	0.000(0.000)
Percentage college in the tract	0.010(0.003)***	0.011(0.003)***	0.011(0.003)***	0.011(0.003)***	0.011(0.003)***
Tract-to-income ratio	0.005(0.002)***	0.006(0.002)***	0.006(0.002)***	0.006(0.002)***	0.006(0.002)***
Minority population in the tract	– 0.006(0.001)***	– 0.005(0.001)***	– 0.005(0.001)***	– 0.006(0.001)***	– 0.005(0.001)***
Applicant income	0.000(0.000)	0.000(0.000)	0.000(0.000)	0.000(0.000)	0.000(0.000)
Lien status (0 = no lien)	– 0.368(0.105)***	– 0.375(0.105)***	– 0.375(0.105)***	– 0.379(0.105)***	– 0.375(0.105)***

CRA = Community Reinvestment Act.

Note: Logistic regression coefficients with standard deviations in parentheses (p ≤ .05; ** p ≤ .01; *** p ≤ .001).*

Exhibit 4

Applications to Type of Lender by Governance Context, 2007–2014

	Coefficient				
	2a.	**2b.**	**2c.**	**2d.**	**2e.**
Credit Union					
White, non-Hispanic	Base				
Asian	– 0.944(0.311)**	– 0.947(0.310)**	– 0.992(0.311)***	– 1.425(0.418)***	– 1.862(0.721)**
African-American	0.345(0.155)*	0.357(0.156)*	0.366(0.156)**	0.184(0.185)	0.010(0.207)
Hispanic	0.263(0.276)	0.265(0.276)	0.324(0.277)	0.302(0.296)	0.292(0.376)
Pre-/Post-CRA governance	1.885(0.178)***		1.880(0.187)***	1.846(0.187)***	1.764(0.189)***
Tract covered by agreement		0.107(0.159)	0.124(0.159)	– 0.121(0.191)	– 0.038(0.173)
Interactions: Tract covered by agreement and race/ethnicity					
Asian				1.575(0.647)*	
African-American				0.579(0.298)[t]	
Hispanic				0.056(0.816)	
Interactions: Pre-/post-CRA governance and race/ethnicity					
Asian					1.278
African-American					0.623*
Hispanic					0.018
Non-CRA-Regulated					
White, non-Hispanic	Base				
Asian	– 0.813(0.137)***	– 0.808(0.137)***	– 0.845(0.138)***	– 0.864(0.152)***	– 1.049(0.216)***
African-American	0.084(0.068)	0.063(0.069)	0.065(0.069)	0.186(0.072)**	0.255(0.076)***
Hispanic	– 0.114(0.150)	– 0.117(0.150)	– 0.053(0.150)	0.050(0.154)	– 0.016(0.192)
Pre-post agreement	1.033(0.068)***		1.125(0.074)***	1.147(0.075)***	1.172(0.076)***
Tract covered by CRA agreement		– 0.177(0.084)**	– 0.158(0.085)[t]	0.025(0.092)	– 0.018(0.089)
Interactions: Tract covered by CRA agreement and race/ethnicity					
Asian				0.066(0.372)	
African-American				– 1.112(0.217)***	
Hispanic				– 1.240(0.650)[t]	
Interactions: Pre-/post-CRA governance and race/ethnicity					
Asian					0.366(0.286)
African-American					– 0.976(0.174)***
Hispanic					– 0.066(0.310)
Pseudo R^2	0.038	0.039	0.057	0.059	0.059
N	14,483	14,483	14,483	14,483	14,483
Log pseudo likelihood	– 9,840	– 9,838	– 9,653	– 9,629	– 9,627
Control variables	Yes		Yes	Yes	Yes
Year control	Yes		Yes	Yes	Yes

CRA = Community Reinvestment Act.

Note: Logistic regression coefficients with standard deviations in parentheses (p ≤ .05; ** p ≤ .01; *** p ≤ .001; p ≤ .10).*

African-American applicants are significantly more likely than White applicants to apply to a credit union rather than to a CRA-regulated lender (ß = 0.366, $p < .05$), however, they are not more likely than White applicants to apply to a non-CRA-regulated lender (ß = 0.065, p = not significant). Overall, applying for a loan in a tract covered by a CRA agreement does not significantly influence the likelihood an applicant applies to a credit union as opposed to a CRA-regulated lender. However, applicants applying for a loan in a tract covered by a CRA agreement are less likely to apply to a non-CRA-regulated lender, a marginally significant difference (ß = -0.158, $p < .10$). In the post-CRA governance context, applicants are significantly more likely to apply to a credit union (ß = 1.880, $p < .001$) and more likely to apply to non-CRA-regulated lenders (ß = 1.125, $p < .001$).

However, as evidenced in models 2d and 2e, race and ethnicity, interacted with the CRA variables, make a significant difference. CRA agreements and the post-CRA context have differential effects based on applicant race and ethnicity. Overall, the post-CRA governance context appears to increase the likelihood that applicants apply to a non-CRA-regulated lender, however, this increase appears to be mitigated by the race and ethnicity of the borrower. Model 2d illustrates the effects of applicant race and applying for a loan in a tract covered by a CRA agreement on the type of lender. African-American loan applicants in tracts covered by CRA agreements are significantly less likely to apply to non-CRA-regulated lenders when compared with White borrowers (ß = -0.926, $p < .01$). Model 2e illustrates the effects of applicant race and the post-CRA governance context on the type of lender. Model 2e illustrates that in the post-CRA governance context, African-American applicants are significantly less likely to apply to non-CRA-regulated lenders than White borrowers (ß = -0.721, $p < .01$). Hispanic applicants are marginally significantly less likely to apply to non-CRA-regulated lenders in tracts with CRA agreements (ß = -1.19, $p < .01$), but the post-CRA governance context does not seem to exert a significant effect (ß = -0.082). The CRA variables exert less influence on the behavior of Asian applicants, with the exception that Asian applicants who apply for a loan in a tract covered by a CRA agreement are significantly more likely to apply to a credit union than to a CRA-regulated lender (ß = 0.05, $p < .05$).

In summary, the analysis suggests the post-CRA governance context is associated with a change in the lending environment—the likelihood of loan approvals in a post-CRA governance context increases. The overall post-CRA governance context and applying to a lender with an agreement are associated with an increased probability of loan approval. Conversely, applying for a loan in a tract covered by a CRA agreement does not seem to be associated with loan approval. The CRA variables do not appear to exert a mediating effect on race and ethnicity and loan approval.

The results also suggest that the post-CRA governance context is associated with the types of lenders to which applicants apply. Overall, in the post-CRA governance context, applicants are more likely to apply to a non-CRA-regulated lender. However, there is marginal support that the presence of a CRA agreement in the tract reduces the likelihood of a borrower applying to a non-CRA-regulated lender. Perhaps more importantly, the post-CRA governance context appears to have differential effects based on borrower race and ethnicity, particularly on the behavior of African-American applicants. African-American borrowers experience different outcomes in the post-CRA governance context, both when applying for loans in a tract covered by an agreement and during a period when agreements are in effect. Under these two conditions, African-American applicants are less likely to apply for loans from a non-CRA-regulated lender.

Taken together, the results suggest that the post-CRA governance context may be associated with community reinvestment activity, particularly by increasing access to CRA-regulated lenders for African-American borrowers. This finding suggests that the signaling effect may change applicant behaviors, and efforts of the coalition may be improving information flows between CRA-regulated lenders and African-American borrowers. Likewise, lenders with CRA agreements may be associated with stimulating community reinvestment activity as they increase the likelihood of loan approvals. However, these activities do not necessarily translate to benefits for all minority applicants. Although the post-CRA governance context is associated with a higher level of loan approvals, it is also associated with more loans being made by non-CRA-regulated lenders. The longitudinal analysis also suggests that the post-CRA governance context may improve community reinvestment outcomes for African-American borrowers but not necessarily for Hispanic or Asian borrowers.

It is important to note the limitations of the study. First, other factors that cannot be ruled out, such as personal credit history or other unique features of the property for which data are not available, may influence a loan approval or denial decision. However, these data are not available from HMDA or a publicly available data source. Even so, it is plausible that barriers, such personal credit history, or other individual factors, such as length of employment, that typically lead to the exclusion of credit may be reduced in a post-CRA governance context due to the partnerships and programs enacted that provide a bridge to lenders. Secondly, this analysis considers only one CRA governance context, the city of St. Louis. The history of racial segregation that characterizes the city of St. Louis may explain why some particular races or ethnicities benefit more than others in the post-CRA governance context.

Finally, considering only one city does not allow for us to account for macro-level forces that may explain these results. To address this limitation, we conduct a descriptive analysis of lending patterns using data from Kansas City, Missouri, during the same time periods. The purpose of the descriptive analysis is to understand if the pattern of loan approvals and types of lender looks similar or different from the pattern in the city of St. Louis. Kansas City is different than St. Louis in that it cuts across several county boundaries, whereas St. Louis city is its own county. The descriptive analysis of loan applications and types of lenders to which borrowers applied indicates a minimal change in loan approvals from the time period of 2007 to 2010 (M = 86.00 percent, SD = 0.35) to the period of 2011 to 2014 (M = 87.00 percent, SD = 0.34). The number of loans to CRA-regulated lenders also declined significantly during the 2011-to-2014 time period (M = 36.00 percent, SD = 0.49) as compared with the 2007-to-2010 period (M = 66.00 percent, SD = 0.49). Loan applications to non-CRA-regulated lenders increased from 2007 to 2010 (M = 15.00 percent, SD = 0.36) to 2011 to 2014 (M = 59.00 percent, SD = 0.49). The percentage of minority loan applications (n = 13,898) approved during the 2011-to-2014 period (n = 4,283, M = 76.00 percent, SD = 0.43) to that of the 2007-to-2010 period (n = 9,615, M = 75.00 percent, SD = 0.43) remained almost constant. As in St. Louis, the percentage of minority borrowers applying to CRA-regulated lenders declined in the years of 2011 to 2014 (M = 33.00 percent, SD = 0.47) as compared with 2007 to 2010 (M = 60.00 percent, SD = 0.49). Although the analysis of Kansas City is descriptive in nature, it does suggest that macro-level forces alone may not be the only factor explaining the results. However, it is still limited in proving causality, in that we do not control for nuances about variations in local lending markets in the descriptive analysis.

Discussion and Conclusion

The results suggest that applicant outcomes differ in the post-CRA governance context and that community-based mobilization around CRA can stimulate community reinvestment activity. CRA has fueled the creation of nonprofit partnerships and networks that serve as valuable links between lenders and borrowers and, in many cases, can make the regulation to work better. Community involvement in its implementation gives voice to a community, and allows for local-level influence in decisionmaking. For example, Casey (2009) found that challenges and negotiations in Chicago, Illinois, and in Cleveland led to agreements that contained a number of provisions that moved beyond increasing the number of loans. These agreements included community-level input from groups representing multiple segments of society and included the provision of education, resources, and outreach to improve borrower awareness of opportunities and options.

However, organizing around CRA has been highly variable across time and place, which may lead to further inequities when community-based coalitions or organizations are absent. Casey (2009) argued that the indirect element of CRA regulation is positive in that it can foster broader connections between lenders and community-based groups to develop community reinvestment responses. However, the previously referenced study that analyzed four different cities—Cleveland; Chicago; Indianapolis, Indiana, and St. Louis—revealed inequities across cities in mobilization around CRA. Indianapolis and St. Louis did not organize around CRA; hence, the benefits afforded to communities in Chicago and Cleveland were not realized (Casey, 2009).

A major shortcoming in CRA regulation is its variation across places, and this variation is further complicated by a changed regulatory landscape. The regulatory landscape has changed and has led to the emergence of a host of non-CRA-regulated lending entities and banks that do business across state lines and outside the communities in which they are chartered. Arguably, these changes produce positive externalities; however, it is also critical to reflect on the implications of these changes on reinvestment in urban areas, potential negative externalities, and the potential of CRA in today's environment. The current design of CRA regulation has both positive and negative externalities. A positive is that CRA's current design provides local groups and organizations with the opportunity to better inform lenders of the banking needs of low- to moderate-income and minority communities. Community development advocates in the 1960s and 1970s argued for more community-based participation in programs and policies in response to top-down initiatives (Phillips and Pittman, 2009); however, it is necessary to consider how to strike a more appropriate and just balance between formal and informal regulation. The balance is necessary to address the variation across metropolitan areas in the capacity for community-based groups and nonprofit organizations to take regulation into their own hands.

What, then, do the findings from this analysis suggest for the future of community reinvestment and, more specifically, the design of CRA for the future? The findings suggest that the appropriate policy design lies somewhere between top-down and bottom-up regulation. Too much reliance on bottom-up regulation may reproduce inequities or shift the burden to nonprofit and community-based organizations that may lack the capacity or leadership to undertake mobilization efforts. Conversely, too much reliance on top-down regulation has the potential to diminish community participation in reinvestment activity, proscribing one-size-fits-all approaches for meeting CRA objectives.

Thus, the design of the policy (and formal regulatory enforcement of it) needs to address the organizational capacity equities and inequities that are built into the context in which community reinvestment is vital. A value of CRA is that it allows for flexibility to best address reinvestment market conditions and community needs; however, CRA in its current form seems to be more effective in areas with a strong community-based capacity or network. This aspect of CRA is important when considering the democratic value of CRA, but it neglects to consider the inequities in capacities and reinvestment needs that exist across places. In effect, the unevenness of community-based capacity and networks around CRA can lead to CRA assessment areas that are more desirable for lenders to target, which may deplete lender activity in areas that lack community capacity.

The resulting recommendation is the need to balance bottom-up and top-down regulation and address organizational capacity at the local level of the community. The three recommendations that follow suggest several roles for formal regulatory agencies, including the newly formed CFPB and HUD. The first recommendation is for formal regulators to more stringently define and restrict what qualifies as a CRA assessment area. Some precedent for this exists, as the CFPB and DOJ have recently taken action against a bank in New Jersey for selectively picking its CRA assessment areas (Davenport and Epstein, 2015). Formal regulatory agencies can strengthen their enforcement by requiring lenders to define CRA assessment areas as those that not only possess the historical characteristics related to redlining but also are areas that are overly serviced by non-CRA-regulated lenders. Fulfilling this recommendation requires an expansion of the definition of CRA assessment areas to include criteria related to the current level of investment in the area and the types of lenders in operation.

Second, formal regulatory agencies can strengthen enforcement by analyzing CRA mobilization capacity in specific areas, and other agencies such as HUD can develop grant programs geared toward building capacity around CRA. Areas that are weak in CRA capacity should be prioritized for capacity building. The goal of these efforts should be twofold: to develop internal, local networks aimed at developing local knowledge and capacity in these CRA assessment areas, and to leverage the knowledge and experience of successful CRA networks from outside the CRA assessment area.

Finally, the design of CRA policy needs to recognize the diverse composition and lending experiences of minority borrowers, and also the variation that exists across different metropolitan contexts. The results from this study suggest that organization around CRA can lead to differential effects for borrowers, which could be due to the types of groups mobilized around CRA or the historical disparities that have persisted. However, formal regulation needs to ensure that when CRA activity occurs, it creates reinvestment opportunities equally for all.

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Data, Accountability, and the Public: Using Community Reinvestment Act Data for Local Community Development

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Abstract

Community development corporations (CDCs) are place-based, resident-led organizations committed to revitalizing neighborhoods and expanding opportunities for low- and moderate-income residents. The Community Reinvestment Act (CRA) shares a place-based focus, as it was intended to hold banks accountable for their activities in all parts of their service areas—including the low- and moderate-income neighborhoods where CDCs operate. This article discusses the disconnect between the mandated CRA process and the type of information on banking activity that would be useful for local organizations working on community revitalization. It presents a case study from the city of Holyoke, Massachusetts, detailing a partnership between a university and a CDC, focused on federal CRA performance in the low- and moderate-income area the CDC serves. Students reviewed performance evaluations of seven banks and, working with the CDC, prepared an examination of the findings. Conclusions of the research include the inadequacy of CRA performance evaluations and data for local CDCs and the lack of a documented deep analysis of community needs. Actions that regulators, banks, and CDCs can take to improve the CRA process are discussed.

Introduction

The federal Community Reinvestment Act[1] (CRA) of 1977 was part of a larger multipronged federal response to discriminatory practices in real estate and lending, urban disinvestment, and a consumer protection movement (Squires, 1992). Adopted shortly after the Home Mortgage Disclosure

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.

Act[2] (HMDA) of 1974,CRA was based on the principle that "regulated financial institutions have a continuing and affirmative obligation to help meet the credit needs of the local communities in which they are chartered."[3] CRA had multiple purposes, but one received a lot of traction with community groups: to assess and correct for *deposit redeployment*—banks failing to invest in areas where they collected deposits (Bradford and Cincotta, 1992; Marsico, 2005). Beyond this purpose, CRA was seen as a market-correction action (Avery, Bostic, and Canner, 2005; Olson, Chakrabarti, and Essene, 2009), surfacing information on local needs and conditions to get beyond the banks' ignorance of certain geographies and perceptions that there was no demand nor sound basis for loans in low- and moderate-income (LMI) neighborhoods (Ludwig, Kamihachi, and Toh, 2009; Marsico, 2005). CRA was meant to make banks more knowledgeable about and responsive to the financial needs of local communities. In addition, CRA was seen as a logical quid pro quo—public services in exchange for the "federal safety net" provided to banks and thrifts (Immergluck, 2004; Ludwig, Kamihachi, and Toh, 2009; Marsico, 2005; Olson, Chakrabarti, and Essene, 2009).

CRA's intent to ensure banks attend to the needs of all parts of their service areas—including those places that are home to LMI households—dovetails with the work of community development corporations (CDCs). As place-based, resident-led organizations, CDCs have worked tirelessly to address community needs in distressed and declining areas (Mallach, 2009). CDC-led programs are very diverse and may include affordable housing development, small business entrepreneurship, vocational training, youth programming, community greening and local food system improvements, environmental cleanups, and other quality of life concerns. The work of these programs requires funding and often relies on leveraging an assortment of sources. Banks can assist CDCs by providing some of the capital, loans, and technical assistance needed for community improvement efforts to succeed. In addition, banks traditionally have played a role in the vitality of neighborhoods by meeting the ongoing day-to-day financial needs of local businesses and residents. CDCs often advocate, on behalf of the community members, for access to services such as business loans, payroll processing, lines of credit, home mortgages, car loans, and check cashing, at affordable rates.

Discussions on the effectiveness of CRA have consistently noted the critical role that organized groups, such as CDCs, and the wider public play in the CRA process. CRA was written with very weak enforcement authority (Immergluck, 2004). The bank regulators were charged with "encouraging" banks to fulfill the objectives of CRA. The law requires banks to periodically submit data for a regulatory review, and this review leads to a rating of the bank's performance. CRA only has true teeth when a regulator is considering a banking institution's application to open or close a branch or to acquire or merge with another institution (Marcy and Miller, 1993; U.S. Department of the Treasury, 2003). It is then that the regulating authority may consider the bank's CRA rating, and the public and community organizations have a formal opportunity to comment on the bank's CRA performance.

As expressed by Gale Cincotta, one of the main citizen leaders behind the adoption of CRA, "full responsibility for the enforcement of CRA has always been the job of people in the neighborhoods"

[2] Pub. L. 94–200, 89 Stat. 1124.

[3] 12 U.S.C. § 30.

(quoted in Immergluck, 2004: 3). Similarly, former Ohio Congressman Denis Kucinich observed CRA "was borne out of public protest and sustained by public participation" (House Subcommittee on Domestic Policy, 2009: 4). A large part of the power of CRA, then, has come from an accountability to the public facilitated by the disclosure of data (Littrell and Brooks, 2010; Squires, 1992). The requirement to publish figures on the geography and borrower profiles of mortgage lending, small business loans, and community development activity has forced banks to consider and document their activity in LMI areas—the very places where CDCs work.

Today's less-local banking environment, combined with CRA's generalized reporting requirements, often fails to provide the accountability CDCs seek. NACCED (2005) estimated that more than 4,000 CDCs are in the United States, and two-thirds of them work within one neighborhood, several neighborhoods, or one city. For these small-scale organizations, the nature of the aggregated data reported under CRA is not useful for assessing the activity of banks in their neighborhood target areas. Although the transparency of data is important, the form and content of information also determines its suitability for assessing impacts. A lack of precision can weaken accountability.

Background on Community Reinvestment Act Data and Ratings

The CRA implementing regulations specify the types of data banks must report. These requirements have evolved over time, both to be more specific and to streamline the process for smaller institutions (Alexander, Dahl, and Spivey, 2009; Getter, 2015). Although the CRA domain is complex (it involves three regulating bodies, four different bank categories, varying examination schedules, and pages of definitions and examples), regulators have developed a common explanatory narrative—the "Interagency Questions and Answers" and other manuals—to assist banks in meeting their reporting obligations.[4] A performance evaluation (PE) is generated by the appropriate regulator, is based on a review of a bank's submittal and, due to a 1989 amendment to the original CRA legislation, must be available for public review.[5]

Exhibit 1 summarizes the data banks report annually through CRA, based on the size of assets. In general, larger banks must report more information with greater specificity. All banks are required to report on their lending activity in terms of home mortgages, small business loans, and consumer loans. Banks report figures annually, and, depending on their size, the data indicate the total dollars, number of loans, percentage of loans in LMI census tracts, and loans by income of borrowers. Small business loans are defined as nonfarm loans with original amounts of $1 million or less.

Bank reviewers consider the reported overall loan-to-deposit ratio as part of their assessment of how well the banks are meeting the credit needs of their service areas. Regulators are looking for a "reasonable" loan-to-deposit ratio (FFIEC, 2015). A low loan-to-deposit ratio (for example, less than 80 percent) would be reason to look more closely to see if a bank is not making enough loans

[4] See http://www.ffiec.gov/cra/ and http://www.ffiec.gov/cra/pdf/2010-4903.pdf.

[5] With the 1989 amendment, CRA data mirrored the expansion of HMDA filings. When first adopted, HMDA reported only mortgage originations by census tract; in 1989, reporting was expanded to require applications also and to break down the data by race, gender, and household income.

Exhibit 1

Generalized CRA Data Reporting by Bank Type

Bank Size	Lending	CD Investments	CD Services
Small (less than $305 million in assets)	Loan: Deposit ratios and the number, amount, and geographic (LMI CT level) and income distribution of mortgage, small business, and consumer loans (as applicable).	—	—
Intermediate small ($305 million–$1.221 billion in assets)	Loan: Deposit ratios and the geographic and income distribution of mortgage, small business, and consumer loans (as applicable). Small business loans include the number, total amount, and percent in LMI CT. Mortgage loans: HMDA requirements.	—	Branch locations within AA and other types of services provided, including technical assistance to community organizations.
Large (more than $1.221 billion in assets)	Loan: Deposit ratios and the geographic and income distribution of mortgage, small business, and consumer loans (as applicable). Small business loans include the number, total amount, and percent in LMI CT. Mortgage loans: HMDA requirements.	Listing of number and dollar amount.	Branch locations within AA and other types of services provided, including technical assistance to community organizations.
Wholesale/limited purpose	Can choose one: CD investment, CD loans, or CD services.	Can choose one: CD investment, CD loans, or CD services.	Can choose one: CD investment, CD loans, or CD services.

AA = assessment area. CD = community development. CRA = Community Reinvestment Act. CT = census tract. HMDA = Home Mortgage Disclosure Act. LMI = low- and moderate-income.
Note: The asset limits that define categories fluctuate with the Consumer Price Index.
Sources: Avery, Bostic, and Canner (2005); FFIEC (2015)

in its service area; a high ratio (for example, greater than 90 percent) could be reason for concern about whether the bank has adequate funds on hand to cover unexpected demands (Trefis Team, 2015). Banks that must comply with HMDA complete multiple tables, breaking down home mortgage lending activity by borrower race, borrower income classification, and home location. Larger banks may also list community development loans, including loans to support the development of affordable housing or the establishment of a community facility to serve LMI residents. Large banking institutions list any "community development investments" they have made. This category includes investments or grants for a wide range of activities, including affordable housing development, homelessness services, daycare and job training, youth programs, and investing in a local Community Development Finance Institution (CDFI).

Banks that are classified as "intermediate small" and "large" must also include information in the category of "community development services." Services are assessed by considering the location of bank branches and whether the bank has worked with local community groups to support community development activities. According to official guidance, these services could include

providing technical assistance on financial matters by having bank personnel serve on the board of a nonprofit organization, offering financial literacy classes, providing credit and foreclosure prevention counseling, reviewing CDC rehabilitation loans, and more (OCC, 2014).

The legislation deliberately avoided establishing set quotas for community development lending, investments, and services, and thus regulators and community groups have no benchmarks to use in assessing activity in these categories (Avery, Bostic, and Canner, 2005; Bradford and Cincotta, 1992). Nevertheless, community groups successfully used CRA (and its sister, HMDA) to improve the performance of banks in LMI areas during the late 1980s and 1990s, when banks were growing rapidly and mergers were frequent (Holyoke, 2004; Squires, 1992). Agreements reached between CDCs and banks established special pools of funding and new loan initiatives for community and economic development activity.

In PEs, regulators review all the data (as outlined in exhibit 1) and assign one of four overall CRA ratings; they consider the performance context in which the bank operates, for example, overall market conditions, the bank's structure, the amount and nature of bank competition, and the economics and demographics of the service area. From highest to lowest, the possible ratings are outstanding, satisfactory, needs improvement, and substantial noncompliance (FFIEC, 2015). These ratings are widely seen as subjective and have been documented as inconsistently interpreting the same figures across regulatory agencies and reviewed institutions (Alexander, Dahl, and Spivey, 2009; Immergluck, 2004; Marcy and Miller, 1993; Marsico, 2005). Today, the landscape after the banking crisis consists of five main banks with 44 percent of the assets and nonbanking financing institutions (which are not subject to CRA) on the rise; the community reinvestment climate is subdued as banks find their footing, and the role of CRA appears to have declined (Rosengren and Yellen, 2009; Schaefer, 2014).

Research Methodology

Working in the spring of 2013 with the CDC Nueva Esperanza of south Holyoke, Massachusetts, a team of three undergraduates and one faculty member researched the CRA performance of banks operating within the city. Nueva Esperanza sought a general profile of banking services for residents of the neighborhood and a review of the performance of banks in Nueva Esperanza's service area along two criteria: the nature and level of community development loans, investments, and services; and loan activity levels to small businesses. Given that the housing stock of the neighborhood presented extremely few opportunities for homeownership, the CDC was not interested in reviewing the HMDA data.[6] Students completed the data gathering and analysis, meeting regularly with the staff and board members of Nueva Esperanza for feedback and direction. The objective of the CDC was to understand the banking activity and services in the area before directly approaching banking institutions. Nueva Esperanza was thinking strategically about which banks to approach for support with a Latino small business entrepreneurship initiative and with the revitalization of mixed-use properties in the heart of the neighborhood. The strategy was to focus on presenting an ask to the banks with a less-stellar performance in the neighborhood, which would be informed by a knowledge of the activity of all the banks in the city.

[6] Massachusetts has a state Community Reinvestment Act, but these reviews are coordinated with the federal CRA so, for purposes of this research and given time constraints, only the federal CRA documents and processes were examined.

The first step was to determine which banks should be reviewed. An assessment of bank locations (using bank websites, Google map searches, and field observations) found no bank branches in Nueva Esperanza's immediate focus area, census tracts 8114 and 8115, but seven banks within the city as a whole (see exhibit 2). A part of the assessment included locating and mapping all alternative financial service providers serving the area, including automated teller machines (ATMs) and payday loan operations nearby. Following the identification of the banks operating in Holyoke,[7] the online CRA Performance Evaluations data bank was used to locate the most current PE for each institution,[8] and the online PE documents were reviewed prior to the arranged site visits. After the review, phone calls were made to the financial institutions to request an opportunity to review the public CRA files. The public CRA files contain the same online PE, and any correspondence received by the bank concerning its performance—including any complaints or commendations. As none of the files reviewed contained any correspondence, the following findings were based on the PEs alone.

Exhibit 2

Summary of Federal CRA Performance Evaluations for Banks in Holyoke, Massachusetts

Bank Name	Exam Date	City, State HQ	Overall CRA Rating/ Bank Size	Regulator
Bank of America	3/31/2009	Charlotte, NC	Outstanding/ large bank	OCC
RBS Citizens, NA	4/03/2010	Providence, RI	Satisfactory/ large bank	OCC
Peoples Bank	11/07/2011	Holyoke, MA	Satisfactory/ large bank	FDIC
People's United Bank	10/05/2009	Bridgeport, CT	Outstanding/ large bank	OCC
TD Bank, USA	12/31/2011	Portland, ME	Outstanding/ large bank	OCC
United Bank	10/29/2012	West Springfield, MA	Satisfactory/ large bank	OCC
Westfield Bank	4/05/2010	Westfield, MA	Satisfactory/ intermediate small bank	OTS

CRA = Community Reinvestment Act. FDIC = Federal Deposit Insurance Corporation. HQ = headquarters. OCC = Office of the Comptroller of Currency. OTS = Office of Thrift Supervision.
Note: Two other banking institutions, First Niagara Bank and Holyoke Credit Union, are not included, because First Niagara Bank was new to Massachusetts, and the Holyoke Credit Union is not subject to federal review.

[7] Credit Unions are exempt; one bank was new to the area and thus did not have a PE.
[8] See https://www.occ.gov/topics/compliance-bsa/cra/perfomance-evaluations-by-month/index-perfomance-evaluations-by-month.html.

Findings

From this research of online sources, face-to-face meetings, and document review, themes emerge on the shortcoming of CRA PEs. The shortcomings, described here, have to do with the nature of data collected, the ease of access to the data, and the mismatch between the data and the work of CDCs.

Mismatched Scale of Data Reporting

Under CRA regulations, banks report information for a self-defined *assessment area* (AA), which is generally quite large. Guidance on defining the AA stipulates—

> … assessment areas must consist generally of one or more metropolitan statistical division (MSA/MD) or one or more contiguous political subdivisions such as counties, cities, or towns. An institution must include the geographies in which its main office, branches, and deposit-taking ATMs are located as well as the surrounding geographies in which it has originated or purchased a substantial portion of its loans. (FFIEC, 2015: 7)

The AA scale of data makes it difficult to determine community development activity within the much smaller target area of the CDC. Of the seven institutions reviewed, five were large banking institutions with multiple AAs and multistate AAs, one 1 was a large institution using the local metropolitan statistical area (MSA; 2 counties for a total of 124 census tracts) for an AA, and one was an intermediate small bank, with an AA of 1 county plus 6 political subdivisions (a total of 94 census tracts)., The regulators reviewed only a sampling of the AAs of the most geographically extensive of the large institutions. Even when the AA chosen included the 2 census tracts of interest to Nueva Esperanza, the size of the AA was at least that of the entire county. The PEs included the total number and amount of small business loans, along with an overall percentage of the banks' small business loans in LMI census tracts within the defined AA. It was not possible to determine if a bank's small business loans went to census tracts 8114 and 8115.[9] Community development loans, investments, and services were reported in various forms. For four banks, the community development information consisted of the minimal requirements—the total number, amount, and generic type of project (for example, homeless shelter)—and only three banks included references to the specific community location, organization involved, or project name. Thus, in general, it is not possible to determine if the community development activity happened within census tracts 8114 or 8115, or even more generally within the city of Holyoke (which has 11 total census tracts). Of the seven banks reviewed, only one bank specifically reported community development loans or investments for projects in the city of Holyoke. It is important to realize that the PEs that were reviewed covered such large areas that a CDC in a separate city within the same MSA (Springfield, MA) would be looking at exactly the same information. Given that the financial institutions serving the census tracts in question, and the city in general, are large, the defined AAs are geographically extensive.

[9] The CRA Aggregate Reports, however, provide the ability to see the overall (from all banks) small business activity by census tract (see http://www.ffiec.gov/cra/online_rpts.htm). Small business loans may legitimately require a level of privacy that would preclude identifying information. Privacy would seem less applicable to community development activities, however, as community development loans and grants are most often part of a larger public funding or regulatory process that includes public disclosure of information.

Generalized Level of Detail

As stated, the information in the PEs on community development loans, investments, and services was extremely generalized and included no specific details on the structure of the loan, investment, or services. It was not always possible to determine in which census tract the community development activity was located. For all but three of the listings, the specifics of the organization receiving the loan, the project location, or both were not disclosed. Typical listings included language such as—

> An officer serves on the Board of a local housing organization that provides programs targeting LMI individuals and families. (OTS, 2010)

> Twenty-four community development grants made by the foundation were reviewed to verify eligibility. These grants totaled $379 thousand, and each provided significant assistance to LMI persons, affordable housing assistance, and/or neighborhood stabilization. (OTS, 2009)

> The largest investments in the Springfield MSA totaled $3.9 million and consisted of LIHTC [low-income housing tax credit] projects which provided more than 400 housing units affordable to LMI families. The bank also invested $290 thousand in one CDFI. Other investments consisted primarily of contributions to local or regional organizations providing economic development, affordable housing, community services or activities that revitalize or stabilize LMI geographies. (OCC, 2009)

These overly generalized descriptions make it impossible to determine if any of the aforementioned efforts occurred in the focus area of the CDC.

Lack of Community Development Benchmarks

PEs combine quantitative and qualitative information and do not establish minimum benchmarks for community development activity. In this study, it was not possible to assess if PE ratings reflected differing standards based on bank size. For instance, Peoples Bank had local deposits far exceeding many of the other banks (anywhere from 4 to 25 times greater than the deposits of other banks in the city), yet its community development portfolio did not seem to reflect such a comparable level of activity (see exhibit 3). Loan and investment activity were not substantially greater, but the PE does note Peoples Bank had a higher level of community development grantmaking than other institutions.[10] Given the subjective evaluation of loans, investments, and services and the regulators' directive to consider the "performance context," it is difficult to draw a direct conclusion about the level of community development activity reported or about how the bank evaluators used performance context in the assessment, which garnered the bank an overall "satisfactory" rating. The comparison, in terms of number of loans and total amount, would not appear to be proportionate to the level of deposits the institution holds. The findings in the study team's final report to Nueva Esperanza highlighted the importance of reaching out to Peoples Bank.

[10] Note that the community development activities are for the entire AA, whereas the deposits are for the city of Holyoke alone.

Exhibit 3

Total Deposits in Bank Branches as of June 30, 2012, and CD Activity From PEs

Bank	FDIC #	Deposits—All Holyoke Locations ($)	Percent of Bank's Total Hampden County Deposits	Percent of Bank's Total Massachusetts Deposits	Qualified CD Activity in AA From PE
Bank of America	3510	75,461,000	7.1	0.1	Not Specified for AA
Peoples Bank	90213	344,801,000	32.7	25.5	8 loans $1.2 million
					Investments $1.6 million
					419 grants $1.2 million
People's United Bank	27334	35,435,000	16.0	1.1	21 loans $12.7 million
					Grants $264 thousand
RBS Citizens, NA	57957	14,499,000	4.4	0.05	5 loans $5 million
					2 investments $434 thousand
					27 grants $358 thousand
TD Bank, NA	18409	24,836,000	1.8	0.2	17 loans $16.9 million
					94 Investments $13 million
United Bank	26486	90,438,000	8.8	7.1	9 loans $1.1 million
Westfield Bank	90300	23,033,000	3.1	3.1	7 loans $2.2 million
					Investments $2.6 million
					28 grants $283 thousand

AA = assessment area. CD = community development. FDIC = Federal Deposit Insurance Corporation. PE = performance evaluation.
Note: To get these data, visit http://www2.fdic.gov, choose Industry Analysis, Banks and Statistics, then enter bank of interest, and once selected, choose Summary of Deposits, CD Activity from PE reports.
Source: http://www2.fdic.gov

Unfriendly Data Portal Design

Although the regulating bodies have made efforts to make the PEs available and have websites with useful guides and information, the very nature of banking structures meant the PE database was not easy to use. Challenges included determining the precise name of the banking institution as listed in the database and matching it to the local bank under review. This issue is exacerbated by the multistate institutions, which may be headquartered in some distant city and do business under a variety of names. In one instance, the bank's most recent PE (2 years old) was not available through the database and had to be requested through the bank. Although the database enables searching in a variety of ways, it does not provide contact information for the CRA-regulating agencies. It is a multistep process to first determine the bank's regulating agency and then search for its PE. An additional finding about online access had to do with the banks' own websites. None of the websites had any information on CRA officers or PE access. Most bank websites are structured as retail outlets and department and personnel listings are nonexistent. In fact, in some cases, the websites did not even list branch addresses.

Defensive Gatekeeper Attitudes

Although we reviewed online PEs before going to the banks, when making the site visit, we requested the public CRA file and the most recent PE. Callers identified themselves as students, and if asked also identified with which CDC we were working. The reaction and treatment we received varied greatly. At most institutions, our initial phone inquiry caused confusion, as few of those answering the phone knew what CRA was or to whom to direct us. When we arrived for our file reviews, two banks provided a private space for our use, and one gave us the PE to review on our laps in a crowded office while the manager sat at the desk and conducted business. One, appearing disquieted, asked for details on our research and followed up by searching Nueva Esperanza online. Further, all the bank employees with whom we interacted (at least one of whom had worked for the institution for 20 years) noted that they had never had a request, prior to ours, to review the public CRA file. All the bank employees seemed to be unaware that the PEs are available online, and some provided inaccurate information regarding the policy for providing us with copies. None of the CRA files had any public comments or letters from organizations; in each case the entire file consisted only of the PE.

Narrow Breadth of Information

Some information relevant to the study was not available (and is not required) in the PE. One notable exclusion is information about whether the bank had declined to participate in any community development activities. In addition, PEs provide little explicit information on the bank's evaluation of community needs, despite the CRA legislation stipulating that banks must consider and respond to such needs. One connection that was lacking was any reference to government plans or analyses that could be relevant, including housing or economic development plans, urban renewal strategies, affordable unit preservation efforts, or Community Development Block Grant planning documents. These documents are good sources of housing need evaluations, often drawing from census data and mapped U.S. Department of Housing and Urban Development (HUD) analyses.

One PE contained a statement attributed to an unnamed local community development person that explained, for one community within the AA, "further development opportunities were limited due to the town having already developed most available land" and thus that community did not provide any opportunities for affordable housing (OTS, 2010: 6). This statement distorts the potential, as affordable housing opportunities can be created through redevelopment and adaptive reuse, and the community noted was only one of many in the AA. Further, Massachusetts is a housing "fair share" state, and the community in question fails to meet the Massachusetts housing goal of 10 percent of the housing stock being affordable. In fact, for the municipality in question, the figure was only 3.5 percent (publicly available information). To clarify, this statement was reported by a bank evaluator—not the bank.

In addition, the Massachusetts Community and Banking Council has developed a voluntary program titled the Basic Banking Checking/Savings Account. Banks are encouraged to offer very low-fee, low-minimum-deposit accounts to meet the needs of low- and working-class households for affordable banking (MCBC, 2016). None of the banking institutions mentioned this program, although two of them participate by offering Basic Banking checking accounts. Nueva Esperanza was interested in bank participation in this program, given the needs of unbanked households in

their target area. The Corporation for Enterprise Development reports that 17.8 percent of Holyoke households are unbanked and another 18.9 percent are underbanked (CFED, 2016), and Nueva Esperanza wanted to see how Basic Banking was addressed in CRA PEs.

Conclusions

Research on CRA has highlighted the critical watchdog role community groups can play in keeping banks accountable to the communities they serve. If CDCs are to play this role, however, the CRA PE data must be accessible, comprehensible, complete, and relevant. Our research made it clear that the PE data fall short of those goals in some communities, and that some basic ways of accessing the data could be improved to simplify and improve community-level monitoring of banks.

Although website availability is an improvement over having to travel and collect or view CRA documents at bank locations, the current websites are not particularly user friendly. Determining the proper name to use for the banks in the search functions is not obvious, nor is knowing how to follow the multistep process of identifying the regulatory agency to locate the most recent PE. Although the websites likely work well for the well-informed and repeat users, for CDC staff attempting to add CRA monitoring to their workload, the websites are difficult to use. If banks simply included CRA contacts on their websites, made regulatory contacts available at the CRA search websites, or both, access to the data would be easier. A list that connects the local bank name with the formal listing name would be helpful.

One of the well-known strengths of CDCs is their place-based nature (von Hoffman, 2012). A trend toward citywide or regionwide CDCs has occurred, but many CDCs still strongly identify with (or are eponymously named for) a portion of a city. Given the size of today's banks (and the streamlining of CRA reporting for smaller banks) few data are reported at a scale that can be aligned with the scale at which CDCs often operate. Although some of the banks we reviewed provided identifying information about community development activities (for example, organization involved and location of project), this information is not required, and many left the information in the public document at a very generalized level. Scale is also a concern when it comes to determining a rating for banks. In a testy 2009 exchange between then-Congressman Denis Kucinich and Sandra Braunstein, then Director of the Division of Consumer and Community Affairs for the Board of Governors of the Federal Reserve System, Braunstein explained how large AAs can mask problems in portions of the areas that large banks serve.

> This is a rating that is done by looking at the totality of banks serving their community needs and depending on the size of the institution that would make a big difference. … If you have one of these huge national institutions and they have a problem in one little market, and then in the other 150 markets they are serving they are doing just fine, how much do you weigh that—I mean these are subjective judgments. (House Subcommittee on Domestic Policy, 2009: 97)

Although the data in the PEs are presented in clear, standardized summary tables, the data are often at an aggregated level that does not align with the target areas of CDCs. For the CDC we were working with, it was not possible to determine if the community development activities reported

were geographically dispersed across a large area or concentrated in a portion of the bank-defined AA. The low level of information PEs provide on community development activities, and the lack of benchmarks, leaves the impression that CRA undervalues community development investments and services. Mapping community development activities, or at least identifying the census tract (as is required for home mortgage and small business loans), would provide a more useful picture. Another approach would be for CDCs to consider the promotion of a local responsible banking ordinance that could seek more specific data. Such regulations reward banks receiving high PE ratings with municipal banking business.[11]

Despite the pubic availability of PE reports, some of the banks with which we interacted during our research were defensive about sharing the reports. CRA is used poorly—if at all—by community groups in western Massachusetts, and some banks are uncomfortable with the public review of the documents. Once we connected with the right people at the banks, the information was forthcoming, but most preliminary-level bank personnel were unaware of CRA. Banks could promote more positive and effective interactions by posting the CRA officer online and in the premises so the interested public can begin with the person who knows the most about the PE reports. Local community organizations should take up the role of regularly reviewing and commenting on PEs for banks operating within their focus areas. Despite the mismatch between data reporting scale and CDC actions, CDCs should reach out to banks to let them know of local- or neighborhood-level needs and to comment on the types of community development work reported in the PE reports. Not communicating is a missed opportunity to increase the banks' awareness.

Finally, our review of seven bank CRA PEs found that many sources of information are not referenced in the PE reports, including sources of data on community needs and the ways banks can provide services for LMI households. In an age of big data, it seems inefficient for the large investments in data preparation completed by a federal agency (for example, HUD data on housing needs or Federal Deposit Insurance Corporation survey results on the unbanked) to go unutilized in federally mandated reviews. The PEs do not present a detailed analysis of needs, yet many relevant sources of readily prepared data on housing needs could be referenced and used as comparisons to the bank-reported data. Having banks more explicitly engage with these analyses (if available), or having regulators use them to inform the performance context portion of reviews, seems like an appropriate way to make sure banks and regulators are aware of unmet needs and gaps in community development finance. Several recent publications have stressed the value of complete and insightful performance context narratives. A publication by the National Community Reinvestment Coalition stated, "the foundation of a rigorous CRA exam, particularly for the analyses of community development lending and investment, is rigorous performance context analysis" (Silver, 2016: 26). This report notes the typical PE lacks the indepth and unique analysis needed for a meaningful comparison between needs and services. In addition, a recent report by the Federal Reserve Bank of San Francisco suggests that banks, although not required to, could benefit from completing and sharing their own performance context analysis with regulators (Choi and Dowling, 2014).

[11] The ordinances are aimed at empowering municipalities with better data, but a recent New York State case has put their fate in limbo. See http://www.ncrc.org/media-center/press-releases/item/1047-ncrc-statement-on-court-ruling-to-overturn-new-york-city's-responsible-banking-act.

In many ways, CRA is an awkward and cumbersome structure for banks to report on how they are meeting the needs of the communities in which they operate. The fact, however, that regulators conduct performance reviews, and that these reviews are public, is a good thing. Certainly, the banking landscape has changed dramatically since the conception and passage of CRA, and thus room for improvement exists. Considering the changes in the economy and banking, revisiting the usefulness of the present PEs is appropriate. Concerns about banking access continue, and options for affordable and community responsive banking continue to be explored (see, for example, Servon, 2017). As CDCs remain strong local agents of change, making sure data on bank activity are more easily accessible and meaningful can translate into informed advocacy for equal access and creative cooperation in the design of needed community development initiatives.

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Commentary: The Community Reinvestment Act Must Be All About Public Participation, but It Still Doesn't Feel That Way

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Under the Community Reinvestment Act (CRA)[1] of 1977, banks have an affirmative and continuing obligation to serve the convenience and needs of the communities in which they are chartered to do business.[2] The best way to determine if banks are serving the credit and deposit needs of the communities is to listen to the residents assess the banks' records of doing so. As Marijoan Bull's article in this symposium shows, however, the public input mechanisms established by the federal bank agencies remain incomplete and, in many instances, are difficult to use (Bull, 2017). Thus, the full potential of CRA is frustrated in terms of increasing responsible lending, investing, and bank services in low- and moderate-income communities.

Two aspects of public participation are related. First, are the public input mechanisms easy to use so that members of the public know how and when to offer input on banks' reinvestment records? Second, what is the impact of public comments on bank performance, and do the agencies take the comments seriously?

In considering CRA and the role of public input on the 40th anniversary of CRA, it is necessary to consider if legislative and regulatory reluctance to update CRA frustrates public input and ultimately impedes CRA's effectiveness. A lack of updating law impedes progress. As Thomas Jefferson said—

> I am not an advocate for frequent changes in laws … but laws … must go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened … new truths discovered … institutions must advance also to keep pace with the times. We might as well require a man to wear still the coat which fitted him when a boy as a civilized society to remain ever under the regimen of their barbarous ancestors.[3]

The current status of CRA resembles more a straightjacket that suffocates public input than a suit that empowers community residents and enables them to make comments that count and influence bank behavior in a positive manner under CRA.

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.
[2] 12 U.S.C. 30, available via https://www.fdic.gov/regulations/laws/rules/6500-2515.html#6500hac801.
[3] https://www.nps.gov/thje/learn/photosmultimedia/quotations.htm.

This commentary describes and assesses the formal mechanisms of public input on CRA exams and merger applications, and it explores whether legislative and regulatory constructs impede public input or create possibilities of public participation having significant impacts.

Formal Mechanisms for Public Input

Federal banking regulatory agencies have established formal mechanisms for public input during CRA exams and merger applications. Agencies solicit and accept comments while examiners conduct CRA exams.[4] Likewise, bank regulatory agencies have established procedures during merger application proceedings for accepting comments on the past and likely future CRA and fair-lending performance of a bank (OCC, 2017).[5] Public input is a primary mechanism of CRA enforcement; the CRA statute requires federal banking agencies to consider a bank's CRA performance in deciding whether to approve or deny a bank's application to merge.[6]

However, the ease of commenting on CRA exams and merger applications is uneven across and within agencies. Although agencies have web page features that facilitate commenting, other aspects of the web pages often frustrate commenting, like a lack of contact information for regulatory staff. For example, the Federal Reserve provides a list of quarterly exams on its web page, where a member of the public is directed to another section of its website to submit a comment with a 1,500-character maximum (which is insufficient for comments on complex topics or large banks spanning several states). The site gives no clear indication about whom to contact if a member of the public has basic or technical questions about the upcoming exam. Other regulators are not much better. The National Community Reinvestment Coalition (NCRC) recently produced a white paper that evaluated and rated the public comment process of the agencies. Overall, NCRC gave the agencies low and failing ratings for their public comment process (NCRC, n.d.).

In addition to the process for commenting, the second critical aspect of the public participation process is the extent to which the agencies take the comments seriously. The agencies tend to elevate the visibility of comments to a greater extent on merger applications than on CRA exams. When agencies issue decisions on merger applications, they discuss past CRA performance and the mergers' impact on future reinvestment and fair-lending performance in a section called "Convenience and Needs." In this section of the merger decision, it is common to see numerous footnotes summarizing community group comments on specific aspects of CRA and fair-lending performance. The footnotes and the body of the narrative include the agencies' responses to the community group comments. Through this discussion and the final decision, it is possible to discern whether community group comments affected the agencies' analyses, conclusions, and final orders.

In contrast, community group influence on CRA exams is more difficult to discern. CRA exams have a section called "Community Contacts." This section often offers generic and cursory

[4] See the CRA regulations 12 CFR Part 25 §25.26. The most explicit statement of this procedure is in the regulations for small-bank CRA exams, in which public comment on a bank's record is one criterion for determining the rating of a small bank.
[5] Federal Reserve rules for public comment and hearings on mergers are in 12 CFR Part 225, specifically see §225.16, Public notice, comments, hearings, and other provisions governing applications and notices. See http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=635f26c4af3e2fe4327fd25ef4cb5638&tpl=/ecfrbrowse/Title12/12cfr225_main_02.tpl.
[6] See Section 804 of the CRA statute (12 U.S.C. 30 §804).

observations of community groups regarding the credit needs and economic conditions of a locality. From these general observations, it is usually not possible to determine if the public input influenced the CRA examiner's analyses, conclusions, or ratings. NCRC commented about a year ago on the CRA exam of Texas Capital Bank. The comments concerned the low levels of lending to businesses with revenues of less than $1 million. The comments caught the attention of the bank's CRA staff, who had some conversations with NCRC. The Office of the Comptroller of the Currency, however, did not contact NCRC for any followup regarding its concerns, leading NCRC to wonder whether its comments had any effect.

The seriousness with which community input is solicited and reflected on CRA exams and merger applications motivates or discourages public involvement. If members of the public regard either CRA exams or merger applications as rubber stamp processes—in which public input is formally solicited in a minimalistic manner, acknowledged in a brief manner, but then largely discarded—then public participation will be infrequent. On the other hand, if substantive comments are elevated in importance, are treated courteously, and influence analyses or conclusions, then public input will be more frequent.

Impact of Public Comment on Community Reinvestment Act Exams—Constraints and Opportunities

In addition to the difficulty of figuring out how to comment on CRA exams, limits on CRA exams' coverage and flexibility, due to legislative and regulatory impediments, curtail the effectiveness of public comments. In particular, three features of CRA exams currently constrain the influence of public comments: (1) assessment areas or geographical areas on CRA exams, (2) the treatment of bank affiliates on exams, and (3) fair lending reviews accompanying exams.

Assessment Areas

Assessment areas are geographical areas on CRA exams that are usually metropolitan areas or counties that contain bank branches. In the case of traditional banks that conduct most of their lending through branches, assessment areas will cover the great majority of a bank's retail lending activity. In contrast, assessment areas will be less effective and cover only a minority of a bank's lending activity when a bank is a nontraditional lender using the internet, brokers, or loan officers to make large numbers of loans. Retail lending outside of assessment areas does not factor in a bank's CRA rating. If a community group therefore raises a legitimate issue concerning retail lending to low- and moderate-income borrowers outside an assessment area, the comment will not factor on the CRA exam.

It is possible to fix the assessment area constraint in a number of ways. The more difficult one in the current political environment is to amend the CRA statute to stipulate that CRA exams consider most bank retail lending, regardless of whether it is conducted through branches. Another fix that could be readily implemented is to follow the example of a few outlier CRA exams that considered lending outside of assessment areas. These exams rely on the current regulation and interagency guidance indicating that a small percentage of lending in the assessment areas will reflect poorly on

a bank (Silver, 2015). The exams then check to see if lending outside the assessment areas is serving low- and moderate-income borrowers. NCRC has yet to see an exam conducted in this manner lower a rating for poor retail lending performance outside of assessment areas. However, it would seem that if an examiner observes poor performance, the exam narrative could point it out and encourage the bank to improve performance. Although a more effective and sweeping procedure is needed, this approach would at least be able to incorporate and respond to community group concerns about substantial volumes of bank lending wherever it is occurring.

A second problem with assessment areas is the distinction between full-scope and limited-scope assessment areas. Full-scope areas have a considerable influence on the final rating, whereas limited-scope areas have little influence on the final rating. In the case of several large-bank CRA exams, full-scope assessment areas are the minority of assessment areas. Moreover, full-scope areas tend to be large metropolitan areas, whereas medium-sized or small cities and rural counties are usually limited-scope areas. NCRC members from areas like Dayton, Ohio; Gary, Indiana; or Upstate New York often have less influence than other members in larger cities on a CRA exam rating, only because of where they live and work.

CRA examination procedures could be changed to facilitate influence from community organizations in smaller metropolitan areas or rural counties by increasing the number of full-scope areas.[7] This change would not significantly increase examiners' workloads or exhaust resources because examiners conduct data analysis for all areas already. Alternatively, agencies could use a random process for designating some full-scope assessment areas so that a bank would be compelled to perform reasonably well in all areas.[8] Still another approach would be to group all limited-scope areas in a state together and count them as one full-scope area, which would give these areas a greater chance to influence a rating.

The CRA examiner could also expand the exam narrative for limited-scope areas, indicating where performance could be improved. Overall, NCRC believes that expanding CRA exam narrative to include discussions of expected improvements in CRA performance—for example, in a new section on CRA exams called "Expectations for Improvement"—would actually be beneficial for both limited- and full-scope exams.

The relatively few times that NCRC and its members have affected a CRA rating involved a systemic issue, meaning that it was significant enough to capture regulator attention. In the case of Woodforest National Bank, for example, NCRC commented on a low loan-to-deposit ratio; that is, the bank was taking deposits but not making loans. The bank failed its exam (OCC, 2012a). Likewise, several NCRC members commented on a restrictive policy involving credit scores and FHA lending in the case of BBVA Compass Bank, which contributed to low levels of lending to low- and moderate-income and minority borrowers (Federal Reserve Bank of Atlanta, 2013).[9]

[7] Presently, full-scope areas tend to be where the most loans are made, deposits are received, or both. However, although a large bank may have a small minority of its loans and deposits in a limited-scope area, the bank, by virtue of its size and market presence, might be a major lender in the limited-scope area. Hence, the case can be made that a number of limited-scope areas on large-bank CRA exams should receive more consideration.

[8] The bank's largest markets, where it has its highest numbers of loans or deposits, will likely remain full scope. However, an examiner could create a random process for smaller markets (whether they be smaller metropolitan areas or rural areas) in which some of these areas are assured full-scope status.

[9] Compass received a needs-to-improve and passed its subsequent exam.

However, identifying systemic issues is a high bar that will not be met in all cases, particularly in the cases of uneven lending across assessment areas. Having an "Expectations for Improvement" section may point to an unmet need that the examiner could agree that the bank has the capacity to address, even when community groups' concerns do not lead to a lower rating. Examiner narrative indicating expectations for improvement would increase the chances that nonsystemic issues, which will probably not impact a rating, will nevertheless be addressed. Also, if a need remains unaddressed and community organizations issue comments in the bank's CRA public file during subsequent years, these comments should influence a bank's rating in one or more states or overall on the next exam.

Affiliates

The current examination procedure of allowing banks to decide whether their nondepository affiliates are included on CRA exams also limits community-group input on CRA exams. Banks tend to include their affiliates if they are making responsible loans and are effective in serving low- and moderate-income borrowers. However, banks will tend to exclude affiliates from their CRA exams if they have compliance concerns or if the affiliates are not particularly effective in reaching low- and moderate-income borrowers. In the early 2000s, leading up to the financial crisis, a number of nondepository affiliates made high numbers of questionable subprime loans that were not included on CRA exams. Clearly, this limited the CRA exams' effect on the behavior of these affiliates and also prevented community organizations from commenting during CRA exams about the affiliates. Community groups would have to wait for merger applications to make their views known about the affiliates. Thus, timely community input on these important matters was limited.

The agencies have not mandated inclusion of affiliates on CRA exams. If they believe action is needed by Congress to mandate nondepository affiliates be included on CRA exams, the agencies could nevertheless amend CRA examination procedure. At the very least, if community groups believe that affiliates are violating antidiscrimination and consumer protection law, they should be able to present their concerns on CRA exams. If the agencies identify violations or inadequate compliance controls, they should downgrade the bank's rating. The inadequate legal compliance would ultimately affect the bank because management does not have strong enough controls throughout the entire organization to ensure legal and responsible operations.

Currently, affiliate violations can lead to downgrades in ratings only if the violations occur in the assessment areas and the bank has included the affiliates in the exam. A recent example of this involves SunTrust Bank, whose affiliate, SunTrust Mortgage Company, was involved in two settlements involving price discrimination[10] and violations of the Home Affordable Modification Program (HAMP)[11] program that occurred during a time period covered by two consecutive CRA exams. The settlements did not affect the bank's CRA exam because the affiliate was not included on the CRA exam. The mortgage company, however, was making high volumes of home loans that the bank was purchasing (Federal Reserve Bank of Atlanta, 2010).

[10] https://www.justice.gov/opa/pr/justice-department-reaches-21-million-settlement-resolve-allegations-lending-discrimination.
[11] HAMP was a federal program that provided subsidies to banks to restructure mortgages of distressed borrowers in order to prevent foreclosure. See https://www.justice.gov/opa/pr/suntrust-mortgage-agrees-320-million-settlement.

Fair Lending Reviews

CRA does not consider lending to people of color or communities of color. Ironically, before the CRA regulatory reform of the mid-1990s, analysis of lending to people of color would occasionally be included on CRA exams (Silver, 2015). Now, a fair-lending review section affirms that either the bank regulatory agency or the Consumer Financial Protection Bureau has conducted a fair-lending review. In a few brief sentences, the section will state that neither review detected discrimination or other illegal activity. Sometimes, the section will state whether occurrences of discrimination or other violations were widespread, thus resulting in a rating downgrade. Occasionally, the exam will describe the nature and type of the violation and which protected classes were victimized. Recently, some very large banks, including Wells Fargo (OCC, 2012b), failed their CRA exams due to serious violations of fair lending and consumer compliance, which were described in the fair-lending review section. However, in many—if not most—instances, the exam will not describe the violation.

When violations are not described, community group input is stunted. Fair-housing and fair-lending groups are unable to engage in testing or mystery shopping to determine if the violations have indeed ceased. They are thus unable to report findings from their investigations on future CRA exams or merger applications. Also, when CRA examiners do not describe community group comments on bank performance concerning communities of color, the community group does not know if the agencies took these comments into account when conducting the fair-lending review. Even if the agencies find that no discrimination occurred, the exam narrative should describe that community organizations raised concerns but that the agencies did not find violations. This would provide reassurance that serious concerns of the public were at least addressed. Overall, the CRA examiner narrative on the fair-lending section needs improvement to be more transparent.

Impact of Public Comments on Mergers and Applications—More Effective Than Community Reinvestment Act Exams

In contrast to CRA exams, the regulators' responses to public comments on merger applications have resulted in public input achieving significant impacts. The Bank Merger Act[12] requires the federal agencies to consider the "probable effect of the merger transaction in meeting the convenience and needs of the community to be served." The "probable effect" is also referred to as the "public benefit" standard. Although not in most cases, the agencies have acted on public comments regarding public benefit.

Past performance will provide a guide to likely future performance. If a bank performed poorly in the past and received a low CRA rating, the future performance is likely to be poor or mediocre at best. Thus, commenting on CRA exams is also important for merger applications. If community groups influence the CRA rating, they can also influence the outcome of a merger proceeding by pointing out weaknesses or strengths in bank CRA performance and exams.

[12] 12 U.S.C 1828 (b). https://www.law.cornell.edu/uscode/text/12/1828.

It is also the case that future performance could be different from past performance. For example, suppose a bank did well on its CRA exam and received a good rating. The future performance could decline if the bank closed several branches after its merger in a cost-cutting move. Hence, careful review of the merger application by federal agencies and the public is important to determine the likely impacts on future performance.

A number of banks try to satisfy the forward-looking requirement with vague promises that they will continue to comply with their CRA and fair-lending requirements. However, NCRC and its member organizations maintain that assessing the probable effect of a merger entails using objective measures of performance in determining whether a proposed merger will have public benefits in the future. For example, will the number and percent of branches in low- and moderate-income communities increase or decrease after the merger is consummated?

Four years ago, NCRC and its member organizations opposed a proposal by Renasant Bank in Mississippi to acquire another midsize bank. Renasant's percentage of loans to minorities and low- and moderate-income borrowers was much lower than that of its peers in a number of metropolitan areas. NCRC asked for a specific plan and performance measures indicating how the bank would improve. The Federal Deposit Insurance Corporation (FDIC) responded in a conditional merger approval requiring the bank to develop an action plan that would indicate how it would improve lending performance to be at or above the level of its peers within 3 years.

NCRC applauded the FDIC's move but noted that the action plan was to be submitted to the agency directly, without the public being able to comment on its adequacy before submission. Ultimately, NCRC and its members want banks to develop such plans regularly and submit them as part of their application. This would help significantly in the implementation of the public benefit standard.

In subsequent mergers, NCRC and its members were not content to wait for the agencies to require action plans submitted by banks. In recent cases involving large banks, NCRC saw an opportunity to work with forward-thinking banks in jointly developing public benefit plans. In early 2016, Keybank proposed to acquire First Niagara, which was a major lender in New England. Communities throughout Keybank's footprint, but particularly in New England, were concerned about branch closures and reductions in lending. Taking advantage of a positive relationship with Keybank, NCRC approached the bank regarding a public benefits agreement.

During the merger application process over a period of several months, NCRC, 100 NCRC member organizations, and Keybank negotiated a public benefits agreement that lasts 5 years that commits Keybank to significant increases over the premerger lending of it and First Niagara. Committed totals include $5 billion in mortgage lending, $2.5 billion in small business lending, and $8.8 billion in community development lending in low- and moderate-income communities. Also, Keybank agreed to halt the closure of four branches in low- and moderate-income tracts and to open a branch in a low- and moderate-income tract in Buffalo (NCRC, 2016).

To increase the chances that the benefits plan can be achieved, Keybank and NCRC established a national advisory committee and several local advisory committees consisting of bank officials and community group representatives. These committees will review the bank's progress in meeting plan goals and work together to magnify successes and also address any obstacles or challenges

impeding goal attainment. The Federal Reserve Board issued a conditional merger approval of Keybank's merger, acknowledging the execution of the benefits agreement reached with community organizations.

Shortly after the Keybank merger, NCRC and Huntington worked together to strike a similar public benefit commitment to be implemented after Huntington's acquisition of First Merit. The total commitment of $16 billion was quite similar to Keybank's. Other important provisions included the addition of dedicated community mortgage loan officers and the formation of a dedicated mortgage processing team to handle unique underwriting opportunities. Reforms in bank processes and additions of specialized loan officers will help banks reach traditionally underserved communities.

The merger application process is far from perfect. Public benefit plans and commitments do not happen regularly. Community groups need to advocate vigorously for their adoption. The agencies, however, recognize the importance of considering convenience and needs in the merger process to make sure that mergers do not benefit banks at the expense of communities. During NCRC's annual conference in 2016, Comptroller of the Currency Thomas Curry called conditional merger approvals a "unique tool" and said that community groups like NCRC have a "critical role" in addressing public benefit concerns (NCRC, 2016).

Conclusion

A law, no matter how well constructed, is only as good as its implementation. CRA and the merger application process have conferred significant benefits on traditionally underserved communities, but the constrained and tentative regulatory implementation of these laws has frustrated their full potential. Integral for the full attainment of these laws is the active participation of the communities these laws are intended to empower. The participation of the communities, however, will be stunted if CRA exam procedures continue to limit the scope and application of community group comments due to blinkered procedures regarding assessment areas, affiliates, and fair-lending reviews. Although the procedures regarding public input and the consideration of public input are more developed and effective on merger applications, inconsistencies remain. CRA and the merger application process should ultimately be regarded as means for creating dialogue and conversation among stakeholders (community groups, banks, and regulators) about the extent to which banks are meeting community credit needs. If the conversation is stilted and options are limited for responding to the conversation, then CRA and the merger application process will fall short of their potential to increase access to credit, investment, and bank services for traditionally underserved communities. The recommendations in this commentary are geared toward promoting a rich and powerful dialogue that leads to mutually beneficial results for communities and banks.

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Commentary: FinTech and the Liberation of the Community Reinvestment Act Marketplace

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Abstract

Observers of the Community Reinvestment Act (CRA) have for many years noted the pressing need for reform of the law's principal unit of analysis—the assessment area. As noted on prior anniversaries of CRA, the geographic basis for assessment areas has become increasingly irrelevant, given the disparity between where deposits are held and where the business of banks actually takes place. What was once an observation on a growing trend is quickly becoming a historical footnote, thanks to the way financial technology, or FinTech*, is rewriting how and where financial services are provided. To date, FinTech organizations are without community reinvestment obligations. The impending oversight of the FinTech market presents an historic opportunity to rethink assessment areas, while using technological innovation to more equitably distribute CRA investments to the people and communities most in need.*

Introduction

The ongoing disruption of the banking industry has raised a lot of questions, including how the banking industry will continue to fulfill its community reinvestment obligations in the face of relentless change. As described throughout this issue of *Cityscape*, the Community Reinvestment Act (CRA)[1] of 1977 places one or more requirements related to lending, investment, and service requirements on banks. This legislation was passed to combat practices of denying credit to business and residents (often minority and/or low income) within defined geographies by literally mapping a red line of exclusion (that is, *redlining*) around these areas (Federal Reserve Bank of Minneapolis, 2017).

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.

For 40 years, CRA has provided a critical lifeline for community development efforts in underserved communities, while ensuring stable and accessible funding for small businesses, housing, and community facilities. An effective solution at the time, this framework for the equitable distribution of financial services has become complicated by two related trends in the ensuing years: changes in who provides financial services and where those services are provided.

In particular, changes in technology have led to anywhere-and-anytime financial services enabled by web or mobile apps, created by banks and nonbanks alike, that make branch networks less relevant than in 1977—particularly for granting credit. This trend predates the 2007-to-2009 financial crisis (hereafter, the recession); data compiled by authors at the Federal Reserve Board found an increase in the median distance for a consumer loan between the location of the borrower and the location of the financial institution from 7 to 22 miles, or 214 percent, from 1992 and 2004 (Amel, Kennickell, and Moore, 2008).

The recession contributed to further reducing the reliance on bank branches, as the subsequent low-interest-rate environment pressured margins, and alternative means of providing financial services became more widely adopted.

Between the historical peak in 2009 and 2016, the number of bank branches nationally declined nearly 8 percent, an average of more than 1,000 branch closings per year (FDIC, 2017). The impact of technology on this consolidation is hard to ignore; mobile banking participation rates increased from 22 to 43 percent in the overlapping period between 2011 and 2015. Meanwhile, a rough parity developed during the same period in how customers interact with a bank. A 2016 Federal Reserve Board survey of banking customers polled respondents on whether they had used a branch, automated teller machine (ATM), and online banking during the past 12 months. The results indicated uses of 84, 75, and 71 percent, respectively, demonstrating relatively equal willingness to use alternative access to financial services (Federal Reserve, 2016).

Reflecting on the pressure to traditional banking caused by new technology, the former Chief Executive Officer (CEO) of Barclays, Antony Jenkins, noted that "the number of branches and people employed in the financial services sector may decline by as much as 50 percent over the next 10 years" (Williams-Grut, 2015), which is corroborated by World Bank estimates that the total number of U.S. branch locations will contract an additional 33 percent by 2025, when taking into account population changes (Citi, 2016).

Despite these trends, CRA's primary unit of analysis is unchanged since 1977 and continues to focus on a bank's geographically defined *assessment area*, where branches, ATMs, and offices are located. Banks self-define the assessment area, which represents the geographic area in which regulators measure, both quantitatively and qualitatively, a bank's CRA activities. The problematic nature of the assessment area as the unit of analysis for CRA has been well understood by the community development field for many years—including previous reviews of CRA (Chakrabarti et al., 2009).

More recently, the emergence of the financial technology, or *FinTech*, sector raises a fresh set of questions as to whether CRA's regulatory framework is outdated. The FinTech sector includes diverse applications, including crowdfunding platforms such as Kickstarter, education lending

platforms such as SoFi, and payment tools such as Stripe. The landscape of FinTech expands with each passing day. In broad strokes, FinTech includes everything in financial services to which technology can be applied and is most commonly focused on enhanced speed and better user experiences related to loan origination, credit evaluation, and payment services.

In this article, I highlight the challenges and opportunities of FinTech, given its influence in rewriting the rules of lending and eviscerating the geographic limitations of banking. I first discuss why a CRA framework is critical for FinTech and then why assessment areas are already falling short. I conclude by reflecting on opportunities for FinTech to help alleviate the geographic mismatch of CRA activities. Taken together, it is my argument that CRA continues to be a critical law but that it should be modernized through a broad and a fair framework that acknowledges how financial services are provided in 2017 and how they will be provided in the decades to come.

Why FinTech Is Key to the Future of Banking

The growth of FinTech is best illustrated by Lending Club, which was founded in 2006 and is arguably the most well-known FinTech participant. Lending Club falls in a subcategory of FinTech called *marketplace lending*, in which the company originates the loan and unrelated individuals or firms then fund the loan by purchasing it in real time through the online platform. This model is in contrast to a *traditional lending model*, in which a bank accepts deposits at a brick-and-mortar location, originates a loan, and then funds the loan with those deposits.

Lending Club expanded rapidly following the recession (Crunchbase, 2016). The company's total originations grew from approximately $77 million in 2009 to nearly $19.5 billion by the fourth quarter of 2016 (Lending Club, 2016). In the process, Lending Club helped pave the way for other FinTech startups by showing venture investors the value of the sector. Its initial public offering was the one of the largest for 2014 and netted the company $900 million at an $8.5 billion valuation (Whitehouse, 2014).

Lending Club is only one example in a diverse and rapidly growing field. McKinsey estimates that between April 2015 and February 2016, the number of FinTech startups grew from 800 to more than 2,000—with upper-tier estimates putting the number of related startups as high as 12,000 (Dietz et al., 2016). Industrywide loan origination activity provides another measure of growth. FinTech data aggregator Orchard estimates that unsecured consumer origination in the sector totaled approximately $9.8 billion in 2016, which represents a 312-percent increase over total origination in 2013 (Orchard, 2016). Despite this rapid growth, FinTech is still small compared with conventional bank lending, accounting for only 1 percent of all consumer lending activity, but it is expected to increase to 17 percent during the next 6 years (Citi, 2016).

Traditional lenders have not been passive in the growth of FinTech, however, and are both collaborating with and adopting innovations from the sector (Citi, 2016). Representative examples of this adoption include Citibank's internal Citi FinTech division and JPMorgan Chase's agreement with OnDeck for small business loan origination (Gandel, 2016; Rudegeair, Glazer, and Simon, 2015). More generally, banks have focused on adopting the best practices of FinTech in technology related to payments, credit evaluation, and mobile services.

Unlike traditional lenders, however, CRA compliance is not required of financial service providers that are not Federal Deposit Insurance Corporation-insured depositories, which includes most FinTech participants. As noted previously in the collaboration examples, FinTech often plays a complementary—and, in some cases, substitute—role for traditional banking services. This dynamic calls into question the ability of CRA to ensure equal access to financial services while relying on an outdated framework of banks servicing defined geographic areas.

New Frontiers in Redlining: The Case for Subjecting FinTech to the Community Reinvestment Act

Until recently, the most widely applicable regulations for FinTech are laws related to consumer protection. Following the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act,[2] the Consumer Financial Protection Bureau (CFPB) is the primary oversight body for consumer protection. Its mission is to enforce and to make rules related to consumer financial protection acts, which include the Truth in Lending Act[3] of 1968 and Truth in Savings Act[4] of 1991, which require terms and conditions disclosure; the Equal Credit Opportunity Act[5] of 1974, a precursor to CRA that prevents discrimination on the basis of race, color, religion, national origin, sex, marital status, age, and receipt of public assistance; the Real Estate Settlement Procedures Act[6] of 1974, which requires disclosure and fee restrictions with regard to home loans; and the Fair Debt Collection Practices Act[7] of 1977, which restricts debt collection activities (Carpenter, 2014).

In addition to the laws mentioned previously, many states have usury laws that limit the maximum interest rate charged by institutions. State-specific laws, however, can be avoided when the lender is a bank based in another state with more flexible interest rate regulations (Rudegeair, 2015; Beam, Kaplan, and Weissgold, 2011). Many FinTech lenders use the latter exception to avoid usury laws through partnerships with nationally chartered banks. In these instances, the bank serves as the legal entity that originates the loans, which are then sold to the FinTech company with payment provided by either their own funds or funds from an outside investor (in the case of marketplace lenders). To date, most efforts to regulate FinTech lenders have focused on these basics, such as a 2015 New York State court case that challenged avoidance of state usury laws for nonbank entities (Wack, 2016).

The dynamic mentioned previously is changing rapidly since the December 2016 announcement by the Office of the Comptroller of the Currency (OCC) that it would grant special-purpose banking charters for FinTech companies. Insight into the OCC's intent with regard to CRA-like obligations are outlined in a white paper that accompanied the announcement and a draft (at the time of writing) licensing manual released in March 2017 (OCC, 2017, 2016). Both documents acknowledge the necessity of accommodating responsible and inclusive applications of new technology.

[2] Pub. L. 111–203, 124 Stat. 1376.
[3] Pub. L. 90–321, 82 Stat. 146, Title I.
[4] Pub. L. 102–242, 105 Stat. 2236.
[5] 15 U.S.C. § 1691 et seq.
[6] Pub. L. 93–533, 88 Stat. 1724.
[7] Pub. L. 95–109, 91 Stat. 874.

Notably, the draft OCC FinTech manual includes a requirement to specify, as part of a special purpose charter application, a Financial Inclusion Plan that would identify markets and communities touched by the organization's products and services. Appendix B of the document outlines regulatory expectations, including identification of geographies and customers served and the need for measurable goals for meeting the financial services needs of these populations. In draft form only and without applicants to review at this time, it is unclear how this Financial Inclusion Plan will be used in practice and whether it can provide the same protections afforded by CRA.

In particular, it is unclear as to how new regulation will address the most concerning aspects of FinTech, which are buried in the algorithms and data aggregation that are the foundation of new approaches to credit evaluation. The CFPB noticed this concern and has focused efforts on ensuring that third-party data used by financial institutions is available to consumers and that consumers grant permission prior to data use (Cordary, 2016). This line of inquiry is particularly important, given the many alternative metrics FinTech uses to evaluate creditworthiness. Discoverable examples (not buried in proprietary models) include indicators such as majors for international students, post-college moves, and trust scores based on social-network data (Dietz et al., 2016; ZestFinance, 2014).

On one hand, new approaches to granting credit have the potential to help previously underserved and unbanked communities, members of which may not currently qualify based on traditional credit metrics that conventional lenders use. On the other hand, it may lead to scenarios in which lenders deny credit because of a lack of access to broadband or a cultural avoidance of social media.

Moreover, rather than outright discrimination based on religion or race, one common link among these alternative metrics is that they bear closer resemblance to CRA's emphasis on spatial service areas. Data on individuals with both many post-college moves and seemingly untrustworthy social networks have a spatial aspect that could be pinpointed on a map and evoke the redlining of years past. Unlike years past, however, the identification of these groups is buried in big data algorithms that, without transparency and a regulatory mandate for inclusion, are impossible to characterize as either fair or exclusionary.

Beyond the invisible boundaries discussed previously that potentially limit (or expand) credit access is the unique threat posed by marketplace lenders. In this subsector of the FinTech sector, entities such as LendingClub, Prosper, and FundingCircle credit score and originate the loan. Critically, the loan is not funded until outside investors, either institutions or accredited investors, make a decision to purchase the loan. This method essentially puts the credit decision in the hands of thousands of individuals who bring their own sources of potential bias in deciding to fund a loan. Marketplace lenders derive income primarily from origination and service fees and are ultimately dependent on these investors for funding the loans.

Dugan and Demos (2016), writing in the *Wall Street Journal*, noted this potential pitfall of the platform while describing a widespread practice on the part of marketplace-lending investors of avoiding certain states like Nevada and Florida. The article focuses on LendingClub, which does not provide neighborhood-specific locational data for loans, limiting the extent to which individuals can engage in de facto redlining. Nevertheless, redlining is clearly the intent of the investors

identified in the article, as evidenced through investment advice articles specific to marketplace lending with titles such as, "The Joy of Redlining: Why I Never Lend Money to Florida" (Dugan and Demos, 2016). Notably, these investors have made it impossible for a marketplace lender to penetrate all areas of its service area and highlight the potential role CRA could serve in ensuring that borrowers in Florida or Nevada receive fair technology-enabled access to credit.

The incorporation of FinTech into CRA cannot work under the current paradigm of geographically defined assessment areas, as these nonterritorial entities seek the largest coverage possible. However, FinTech has the potential to liberate CRA-related spending by reaching borrowers that traditional banking structures cannot. Expanding the assessment area from its narrow historical boundaries to conform to the changing landscape of how financial services are offered is key to the liberation of CRA-related spending.

How Assessment Areas Hurt Community Development

Alongside pressures on the assessment area stemming from FinTech is another issue related to the equity of spending spurred by CRA. One of the more problematic outcomes of CRA is that related activities fall in geographies where bank deposits are concentrated. Because the banking and financial services industry is concentrated in large urban areas, the major banks have assessment areas that overlap among and within major population centers, such as the Northeast corridor and California. The consequence is outsized demand for investments that may qualify for regulatory credit in those markets, whereas states in the Midwest and the Southeast rely on a smaller deposit base for equally meaningful community development needs.

This trend is particularly true of opportunities for investment credit, which is largely facilitated through purchase of tax credits, such as the Low Income Housing Tax Credit (LIHTC) and New Markets Tax Credit, and of mortgage-backed securities (MBS) that include home loans for low- and moderate-income borrowers. The LIHTC program in particular is one of the most liquid of all CRA-related investments, thanks to a process for generating equity for affordable housing development that has been refined in the 30 years since it was created in the Tax Reform Act[8] of 1986. As a result, the market and related pricing for LIHTCs provide the best measure of the geographic mismatch in CRA investments.

Cohn Reznick (2013) explored the geographic mismatch in LIHTC tax credit pricing due to CRA in detail, finding that 76 percent of tax credit properties are in areas where the top 20 U.S. commercial banks have CRA responsibility. Translated to tax credit pricing, this concentrated demand resulted in a 35- to 60-cent premium in the purchase price of each tax credit dollar if the project's location was in a favorable area for CRA. In the fall of 2016, the CRA yield premium was estimated to fall in the range of 1.25 to 1.50 percent (resulting in a higher tax credit price), according to industry observers (Garcia, 2016).

The consequence of this pricing discrepancy is that deserving projects outside of population centers where deposits are concentrated get less money. Cohn Reznick (2013) also noted this

[8] Pub. L. 99–514, 100 Stat. 2085.

conclusion, arguing that geographic tax credit pricing gaps could be closed, and projects funded, by allowing for banks to invest in states and broader regions surrounding assessment areas.

For the purpose of this article, the question is not only how geography can be expanded, but also how other investments outside of the commonly used tax credit investments and MBS can become a more common part of the CRA toolbox, thanks to the specialization and the efficiencies gained through FinTech. One way to accelerate the integration of old and new financial services is to bring them into the same regulatory framework while reviewing each based on their furtherance of CRA's mandate to provide equitable access to financial services.

Comparative Advantage: A New Community Reinvestment Act Framework

Fortunately, a framework for collaboration and alignment of incentives already exists, as two concurrent events—FinTech regulation and discussion of CRA reform—emerge. In early 2015, Lending Club and Citibank teamed up to arrange for a $150 million credit facility that facilitated a third party's purchase of loans to low- and moderate-income neighborhoods and borrowers within Citi's assessment area (Lending Club, 2015). Critically, the arrangement has Citi providing credit to the third-party firm, rather than borrowers, and begs the question of why Citi did not directly engage with the population it had hoped to serve.

Nevertheless, the transaction provides an example of how the new and the old providers of financial services can build on their own comparative advantages to both meet regulatory requirements and produce better community-development outcomes. The former Lending Club CEO noted how this interaction is common when interfacing with traditional lenders.

> We work with a lot of banks now and CRA often comes in conversation about something banks would like to more of. They are having trouble reaching these populations because they don't necessarily have branches in a particular area, so having an online lending platform is a way to reach them. (Banjo, 2015)

In this case, FinTech provided its ability to originate loans in difficult-to-reach populations, and a bank provided its access to capital. Unfortunately, this partnership did not expand CRA markets, as Citi's interest was in meeting the requirement of the existing regulatory framework.

One way to move beyond geographic mandates is to conceptualize CRA in an outcome-based framework that enables regulatory dollars to have the largest impact—wherever those dollars are needed most. In this framework, the power of big data harnessed for alternative credit metrics could also be applied to creating meaningful impact measures.

Pay for Success financing models, for example, provide a promising analogue for the outcome-based approach. In these models, loan payments are tied to outcomes, like reducing stormwater runoff volume or increasing the number of homeless individuals in stable housing. A typical CRA evaluation period spans 3 to 5 years and provides an appropriate timespan to measure the impact of community interventions tied to an institution's business model.

Aiding this potential framework is the large amount of data ready to be analyzed for CRA purposes. The U.S. Census Bureau, among other agencies, has application programming interfaces available for use in dynamic models, and the Federal Financial Institutions Examination Council publishes a number of CRA-related data sets that could be combined to understand where need exists but is not being met under current activities. Most promising, technology could enable community development technology to go where individual practitioners cannot by searching through regulator-authored CRA performance evaluation reports to identify local patterns and gaps—a desperately needed outcome as aggregated reporting on CRA-related community development lending and investments is scarce at a usable scale.

For on-the-ground practitioners of community development, this change would be welcome in all but a few markets. High-quality housing for low- and moderate-income populations may be as important to rural Mississippi as it is to cities on the Acela corridor, but it is often extremely difficult to attract any part of the $87 billion in annual bank-related community-development lending to out-of-the-way places (FFIEC, 2016). Local banks may provide appropriate dispersion of loans and investment through their service areas, but they lack the scale of the 20 largest banks noted in the Cohn Reznick study.

In contrast, a small portion of one of the largest banks' CRA investment goals could go a long way toward increasing demand, and the amount of funding raised, for any number of important community objectives in markets that do not have oversubscription for qualifying projects.

Behind the compliance officer and regulator curtain, rumors abound that regulators expect to see CRA loan and investment targets in proportion to the amount of high-quality capital, such as U.S. Treasury bonds and deposits, known as Tier 1 capital, required by Dodd-Frank and Basel III. In reality, no formal targets exist within CRA, and the issue highlights the wide amount of discretion on the part of CRA examiners. An obvious alternative to the assessment area is to move from the map to the balance sheet and formalize the Tier 1 target (or others developed with stakeholder participation). Banks would then have the burden of proof to make the most meaningful investments within these capital targets.

FinTech can then help locate the most promising investments and loans to low- and moderate-income individuals. The potential for FinTech to aid CRA loans is already established in the Citibank-Lending Club partnership. Investments are an untested, but potentially critical, application of a new approach. A significant amount of activity related to meeting the investment criteria is concentrated in the purchase of qualifying secondary-market securities, like federally guaranteed MBS—hardly a good use of the CRA price premium.

It is not difficult to imagine an alternative wherein banks seek securities with better impact through FinTech start-ups like Neighborly or Point. The first of these is a municipal bond issuance platform that uses technology to gain efficiency in the issuance of municipal securities while opening the door to investments in small-scale infrastructure, like streetscapes and parks. The second is a platform to help owners monetize home equity by selling a fraction of their equity to Point, in turn, the owner avoids using a home equity loan and the start-up does not receive a return until the home sells or the owner buys back the equity.

As discussed previously, a price premium (note that a higher price means a lower yield and potentially a better rate for borrowers) for CRA spending clearly exists, which can provide additional financial incentive for FinTech to become involved in originating investment and loan opportunities. Meanwhile, FinTech will similarly be evaluated for its ability to reach populations in need, based on the appropriate macro outcome—origination, credit, and so on.

A symbiotic relationship between banks and FinTech around CRA could be one way to further the appropriately broad guidance given by the OCC in its framework for innovation in financial products.

> The OCC may also issue guidance on its expectations related to products and services designed to address the needs of low-to moderate-income individuals and communities and may encourage innovative approaches to financial inclusion by promoting awareness of other activates that could quality for Community Reinvestment Act consideration. (OCC, 2016)

Emerging practices in a data analysis can fuel this new framework by shedding light on the actual impact of dollars generated by regulatory requirements. FinTech participation is not the cure-all for better community investments, but it does represent a source of leverage to bring relative impact to the forefront of CRA spending.

Data-enabled guidance and regulatory approval on where banks and FinTech are going before they begin could build on early efforts at providing regulator-defined performance contexts and preapproval of CRA investments. Both of these approaches have anecdotally proven to be a success in facilitating higher quality and new types of activity (Choi and Dowling, 2014; Cisneros, 2015). Data, the fuel of FinTech, can help expedite these early and time-intensive efforts by reducing the risk of banks in considering new methods of CRA compliance.

A data-driven process would ease the time burden of regulators who would be required to evaluate a dispersed book of lending and investment that extends beyond their current geographic specializations. As always, enthusiasm for the elegance of data is tempered by the risk of spending in only those categories that are measurable, but it is one starting point for regulators to complement time-tested methods that have made CRA such an effective law.

Undoubtedly, we will see unimaginable changes in how financial services are provided in the next 40 years, but it is clear that the geographic basis of CRA is increasingly problematic. An outcome-based approach tied to the regulated entities' primary business plans, such as capital, loans originated, or whatever subspecialization emerges, is one method to ensure flexibility. This new framework would be only a start, but it would be critical in helping reallocate current spending related to CRA in a more equitable distribution for the benefit of all involved.

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Commentary: What Can We Learn From Government Attempts To Modify the Allocation of Mortgage and Consumer Credit in the United States?

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Introduction

This commentary considers the Community Reinvestment Act (CRA) in historical context. CRA reflects one of many government attempts to influence the allocation of mortgage and consumer credit, but many of these interventions have had adverse outcomes. This commentary is written in the hope that those who are aware of history will stop repeating it. Specifically, I argue that lawmakers have been too quick to succumb to political pressures and have failed to follow basic economic principles when creating mortgage market policies. As a result, expanding access to credit has been prioritized over the safety and soundness of the housing and mortgage markets.

The Legacy of Past Housing Policies

Until the 1990s, restrictions on banks limited their geographical expansion. The policy of not allowing interstate branching was formalized in the McFadden Act[1] of 1927 and strengthened by the Bank Holding Company Act[2] of 1956. Although these restrictions seem absurd today, they had important implications for mortgage finance. Because they could not branch across state lines, banks held local mortgages in their portfolios and were forced to take substantial geographic risk that could not easily be diversified away. The lack of portfolio diversification was magnified because deposits were also local. As a result, a downturn in the local economy could result in bank failure, because customers would withdraw deposits and loan performance would deteriorate. Banks could not market the poorly performing local loans, and liquidity problems would turn into insolvency.

[1] Pub. L. 69–639.
[2] Pub. L. 84–511, 70 Stat. 133.

Given the political unpopularity of branching, the answer to geographic risk diversification was to get mortgages out of the portfolios of the depository institutions that underwrote and endorsed them. The National Housing Act[3] of 1934, which established the Federal Housing Administration (FHA) and introduced mortgage insurance to make mortgages more marketable, accomplished this goal. In the beginning, insurable mortgages had a maximum term to maturity of 20 years and a maximum loan-to-value (LTV) ratio of 80 percent, based on strict appraisals and required property inspections. The founding of the Federal National Mortgage Association (Fannie Mae) in 1938 to purchase both FHA-guaranteed and conventional mortgages was the second answer to the problem of diversifying geographic risk. Fannie Mae enabled housing to be financed by ultimate lenders who held a well-diversified portfolio. In many cases, banks, which could not diversify geographically due to statutory limits, purchased the mortgage-backed securities back from Fannie Mae.

The prohibition against branching provided a justification for federal involvement to diversify geographic risk, but it introduced other problems. Initially, FHA Section 203(b) mutual mortgage insurance was seen as a success. FHA was designed to protect homebuyers and taxpayers, but the limits on both maturity and LTV ratio crept upward as house prices rose and memories of the Great Depression faded. *Redlining*—which was designed to manage FHA's risk by avoiding neighborhoods where house prices were likely to decline—came under attack for discriminating against minority neighborhoods.

Yet another policy was added in response: Section 235 of the Fair Housing Act[4] of 1968. It relaxed lending criteria, reduced property inspection requirements (increasing the risk that mortgages were made on flawed units), and provided interest rate subsidies. The next 5 years were marked by scandal; more than 240,000 units went into default, resulting in a foreclosure rate five times that of FHA insurance. The effects of dilapidated and abandoned structures on neighborhoods turned residents against FHA and raised demands that the private sector become more involved in financing higher-risk loans. In my opinion, the primary impetus for passage of the Home Mortgage Disclosure Act[5] (HMDA) of 1975 and the Community Reinvestment Act[6] (CRA) of 1977 was the complete failure of Section 235, which was in turn a reaction to deficiencies in FHA Section 203(b) mutual mortgage insurance.

Given the failures of these FHA programs, public policy turned to the thrift industry to provide mortgage credit to lower-income borrowers and, again, set up policy conditions that worked against sound economic principles. Thrifts were given valuable competitive advantages. First, Regulation Q interest-rate ceilings were set to keep the cost of capital for thrifts artificially low but high enough to give them an advantage over commercial banks in attracting small savers. Second, restrictions on branching, particularly convenience and advantage regulations, gave thrifts some degree of local market power. However, a combination of rising interest rates and financial innovation that provided small savers access to market returns through Money Market Mutual Funds prompted disintermediation and destroyed the thrift business model. Economists had forecast these effects, but regulators ignored them.

[3] Pub. L. 73–479.
[4] Pub. L. 90–284, 82 Stat. 73.
[5] Pub. L. 94–200, 89 Stat. 1124.
[6] Pub. L. 95–128, 91 Stat. 1147, Title VIII.

The thrift crisis of the 1980s gave the banking system a reprieve from the regulatory effects of HMDA and CRA, as the government's problem was not how to finance more housing, but how to dispose of all the mortgages and properties acquired in the financial crisis. Eventually, about 750 insolvent institutions with assets of $800 billion (in 2016 dollars) closed. The Resolution Trust Corporation, established under the Financial Institutions Reform, Recovery, and Enforcement Act[7] of 1989, was involved in disposing of defaulted housing assets not unlike that which followed the demise of the Section 235 program. Once again, history repeated itself.

The Post-1990 Public Policy Record

Since 1990, a steady technological transformation of mortgage and consumer credit markets has taken place. Brick-and-mortar branches are closing. Lending is accomplished on the internet. Property appraisals and tax assessments are automated. When HMDA passed in 1975, property records were recorded on paper and filed in local courthouses. Now, property-transfer records are available on the web, easily scraped, and matched with HMDA records, so that today there is virtually no privacy in HMDA data. Indeed, the publication of HMDA data is inconsistent with U.S. Census Bureau standards for preserving privacy.[8] CRA has also failed to respond to technological change. CRA is based on the presumption that deposit insurance is so valuable to banks with brick-and-mortar branches that they will assume substantial examination and compliance costs and will adjust lending, investment, service practices, or a combination of the three to achieve an "outstanding" or "satisfactory" CRA rating. That presumption, however, is technologically obsolete and financially unsound for both borrower and lender. Equally troubling is that economists have been unsuccessful in determining that having institutions with high CRA ratings makes a significant difference in overall community economic performance. Given that 97 percent of institutions examined achieve high ratings, the opportunity to study the effects of unsatisfactory performance on local economies is scarce.[9] Paradoxically, it may be that CRA has actually discouraged branching that could expand the definition of market area. Given that branches have been closing rapidly, perhaps having CRA impose extra burdens on banks that branch is not a good idea.[10]

Despite the fact that the financial landscape had changed in a way that made CRA's original premises invalid, the 1990s instead saw a move to combine CRA with the now revitalized and recapitalized government-sponsored enterprises (GSEs; that is, Fannie Mae and the Federal Home Loan Mortgage Corporation, or Freddie Mac) to provide high-risk mortgage credit. The Federal Housing Enterprise Safety and Soundness Act[11] of 1992 enabled HUD to set mortgage purchase

[7] Pub. L. 101–73, 103 Stat. 183.

[8] For example, Gerardi and Willen (2008) were able to identify more than 70 percent of HMDA respondents by matching census tract, lender, and loan amount with readily available property records purchased from a commercial firm. This finding contrasts sharply with CFPB's (2016) assurance to the public regarding privacy of their HMDA data, which stated, "This provides enough information about the location to be useful, but still provides protections for individual privacy."

[9] For an excellent discussion of the nature of CRA examinations and attempts to find economic effects, see Getter (2015).

[10] For example, Bank of America's annual reports indicate that it has 4,600 branches today compared with 6,100 in 2009. Of course, institutions can earn CRA points by selective branching, so the net effect of CRA on branching is difficult to determine. The intent of CRA is a complete reversal of previous public policy that discouraged branching. Indeed, under convenience and advantage regulation, banks were allowed to branch only into fast-growing, higher-income areas, because the concern was to preserve the safety and soundness of the banking system.

[11] Pub. L. 102–550, 106 Stat. 3672, Title XIII.

goals for the GSEs and established the Office of Federal Housing Enterprise Oversight (OFHEO) to monitor their safety and soundness. Again, sound economic principles were ignored. Initially, OFHEO calibrated a stress test using GSE mortgages acquired between 1979 and 1997 and was required to publish the results.[12] However, OFHEO never updated it. Frame, Gerardi, and Willen (2015) found that, if the stress test had been updated, by 2004 it would have been apparent that the GSEs had a capital adequacy problem. Yet, in 2004, HUD raised the GSE affordable housing goals at precisely the time when the GSEs should have been contracting. In mid-2007, the GSEs reported $65.5 billion in book value of equity against $1.7 trillion in assets (3.9-percent ratio). In June 2008, they reported $54 billion in equity supporting $1.8 trillion in assets. On September 7, 2008, they were put into receivership. OFHEO and the Federal Reserve had allowed them to expand, rather than contract, based on faulty modeling and political pressure. Impartial economic analysis would have curtailed their operations years earlier, but political forces always triumph over economic analysis in mortgage market policy.

During the 1990s, another episode occurred in which political pressure caused large FHA losses in a policy initiative at least as flawed as the Section 235 program: the seller-funded downpayment program. Originally designed to expand access to homeownership, the seller-funded downpayment program enabled sellers to "voluntarily" contribute the downpayment for FHA-insured mortgages to an approved nonprofit organization, which used part of the contribution to help finance a downpayment. The Housing and Economic Recovery Act[13] of 2008 finally terminated the program due to high default rates. Hard experience demonstrated the economic unsoundness of assuming that sellers would voluntarily contribute funds to a third party to pay the downpayment without raising the asking price by the amount of the contribution. Simple economic analysis would have demonstrated the fallacy of the program's expectations and prevented the high rates of default and foreclosure.

Since the housing crisis of the mid-2000s, the gap between economic analysis and public policy toward credit markets has only grown wider. For example, the Dodd-Frank Wall Street Reform and Consumer Protection Act[14] of 2010 (Dodd-Frank Act) limits the fees that mortgage brokers can charge to take, underwrite, and endorse mortgages. Fees are now expected to be uniform; no yield spread premium can be paid, regardless of whether the applicant applies online and has perfect financial records, a large downpayment, high credit score, and ample income or whether the applicant is unable to use a computer, keeps financial records in a shoe box, and has a low credit score.[15] Discovering the lack of creditworthiness of individuals whose financial records are in a shoe box can be very expensive. The response to regulation of fees for brokerage services has been a predictable decline in mortgage brokers serving low-income, less-educated borrowers.

[12] The requirement to publish a stress test is problematic and shows a profound misunderstanding of the problem of bank regulation because the test, once published, invites institutions to engage in regulatory capital arbitrage. The process is like giving students the questions on the final examination at the start of a course. They are likely to learn the answers and nothing else.

[13] Pub. L. 110–289, 122 Stat. 2654.

[14] Pub. L. 111–203, 124 Stat. 1376.

[15] The Federal Reserve proposed the original broker compensation rule in July 2009. It is now part of the Dodd-Frank Act. Section 129 B of the Truth in Lending Act was modified, adding section (c), which prohibits a mortgage originator from receiving and no person from paying compensation based on the terms of the loan except for the amount of a residential mortgage loan.

GSE regulation also continues to be problematic, for example, when political pressure does not allow for GSEs to price mortgages based on geographic risk. In 2008, the GSEs asked Congress to be allowed to require more equity in declining housing markets, a logical step to protect them against default risk. As Hurst et al. (forthcoming) explained—

> The declining market policy was announced in December of 2007 and was implemented in mid-January of 2008. After receiving large amounts of backlash from a varied set of constituents, the policy was abruptly abandoned in May of 2008. Consumer advocacy groups rallied against the policy, arguing that it was a form of space-based discrimination. Real estate trade organizations used their political clout to protest the policy because it was hurting business. For example, the Wall Street Journal summarized the GSEs' abandoning the declining market policy by saying, "The change comes in response to protests from vital political allies of the government sponsored provider of funding for mortgages, including the National Association of Realtors, the National Association of Home Builders, and organizations that promote affordable housing for low-income people." The Washington Post reported, "Critics, including the National Association of Realtors and consumer advocacy groups, had charged that Fannie Mae's policy further served to depress sales and real estate values in the areas tainted as declining.

A further attempt in 2014 by the GSEs to add a 25-basis-point origination fee that would help cover additional losses in five states where foreclosure delays were long was also defeated by the same political forces.

Recently, Luan (2017) demonstrated that the spread between interest rates on jumbo mortgages (loans above the GSE and FHA ceiling) and conventional (GSE and FHA) rates can be used to predict future changes in house prices. This important finding shows that the jumbo market responds effectively to differences in local risk. In contrast, these risks are ignored in pricing conforming mortgages. The result is that the normal role of interest rates in attenuating housing price bubbles is short-circuited by the GSE and FHA pricing policy. How important was this in the housing bubble that precipitated the mortgage crisis? That is difficult to determine, but Tian reported that a 1-standard-deviation change in the jumbo- and conforming-mortgage spread is associated with a 2.5-percent lower rate of subsequent house price appreciation. Clearly, current federal housing policy accommodates local housing bubbles, with CRA contributing to the dynamic by encouraging banks to make loans even in areas where rising house prices threaten housing affordability.

Contrasting an Economic Perspective and Current Regulatory Policy

The fundamental basis for disagreement between economic analysis and current regulatory policy is that economists believe in using prices—that is, interest rates—to ration credit among alternative uses and users. Economists believe that raising interest rates is the proper response to a local housing bubble, but public policy views higher interest rates as a bad thing because they make housing less affordable just as prices of housing units are rising.

CRA is based on the notion that the banking system is responsible for making housing affordable, even when market prices are rising. Economists believe that, if housing is less affordable, that is a housing market issue. If housing costs $300 or more per square foot, the banking system is not responsible for making it affordable for low- or moderate-income households. Economists say that lawmakers should examine policies influencing the supply (zoning, building codes, transportation access, and so on) and demand (tax treatment of mortgage interest and property taxes and the exclusion from capital gains taxation) for housing rather than the local bank branch.

In addition to insisting on geographic uniformity of mortgage interest rates, public policy tends to oppose variation in rates across individuals. Borrowers are urged to shop for credit, presumably in the hope of lowering cost. However, current examination practices penalize lenders if interest rates are determined to be correlated with borrower demographic characteristics. Given that demographic characteristics are correlated with financial and numerical literacy, the correlation of rates with demographic characteristics is inevitable if borrowers earn positive returns from shopping in credit markets, something that an economist would see as a positive.

Also, attitudes toward applicant competence differ between the regulatory environment and economics. Applicants face two challenges: (1) finding investment opportunities that are attractive, and (2) determining the best debt instrument to use in financing the opportunity. Most economists would say that the first challenge is greater and that many borrowers make bad investment choices. Indeed, one function of responsible lending is to stop borrowers from making bad decisions by denying them credit or making the credit so expensive that the problematic nature of the investment decision is clear. CRA does not credit lenders who prevent financial failure by denying applications or offering credit only at high rates. Loan denials are not seen as a valuable deterrent to overly optimistic loan applicants.

Another problem concerns the economic view of appropriate mortgage instruments. Advocates who focus on expanding access to credit often discount the risks and costs of making mortgages; some expect the financial system to provide homebuyers with 30-year, self-amortizing mortgages with no prepayment penalties, no deficiency judgments, debt-to-income ratios of 0.43, and LTV ratios of 0.95 or more. Credit scores of 620 (even 600) should be adequate, and an interest rate within 200 basis points of the 10-year treasury rate is expected. These mortgages may be economically sound as long as nominal housing prices are rising, but if house prices fall, as happens periodically, this mortgage product could result in substantial losses. Accordingly, the financial system is generally not willing to hold such mortgages as an asset in significant quantity unless the government offers some form of guarantee that causes losses to fall on taxpayers or to be passed on to future homebuyers in the form of higher guarantee fees.

Finally, the premise of CRA is inconsistent with modern economic thought. The idea that local depository institutions should reinvest local deposits by holding local liabilities is completely inconsistent with modern portfolio theory and sound banking practice. Modern technology has broken the link between local deposit taking and lending. The great mystery about CRA is how such a flawed view of banking has survived so long in a country that leads the world in both internet technology and financial economics.

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Commentary: Filling a Gap in the Community Reinvestment Act Examiner Toolkit

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Critical to the success of the Community Reinvestment Act[1] (CRA) of 1977 is how bank regulators evaluate a bank's performance in meeting the credit needs of low- and moderate-income (LMI) borrowers. Failure to measure the right outcomes results in a less-effective, if not ineffective, CRA, as banks focus on simply checking off boxes that may make little difference in the communities they serve. A particular problem is if the examiners cannot fully take into account variations in local market conditions and credit opportunities. As noted in Willis (2009), the examination process is critical if CRA is to continue to play a meaningful role in strengthening LMI households and communities. This commentary considers one aspect of the challenge of keeping CRA effective: the criteria for determining how well large banks (banks with assets of $1 billion or more) are serving the home purchase mortgage needs of LMI households. More specifically, I examine how well a bank is doing in helping to meet the credit needs of the LMI community compared with its performance in serving higher income groups.

The burden of determining a bank's CRA performance falls on bank examiners, who currently need better guidance for making evaluations across the vast array of housing market conditions in the United States, ranging from cities plagued with disinvestment and abandonment to those with high housing costs.[2] The lack of adequate guidance results in a lack of clarity that does not serve any of the stakeholders well. Advocates want banks to be held to a consistent and high standard. Bank examiners value standardized tests to increase consistency and to help arm them against second-guessing by advocates. Bankers are looking for standardization and predictability to enable them to develop a forward-looking business plan for their CRA activities.[3] Therefore, the language and results of the evaluation process (which appear in the performance evaluation published with a bank's ratings) show a heavy reliance on a narrow set of standardized statistics. Information on local market and business conditions supplied by the bank as part of its performance context seems incapable of swaying the examiner to reward the bank with a rating any higher than "adequate."[4]

[1] Pub. L. 95–128, 91 Stat. 1147, Title VIII.
[2] The standard criterion for *affordable* is housing costs of no more than 30 percent of income.
[3] A lag in completion of prior exams exacerbates the challenge for banks in planning their CRA activities, by delaying any feedback from the results of those exams.
[4] The terms "excellent," "good," "adequate," "poor," and "very poor" correspond to CRA ratings of "outstanding," "high satisfactory," "satisfactory," "needs to improve," and "substantial noncompliance."

Reliance on only a few standard statistical tests can be a particular problem in high-housing-cost areas; what is a bank to do if market conditions do not make buying a home feasible for an LMI household?

To judge a bank's CRA performance with regard to home mortgage lending to LMI households, examiners look at three benchmarks: (1) the LMI share of the population, (2) the LMI share of homeowners, and (3) the performance of the bank, as measured by its distribution of home mortgages across households by income compared with that for all the lenders in that locality. None of these three benchmarks, however, provides a reliable basis for assessing the extent to which a bank helps to meet the home purchase mortgage credit needs of LMI households in high-housing-cost markets.[5]

The shortcomings of these three benchmarks are made clear by the example of New York City (NYC) where, since 2000, median home prices have more than doubled while incomes have continued to stagnate (NYU Furman Center, 2016). Exhibit 1 presents the benchmarks traditionally used as part of a CRA exam. Benchmark 1, the LMI share of households in NYC (51.6 percent), is meaningless as an indicator for credit demand unless the distribution of sales prices of housing allows for equal proportions of households at all income levels to sustain homeownership—clearly not the case for NYC. Benchmark 2, the percentage of LMI households that are homeowners (30.9 percent), is equally problematic as a target because existing homeowners reflect an amalgam of sales made over many years, including sales made well before house prices boomed. Benchmark 3, the percentage of home purchase mortgages made to LMI households by all lenders in NYC, remains. Is 8.7 percent good or bad? Are banks in NYC meeting local credit needs? There is no way to know if an 8.7-percent share of home purchase mortgages meets the credit needs of LMI households, and the first two benchmarks do little to help.

I argue that a better, localized benchmark is needed for judging whether a bank carries out the intent of CRA and helps to meet the credit needs of its community, and I propose one approach to doing so.[6] To be useful, a benchmark needs to account for differences across cities in home prices and in the factors that go into a lender's ascertainment of how much it can lend. Based on the assumption that most LMI homebuyers take out a mortgage, this commentary demonstrates how such a benchmark can be developed for NYC using 2014 home sales and Home Mortgage

Exhibit 1

Comparison of Benchmarks for New York City, 2014

Benchmark	Percent
LMI share of households	51.6
LMI share of homeowners	30.9
LMI share of home purchase mortgages	8.7

LMI = low- and moderate-income.

[5] Although refinancing mortgages is also part of the home mortgage market, the income distribution of customers for home purchase mortgages can differ greatly from that for refinancing mortgages. The home purchase market is sensitive to the price distribution of the homes for sale, whereas the refinancing market depends on the distribution of existing homeowners and, in particular, those who already have a mortgage.

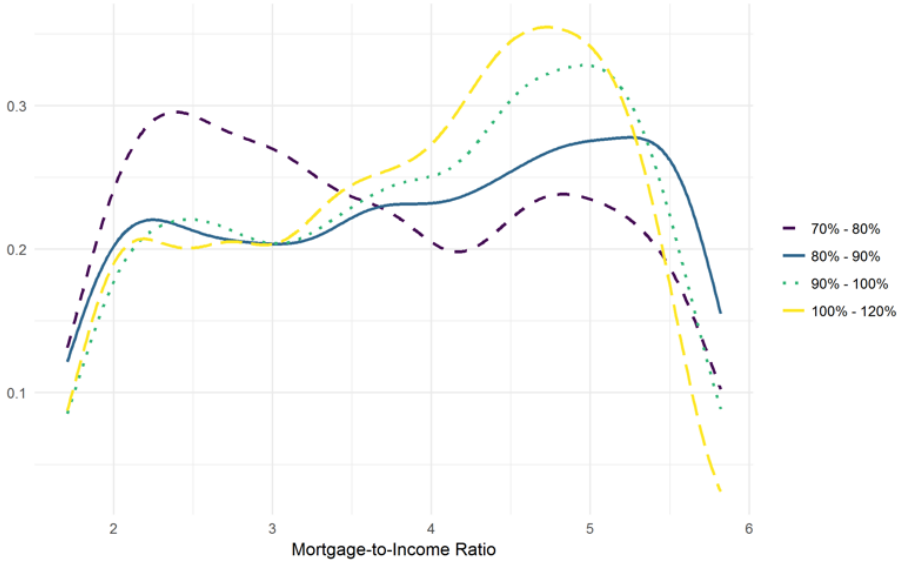
[6] Although this commentary is able to provide only an overview of the methodology, the specific details are available on request from the author.

Disclosure Act[7] (HMDA) data.[8] The home sales data provide us with the price distribution of homes sold—in other words, the potential "stock" of homes LMI families could buy.[9] HMDA provides data on income levels and mortgage amounts by borrower and so enables us to determine the distribution of mortgage-to-income ratios (MIRs) for borrowers within different income ranges. By making assumptions regarding LMI borrower incomes and downpayments, we can use an MIR distribution to estimate a distribution of purchasing power for LMI homebuyers and then match it to the distribution of sales prices to determine a share of sales that LMI homebuyers are likely able to purchase. The distribution can then be used as a benchmark against which to judge lender performance.

The first step is to calculate how much LMI families can realistically borrow. To guard against using an MIR distribution that embodies a failure by banks and other lenders to meet the home purchase mortgage credit needs for the LMI community, we compare the MIR distribution for LMI borrowers with incomes from 70 to 80 percent of the Area Median Family Income (AMFI) with the MIR distributions for borrowers with higher incomes: 80 to 90, 90 to 100, and 100 to 120 percent of AMFI (exhibit 2).[10] Although the shapes of the MIR distributions vary across these income groups,

Exhibit 2

Distribution of Mortgage-to-Income Ratios by Income Range of the Borrowers, New York City, 2014



Sources: Home Mortgage Disclosure Act (2014 data); NYU Furman Center

[7] Pub. L. 94–200, 89 Stat. 1124.

[8] LMI households that purchase two- to four-family homes can often use a portion of the rental income in their mortgage application, thus potentially raising the income that is reported in HMDA above the maximum income for an LMI household, in which case the borrower would be placed in a higher income category.

[9] For more information on the sales data, see NYU Furman Center (2016).

[10] The 2014 AMFI for NYC is compiled using American Community Survey 2006–2010 estimates for the New York, NY Metropolitan Statistical Area.

the bulk of the MIRs lies between 2 and slightly more than 5 in all cases.[11,12] It is clear, however, that households earning between 70 and 80 percent of AMFI have, on average, lower MIRs than those who earn more. This difference may reflect tighter lending standards for LMI borrowers than for higher-income borrowers but can also be explained by numerous other factors. Such factors include the potentially higher cost of credit (with LMI borrowers possibly having to pay higher interest rates, given that their credit histories tend to be weaker than those of higher-income households), borrower concerns about having sufficient residual income after making mortgage payments (for example, needing to make sure they have enough to cover other debts and living expenses, including house repairs and rehab), and the fact that LMI homebuyers may be limited in the amount of house they can purchase because they likely have less savings to devote to a down-payment, closing costs, and lender-required reserves (often two to three times projected monthly housing costs).

The power of this analysis is that it is now possible to map each of the four MIR distributions against the distribution of home sales prices to derive estimates of the share of homes for sale that LMI households could be expected to buy. To simplify the calculation for translating the MIR distributions into LMI borrowing power, I assume that LMI borrowers are evenly split between those with incomes at 80 percent of AMFI and those at 70 percent. That assumption somewhat inflates the borrowing power of LMI borrowers who, based on the HMDA data, were more heavily weighted toward those with incomes less than 70 percent of AMFI than toward those with incomes between 70 and 80 percent of AMFI.

Exhibit 3 shows the results when applying the four different MIR distributions based on that split of LMI borrower incomes, assuming downpayments of either 3 or 20 percent of the purchase price. Although I do not have direct information on the size of downpayments, the low end of this range

Exhibit 3

Estimated Share of 2014 Home Sales That Could Have Been Bought by LMI Households Based on HMDA-Derived MIR Distributions

AMFI Range for the MIR Distribution Used (%)	Estimated LMI Market Shares (%)	
	Assuming Borrowers Able To Put Down 3 Percent of the Sales Price	Assuming Borrowers Able To Put Down 20 Percent of the Sales Price
70–80	6.7	10.2
80–90	7.6	11.6
90–100	7.5	11.5
100–120	7.3	11.2

AMFI = Area Median Family Income. HMDA = Home Mortgage Disclosure Act. LMI = low- and moderate-income. MIR = mortgage-to-income ratio.

[11] Note that the graphs reflect the "cleaning" of the data of ratios that seemed unreasonably high by truncating the HMDA-generated MIR distribution at the 90th percentile and truncating the bottom 10 percent to guard against biasing the results downward.

[12] Interestingly, using the maximum "ability-to-repay," or QM, ratio of 0.43 and the 2014 average mortgage interest rate of 4.5 percent (and no mortgage insurance), Realtor.com yields what might be considered a maximum possible MIR of 5.3, based on a 20-percent downpayment and machine-generated projections for NYC property taxes and insurance costs for a mortgage of $288,000.

is likely to predominate, especially for the first-time homebuyers, given the generally low level of savings of LMI households (Federal Reserve, 2015; see page 23).[13] Assuming a 3-percent downpayment, the MIR distribution for LMI borrowers yields an estimated share of sales of 6.7 percent. Using the MIR distributions of higher-income borrowers yields estimates as high as 7.6 percent, with the highest produced by the MIR distribution for borrowers with incomes between 80 and 90 percent of AMFI. Interestingly, the MIR distributions for the next two higher-income groups actually yield smaller LMI market shares, suggesting that 7.6 percent may reasonably be considered an upper estimate for a benchmark of the potential LMI share of home sales in NYC in 2014, if borrowers put down only 3 percent of the sales price. If LMI borrowers are able to put down 20 percent, the estimated shares of loans are higher, ranging from 10.2 to 11.6 percent.

The numbers in exhibit 3 provide an estimated market share of LMI households and a more realistic benchmark to serve as a target for CRA evaluation. If a bank is working to effectively expand access to credit, and a 3-percent downpayment seems standard, then 6.7 percent of home purchase loans to LMI households would be a good benchmark for judging performance. This calculation also suggests that the industrywide LMI share of 8.7 percent in NYC (exhibit 1) might reflect a strong performance. Such a conclusion would be valid even if it turns out that as many as 25 percent of LMI homebuyers have sufficient savings to put down 20 percent. Even using the highest estimates in exhibit 3—7.6 and 11.6 percent—and weighing them accordingly, the benchmark estimate would be 8.6 percent. In other words, based on this metric, examiners could more effectively conclude that, overall, lenders in NYC are abiding by the spirit of CRA, so any bank that meets or exceeds that standard should also get credit for stepping up to help meet LMI credit needs for home purchase mortgages.

This proposed metric is far from perfect and is based on a lot of assumptions that can surely be further documented and refined. For example, more information is needed on the size of downpayments made by LMI borrowers, but examiners could probably ascertain that information by working with the banks in a local market. In addition, relying on HMDA data of the actual experience of mortgage borrowers where housing costs are high may bear further scrutiny to make sure that this analysis does not simply replicate whatever shortcomings may exist in the way lenders make credit available. Clearly, if lenders are not helping to meet the credit needs of LMI borrowers, then the HMDA data cannot shed light on the true borrowing potential for LMI households. Nevertheless, the existing benchmarks do not provide much guidance in high-housing-cost locations for examiners who are tasked with determining whether a bank meets its CRA obligations. For CRA to work as effectively as it should, regulators need to establish metrics that can effectively capture whether banks meet market demand across the diversity of housing market contexts in the United States.

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[13] As a result of low saving rates, it is not surprising that surveys of prime, working-age household heads show only minimal net worth among those with incomes in the bottom four deciles (Thompson and Suarez, 2015; see page 39).

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Are Homeowners Better Neighbors During Housing Booms? Understanding Civic and Social Engagement by Tenure During the Housing Market Cycle

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Abstract

Research has shown that homeowners' concern with their property values may lead them to have greater civic and neighborhood social engagement than renters. However, it has not been well examined whether changing property values during the housing market cycle affect this purported social benefit of homeownership. Using 2003 to 2013 American Time Use Survey data and Cragg two-part hurdle regression analysis, we assess differences in homeowners' and renters' civic and neighborhood social engagement during the stages of the recent housing market cycle. We find that, holding other characteristics constant, homeowners were more likely than renters to volunteer but spent less time in social activities with neighbors than renters, regardless of the housing market stage. Differences in civic and social engagement by tenure did not vary in consistent or expected ways across the stages of the cycle. These findings reinforce claims that homeownership has civic benefits, but evidence is lacking that homeowners make better neighbors than renters. Our findings also suggest that policies to intervene in the housing market to promote neighborhood cohesion need not vary across the housing market cycle.

Introduction

The United States is emerging from a decade of housing market flux in which most major regions underwent three distinct periods—expansion, recession, and recovery—in residential investment from the mid-2000s through the early 2010s. Increasing housing production and demand defined the expansion period. Falling housing production and demand, and increasing foreclosures and vacancies, characterized the recession period. Declining foreclosures and vacancies and changing property ownership and tenure composition, largely through the disposition of foreclosures, punctuated the recovery period.

These stages offer an opportunity to deepen our understanding of how housing market cycles affect the social benefits of homeownership (Lindblad, Manturuk, and Quercia, 2013; Rohe and Lindblad, 2013). A common rationale for subsidizing homeownership is that it builds strong communities due to homeowners' greater civic and social engagement. Because homeowners are eager to increase their property values and are less transient, they may be more likely than renters to become involved in local affairs and to get to know their neighbors. Existing research largely confirms these suppositions (Blum and Kingston, 1984; Cox, 1982; DiPasquale and Glaeser, 1999; Lindblad, Manturuk, and Quercia, 2013; Lyons and Lowery, 1989; Manturuk, Lindblad, and Quercia, 2010, 2012; McCabe, 2013; Rohe and Basolo, 1997; Rohe and Lindblad, 2013; Rohe and Stegman, 1994; Rohe, Van Zandt, and McCarthy, 2001; Rossi and Weber, 1996; Shlay, 2006). However, these studies overlook the role that changing economic conditions during the housing market cycle may play in these outcomes. It is unknown whether differences between homeowners' and renters' civic and social engagement narrow or widen during the housing market cycle, particularly during recessions when homeowners may experience declines in their property values (Rohe and Lindblad, 2013).

This research helps to fill this gap by using pooled data on civic and social engagement in U.S. metropolitan areas from the 2003 to 2013 American Time Use Surveys (ATUS). We use a two-stage Cragg hurdle analysis to test whether homeowners have greater civic and social engagement than renters across the housing market cycle and then specifically during expansion periods, when property values are rising or stable, during recessions, when property values are falling, and during recovery periods, when the market returns to equilibrium. Examining this question sheds light on whether a social justification exists for countercyclical or even procyclical policies to intervene in the housing market to promote homeownership. Might policies to shore up housing markets in times of distress help to maintain and enhance community social fabric?

In what follows, we first discuss the reasons why homeowners may have greater civic and social engagement than renters and synthesize the findings of existing research testing these claims. Then we discuss theory on how changing economic conditions during the housing market cycle may alter homeowners' engagement relative to renters. This discussion is followed by a description of the data and methodology and then a summary of the results. We conclude by highlighting key takeaways from the study and implications for further research and policymaking.

The Link Between Tenure and Civic and Social Engagement

The social benefits of homeownership have long been the focus of debate (Dietz and Haurin, 2003; Rohe and Lindblad, 2013; Rohe, Van Zandt, and McCarthy, 2001; Rossi and Weber, 1996; Shlay, 2006). One key purported social benefit of homeownership is heightened civic and social engagement, which together may lead to stronger communities that are better able to make improvements and respond to threats.

Civic Engagement

We define *civic engagement* as formal, goal-oriented participation in neighborhood, charitable, church, or government organizations or processes, such as helping out at a church soup kitchen or attending a public meeting on a development proposal. Research, most notably from Putnam (2001), has documented a dramatic drop in American civic engagement during the past decades. Putnam attributed some of the cause for this decline to suburbanization and sprawl, claiming there is a "'sprawl civic penalty' of roughly 20 percent on most measures of community involvement" and that "the direct civic penalty associated with sprawl probably accounts for something less than one-tenth of the total disengagement" (Putnam, 2001: 215). Putnam reasons that sprawl and suburbanization have eroded community life for several reasons, such as greater dependence on socially isolating automobile travel, the social homogeneity of suburban enclaves, and a lack of spatial bounding as suburbanites live, work, and shop in far-flung locations.

American suburbanization, particularly in the post-World War II era, has gone hand in hand with rising homeownership. Glaeser (2011) argued that policies that favor homeownership contribute to sprawl, because the owner-occupied housing market consists overwhelmingly of detached single-family units, whereas rentals strongly tend to be in multifamily, denser structures. Thus, assuming Putnam is correct (see Morris and Pfeiffer [2017] for a critique), suburbanization and poorer community life may be linked indirectly.

However, the literature strongly suggests that the more direct effects of homeownership on individuals' social and community lives dwarf any such sprawl civic penalty. A strong consensus exists that homeownership is positively linked to diverse measures of civic engagement (Cox, 1982; DiPasquale and Glaeser, 1999; Lyons and Lowery, 1989; Manturuk, Lindblad, and Quercia, 2012; McCabe, 2013; Rohe and Basolo, 1997; Rohe and Stegman, 1994; Rossi and Weber, 1996). The civic behavior that is most positively linked to homeownership is belonging to local or neighborhood organizations (Cox, 1982; DiPasquale and Glaeser, 1999; Lyons and Lowery, 1989; Manturuk, Lindblad, and Quercia, 2012; McCabe, 2013; Rohe and Basolo, 1997; Rohe and Stegman, 1994; Rossi and Weber, 1996). Other civic behaviors that are positively associated with homeownership include attending meetings (Cox, 1982; Lyons and Lowery, 1989; Rohe and Basolo, 1997); organizing or signing petitions and communicating with public officials (Cox, 1982; Lyons and Lowery, 1989); voting (DiPasquale and Glaeser, 1999; McCabe, 2013); working to solve community problems; and attending church (DiPasquale and Glaeser, 1999). However, some counter evidence suggests that homeownership is negatively linked to working to solve community problems and voting (Kingston and Fries, 1994), and some research has found that

homeownership is not linked to being involved in religious organizations (Kingston and Fries, 1994; Rohe and Basolo, 1997; Rossi and Weber, 1996) or other local or neighborhood organizations (Blum and Kingston, 1984; Rohe and Stegman, 1994).

Social Engagement

We define *social engagement* as informal social interactions that homeowners have with neighbors, such as talking across the fence, going for a walk together, and taking care of one another. These interactions may lead neighbors eventually to develop trust, shared norms, and social capital—the ability to rely on their relationships to access information or resources (Briggs, 1997; Coleman, 1988). A neighborhood's collective efficacy, or its ability to respond to threats or improve conditions such as rescuing neighbors from flooded homes after a hurricane or lobbying against threats to neighborhood character, derives in large part from residents' social capital (DeFilippis, 2001; Sampson, Raudenbush, and Earls, 1997). It is important to examine social engagement in tandem with civic engagement to fully assess whether homeownership leads to stronger communities.

Evidence exists for a positive association between homeownership and social engagement (Blum and Kingston, 1984; Lindblad, Manturuk, and Quercia, 2013; Lyons and Lowery, 1989; Manturuk, Lindblad, and Quercia, 2010; Rohe and Basolo, 1997), but some studies question this link (Manturuk, Lindblad, and Quercia, 2012; Rohe and Basolo, 1997; Rohe and Stegman, 1994; Rossi and Weber, 1996). Measures of collective efficacy, such as talking to neighbors about problems or people's perceptions of neighbors' ability to solve problems, are most positively linked to homeownership (Lyons and Lowery, 1989; Lindblad, Manturuk, and Quercia, 2013; Manturuk, Lindblad, and Quercia, 2010). Homeownership also is associated with having a higher proportion of one's social network comprised of neighbors (Blum and Kingston, 1984) and growth in social ties with neighbors over time (Rohe and Basolo, 1997). Conversely, homeowners tend to have less intense interactions with their neighbors. For example, they may know fewer people on their block by name or may consider fewer neighbors close friends (Rohe and Basolo, 1997; Rohe and Stegman, 1994). They may also have less frequent conversations with neighbors (Manturuk, Lindblad, and Quercia, 2012) and spend fewer evenings with neighbors (Rossi and Weber, 1996). Thus, although existing research generally has reached a consensus that an association exists between ownership and formal civic engagement, evidence on social engagement and ownership is decidedly mixed.

How Concern for Property Values and Residential Stability May Promote Civic and Social Engagement

Homeowners' (1) concern for their property values and (2) greater residential stability are thought to drive their purported greater civic and social engagement. Homeowners differ from renters in that their homes have exchange (monetary) value in addition to use value (Logan and Molotch, 1987). Home equity is the largest repository of wealth for American households, accounting for about two-thirds of middle-income households' wealth in 2010 (Mischel et al., 2012). Property values affect home equity and are influenced by local conditions, such as the strength of the economy, the quality of the schools, the presence of crime, and nearby amenities. Thus, homeowners have an

incentive to get involved in civic activities that help protect and bolster their property values, such as volunteering for a neighborhood beautification committee, attending a community long-range planning meeting, or forming a committee to protest the construction of a nearby homeless shelter (Blum and Kingston, 1984; Fischel, 2001). They also have a financial incentive to get to know their neighbors to forge shared social norms as a way of enhancing their collective efficacy (Dietz and Haurin, 2003; Lindblad, Manturuk, and Quercia, 2013; Sampson, Raudenbush, and Earls, 1997).

Another way that homeowners differ from renters is that their moving costs are much higher. Although renters have to cover the costs of searching for an alternative place to live, moving possessions, and potentially paying a security deposit and other fees, homeowners incur these costs plus the additional cost in time, effort, and money of selling their homes. As a result, homeowners stay in place longer than renters. For instance, from 2005 to 2010, about two-thirds of renters moved compared with less than one-fourth of homeowners (Ihrke and Faber, 2012). According to the National Association of Home Builders, typical home purchasers will remain in their home for 13 years (Emrath, 2013). Staying in place for longer has three implications for civic and social engagement. First, because homeowners cannot easily change their neighborhood, they have the incentive to become involved in community activities to maintain and improve their neighborhoods as a means of preserving and enhancing their quality of life (Cox, 1982). Second, staying in place for longer may lead homeowners to become more attached to the use values of their communities (Logan and Molotch, 1987), which include amenities and services, such as stores, parks, and transit, and informal networks for support and social control. As both a cause and an effect of these amenities, homeowners may have greater self-identification with their community. They may be more likely to form relationships with neighbors and get involved in community affairs to maintain residential stability, community conditions, and sense of self. Finally, staying in a place longer allows more time for social ties to flourish, because one has a better chance of getting to know one's neighborhood and neighbors.

The Role of the Housing Market Cycle

The recent U.S. housing market cycle, spanning from the mid-2000s through the early 2010s, provides a rare opportunity to explore the role that changing economic conditions and residential investment may play in shaping the social benefits of homeownership, particularly because the fluctuations in home prices and foreclosure rates across this recent cycle were so dramatic. Real estate economists typically define the housing market cycle as taking place in four stages, although their drivers and components are still debated (Mueller, 1995). The first stage is a recovery stage characterized by declining housing vacancies and stagnant housing construction. The second stage is an expansion stage characterized by continued declines in housing vacancies and increases in housing construction. The third and fourth stages are defined by hypersupply and eventual recession, with increasing housing vacancies and continued new housing construction in the short term—the third stage—but declines in new housing construction and increases in vacancies in the long term—the fourth stage (Mueller, 1995).

Stages of the Recent Housing Market Cycle

During the recent housing market cycle, the expansion and hypersupply stages—which we amalgamate to call the expansion stage—spanned from 2004 to 2006 in most U.S. regional housing markets, although in some places the stage began as early as 2003 and extended to as late as 2007. Falling interest rates and new mortgage products sparked rapid investment in housing. The median sales price of existing single-family homes increased from about $190,000 to $220,000 from 2004 to 2006 (JCHS, 2007). The percentage of homes that were owner-occupied reached an all-time high of 69 percent in 2004 (JCHS, 2007).

The economic recession officially spanned from late 2007 to mid-2009. However, in some regional markets, the housing downturn lasted through 2010 and 2011. This period was initially defined by rising home prices, then by growing unemployment, declining income and housing demand, and resetting mortgage loan interest rates. These conditions culminated in a recession and caused widespread disinvestment in housing, with high rates of foreclosures. About $2.5 trillion in home equity was lost in 2007 and 2008 (JCHS, 2009), and nearly 7 million households were displaced by 2014 (CoreLogic, 2014). By 2009, about 11.3 million homeowners owed more on their mortgages than what their homes were worth (*under water*); about 5 million homeowners had loan-to-value ratios that exceeded 125 percent (JCHS, 2011).

During the recovery period from 2010 to 2013, a mix of lower home prices and stringent mortgage lending increased the role of investors in neighborhood housing markets. In 2004, companies bought less than 1 percent of single-family homes for sale. By 2012, this share had increased to more than 6 percent, with rates reaching more than 10 percent in Sun Belt metropolitan areas such as Phoenix and Las Vegas (Molloy and Zarutskie, 2013). These actors ranged from local mom-and-pop operations, such as individuals or family trusts, to out-of-state Wall Street corporations, such as private equity firms, hedge funds, and real estate investment trusts. Investor activity helped to bolster property values. The number of the 100 largest metropolitan areas nationwide posting annual increases in home prices grew from 73 in 2012 to 97 in 2013 (JCHS, 2013). The number of underwater homeowners declined from 11.3 million in 2009 to 6.5 million by the end of 2013 (JCHS, 2011, 2013). Home prices in many metropolitan areas, however, remained below their mid-2000 peak (JCHS, 2013).

Expectations on Civic and Social Engagement by Tenure During the Housing Market Cycle

Four potential hypotheses exist about how civic and social engagement may vary by tenure during the housing market cycle.

1. Differences in engagement may fluctuate, assuming that concern for property values is driving any difference between homeowners' and renters' civic and social engagement. This fluctuation is because the value of the assets homeowners seek to protect vary during the cycle, so concern for protecting their value also varies.

2. Differences in engagement may remain constant if the driver behind differences between homeowners' and renters' civic and social engagement is homeowners' greater residential stability, as stability does not vary as much as property values during the housing market cycle.

3. Differences in engagement may not be present if, contrary to prior research, no actual differences exist in homeowners' and renters' commitment to community despite homeowners' concern with property values or differences in residential stability.

4. Differences in engagement may manifest and fluctuate in unpredicted ways due to an unknown factor affecting civic and social engagement by tenure.

We explore these hypotheses in further detail in the following sections and summarize their expected patterns in exhibit 1.

Our preferred hypothesis is hypothesis 1. Hypothesis 1 assumes that homeowners may be more civically and socially engaged than renters because they seek to protect their property values by improving neighborhood quality through civic and social engagement. Property values fluctuate during the housing market cycle, as previously discussed. If homeowners' concern with their property values contributes to their civic and social engagement, then the intensity of homeowners' civic and social engagement also should vary during the housing market cycle as prices vary. Renters are not directly invested in their properties, so their civic and social engagement should occur more independently of property value dynamics. Thus, if homeowners' civic and social engagement fluctuates, but renters' engagement remains relatively constant, differences in civic and social engagement by tenure should vary during the housing market cycle.

We have two subhypotheses on how these dynamics might manifest. Our first, and preferred, prediction (hypothesis 1a) is derived from rational utility maximization behavior.[1] This theory suggests first that homeowners should be more engaged in protecting the value of their properties,

Exhibit 1

Hypotheses on Civic and Social Engagement by Tenure During the Housing Market Cycle

Hypothesis	Predicted Effect of Homeownership on Civic and Social Engagement				Influencing Factor
	Constant Effect Across the Housing Market Cycle	Additional Effects Within the Stages of the Housing Market Cycle			
		Expansion	Recession	Recovery	
1a	Positive	Positive	Negative or zero	Less negative or zero	Change in property values
1b	Positive	Negative or zero	Positive	Less positive or zero	Change in property values
2	Positive	Zero	Zero	Zero	Lower residential mobility
3	Zero	Zero	Zero	Zero	None
4	Negative	Positive, negative, or zero	Positive, negative, or zero	Positive, negative, or zero	Unknown

[1] For an intellectual history and critique of this fundamental tenet of neoclassical economics, see McCormick (1997).

because they have a greater financial stake in them than renters. Prior research generally finds that homeowners maintain their dwellings better than renters (Dietz and Haurin, 2003; Galster, 1983; Gatzlaff, Green, and Ling, 1998); the most obvious reason is that homeowners reap the financial benefits of home maintenance and improvements when their properties sell, whereas renters do not. If the protection of asset values does indeed drive homeowner concern for the dwelling and its environs, the intensity of these concerns should vary as the value of the asset fluctuates.

High and rising, or at least stable, property values during the expansion stage of the recent housing market cycle should have led homeowners to feel confident in their investment and may have given them more incentive to preserve and further grow that investment by participating in local affairs and getting to know their neighbors. In short, one should work harder to protect something that is more valuable. Conversely, falling or depressed property values during the recession and recovery periods should have led homeowners to feel less incentive to protect their investment as it lost, or failed to fully regain, value. Thus, according to our preferred hypothesis, homeowners should have exhibited greater levels of civic and social engagement than renters during the expansion stage of the cycle, when property values were high and rising or stable, and similar or lower levels of engagement during the recession and recovery stages of the cycle, when property values were falling or depressed (see exhibit 1).

A second possible prediction (hypothesis 1b) is derived from the theory of satisficing behavior, which suggests that individuals may have a minimum outcome they seek to achieve but will cease efforts to maximize their returns when that minimum acceptable outcome is attained (Simon, 1955, 1956). In our case, homeowners may seek to improve their property values if they fall below a certain minimum threshold but lose interest in continuing to improve their property values once they rise above this threshold. Falling or depressed property values during the recession and recovery stages of the recent housing market cycle may have led homeowners to become more civically and socially engaged in an effort to curtail further declines and restore prior levels. However, high and rising or stable property values during the expansion period may have restored homeowners' confidence about their property values and led them to lose interest in civic and social engagement. If this hypothesis has merit, homeowners should have exhibited greater levels of civic and social engagement than renters during the recession and recovery stages of the cycle, when property values were falling or depressed, and similar or lower levels of engagement during the expansion stage of the cycle, when property values were high and rising or stable (see exhibit 1).

The second reason (hypothesis 2) why homeowners may be more civically and socially engaged than renters is that they tend to stay in place longer, which may lead them to become more attached to their communities and want to improve them through civic and social engagement. Homeowners' residential mobility is arguably less strongly linked to the housing market cycle than their concern for their property values. Homeowners historically have had lower mobility than renters, even during the recent recession (Bucks and Bricker, 2015). Thus, if homeowners' greater residential stability contributes to their civic and social engagement, some differences in civic and social engagement by tenure should remain constant during the housing market cycle. Thus, we would expect that homeowners on balance would always exhibit greater civic and social engagement than renters, regardless of the stage of the housing market cycle, and that this difference should not change much across the cycle (see hypothesis 2 in exhibit 1).

Another possibility (hypothesis 3) is that neither property values nor residential mobility affect homeowners' civic and social engagement. There may be no difference in civic and social engagement by tenure; strong evidence of the link between civic engagement and tenure in the existing literature makes this scenario unlikely, although it is possible that homeowners are self-selected from people who have a preexisting tendency to be civically involved, and this trait may not vary across the housing market cycle. Moreover, the ambiguous evidence for links between ownership and neighborhood social engagement suggest that no difference by tenure in terms of social engagement may be more plausible. In any event, in these cases, we would expect no difference in civic and social engagement by tenure during the housing market cycle (see hypothesis 3 in exhibit 1).

A final possibility (hypothesis 4) is that an unknown factor may lead homeowners to have less civic and social engagement than renters across the stages of the housing market cycle. Homeownership may have a positive, negative, or statistically insignificant varying effect on engagement during the housing market stages depending on what this unknown factor is. Hypothesis 4 is an exploratory hypothesis, as no strong theoretical basis currently exists for another contributing factor to differences in civic and social engagement by tenure.

Thus, the relationship between differences in civic and social engagement by tenure and the housing market cycle is potentially complex, with countervailing tendencies depending on which causal factors (financial incentives versus residential stability) are paramount in causing homeowners' observed high levels of civic and social engagement and which principle of behavioral economics (rational utility maximization versus satisficing) guides homeowners' decisionmaking. Nevertheless, we expected to find that homeowners had greater civic and social engagement than renters during the expansion stage of the cycle and lower engagement during the recession and recovery stages of the cycle due to owners' incentive to protect their monetary investment through rational utility maximization behavior, which would lead to more efforts to protect that investment when it is more valuable.

Data and Methods

We tested our preferred hypothesis against the four competing hypotheses using pooled data from the 2003 to 2013 ATUS (Bureau of Labor Statistics, 2014; Hofferth, Flood, and Sobek, 2013). The ATUS provides detailed, micro-level information on how a representative sample of noninstitutionalized people ages 15 and older living in the United States spend their time. The ATUS selects its respondents from the pool of people who have completed the Census Bureau's and Bureau of Labor Statistics' Current Population Survey (U.S. Census Bureau, n.d.). The ATUS selects a stratified sample from this group (stratifying by state of residence, race and ethnicity, and household structure). Of those contacted by the CPS, 90 percent participate in that survey, an extremely high response rate. In turn, about 50 percent of those CPS respondents agree to participate in the ATUS, yielding an aggregate response rate of roughly 45 percent; this response rate is quite high by the standards of survey research, suggesting limited problems due to response bias. The valid sample size per year is approximately 13,500 individuals; thus, in our models, we observe a very large sample of more than 133,633 individuals.[2]

[2] Due to missing data, 10 percent of the observations were excluded.

The ATUS is primarily conducted by telephone, but special efforts are made to reach those who are impossible to contact by phone (about 5 percent of the sample). Surveys are conducted in English and Spanish. The ATUS generates sampling weights to reflect the fact that some groups (for example, those reporting weekend days) are oversampled.

Professional interviewers, who guide respondents in reconstructing the day prior to the interview, gather the ATUS data. The use of trained interviewers to code the activities greatly reduces possible error. Interviewers code where each activity took place (with 26 separate codes for places and travel modes), the times the activity took place, and with whom the activity was conducted (broken down into 24 types of companion). Our research particularly makes use of the "neighbors, acquaintances" category, which best reveals respondents' level of community connectedness. The interviewers also assign each activity to one of more than 460 activity types, providing a very fine-grained look at time-use patterns. These categories cover a range of civic and social activities that are underrepresented in existing research on the social benefits of homeownership. Civic activities include attending government hearings and sessions and meeting with political representatives, whereas volunteering activities include undertaking unpaid work for a formal institution, such as church or charity. The rest of the activity categories are self-explanatory. The ATUS collects reasonably rich demographic data, including variables commonly used in social science model specifications (age, race and ethnicity, sex, income, employment status, health, and so on). Also collected is housing tenure, one of our variables of interest.

Examining civic and social engagement with the ATUS data has several limitations. The first relates to variable construction. Our measures of social activities performed with neighbors include activities undertaken with acquaintances, because the ATUS combines neighbors and acquaintances together in one category. Moreover, the ATUS includes a separate category, "friends," which we exclude from our measure. The respondent determines whether a companion is categorized as a "neighbor, acquaintance" or a "friend." Thus, activities undertaken with nonneighbor acquaintances, or especially friendly neighbors, may not be included in the analysis. These factors should not introduce systemic bias into our results unless patterns of socialization with neighbors and acquaintances or the predisposition to label people as friends or neighbors and acquaintances vary based on tenure or the stage of the housing market cycle.

A second limitation relates to the fact that we are observing only a single day in the lives of participants. Obviously, many respondents may have had atypical days on the study day. However, in a sample as large as ours, it can be expected that this noise will cancel out. The size of the sample also means that we are able to capture a reasonable number of instances of participation in rare activities. However, some of the activities that we planned to observe are excluded from the following analysis, simply because they are so rare. These rare activities were instances of socially engaging with neighbors while watching sports, providing care, attending arts or entertainment events, participating in school extracurricular activities, and attending volunteering meetings.

We classified respondents as either homeowners, meaning they lived in an owner-occupied household, or renters, meaning they did not live in an owner-occupied household. Homeowners were 73 percent of our sample, which is slightly higher than the national homeownership rate during the

study period (about 65 to 69 percent; Schwartz, 2015). We accounted for the stage of the housing market cycle during which the respondent was interviewed by defining 2003 to 2006 as the expansion stage, 2007 to 2009 as the recession stage,[3] and 2010 to 2013 as the recovery stage.

We used a logit model to determine the demographic, temporal, and geographic characteristics associated with being a homeowner. Homeownership was more common among respondents who were interviewed prior to the recession; older; married and living with their spouse; a parent of children under 18; non-Hispanic White; born in the United States; higher income; employed; and living in the Midwest or South. These associations were all as expected. These estimates are not reported in the exhibits in order to conserve space but are available on request.

We assessed civic and social engagement by tenure during the housing market cycle using descriptive statistics and a two-stage Cragg hurdle model (Cragg, 1971). The Cragg model is useful in time-use research, primarily because it copes with the censoring of activity times at zero (most respondents do not participate in most activities on any given day) and because the model assumes that separate psychological processes determine, first, whether an individual decides to participate in an activity, and then second, how long he or she participates in the activity conditional on having decided to undertake it. For example, it is reasonable to assume that a person who attends community meetings frequently does not necessarily spend a longer period of time at those meetings than a person who attends them infrequently. This feature makes the Cragg technique superior to other models used for dealing with censored data, such as forms of tobit regression.

The Cragg method involves the calculation of two separate models. First, a probit model is used to identify the factors that help determine whether respondents participate in a particular activity on any given day; these factors include the demographic control variables and the independent variables of interest in this study (homeownership and stage of the housing market cycle). Second, a truncated linear or exponential model is used to determine the factors that contribute to activity duration for those who engaged in the activity. We use exponential models in this research, because nearly all time uses are positively skewed for those who undertook them. Most people participate in the activities for relatively short periods of time, whereas a small number of people participate for long amounts of time, yielding a long tail to the right for the distribution.

Separate coefficients and *t*-statistics are generated for each part of the model. Because the coefficients are difficult to interpret, we generate predictions for the probability of engaging in the activity and the conditional duration of activity participation (activity time, provided the activity is engaged in) for homeowners and renters in all three time periods, holding the demographic control variables at their means. Further, we amalgamate these outcomes to produce predicted unconditional activity times, or the average amount of time per day homeowners and renters in all three periods are predicted to spend on our civic and social activities.

As has been noted, the main variables of interest in the models are whether or not a respondent was a homeowner and whether or not a respondent was interviewed in the expansion, recession, or recovery period. We interacted tenure with the stage of the housing market cycle to assess how

[3] This period, which coincides with the official duration of the recession (December 2007 through June 2009) as defined by the National Bureau of Economic Research, is commonly used to study the effects of the recession on neighborhoods, housing, and social life, because it allows for geographic variability in timing of the recession.

the differential effect of homeownership varied during the housing market cycle. We compared these effects with our preferred hypothesis and four competing hypotheses to determine which hypothesis best fits the pattern from our results.

Results

In this section, we evaluate the results to determine whether they favor our preferred hypothesis—that homeowners have lower levels of engagement than renters during the recession stage of the cycle, when property values are falling. First, we use *t*-tests of differences in proportions and means to explore changes in respondents' civic and social engagement during the housing market cycle, regardless of tenure. Then, we assess results from the Cragg models to determine whether being a homeowner has a differential effect on the likelihood and extent of civic and social engagement during the stages of the housing market cycle.

Civic and Neighborhood Social Engagement During the Housing Market Cycle

Civic and neighborhood social engagement was not common among the respondents during the stages of the housing market cycle (exhibit 2). Volunteering was the most commonly reported activity of the civic engagement variables. About 6 to 7 percent of the respondents volunteered on the day prior to their interview across the stages, typically for about 2 hours. Respondents' unconditional average time spent volunteering on a given day, including participants and nonparticipants in the activity, was between 8 and 9 minutes. Less than 0.5 percent of the respondents engaged in civic activities, typically for about an hour, or an unconditional average of about 0.2 minutes per day. About 4 to 5 percent of the respondents participated in social activities with their neighbors (110 conditional minutes and 4 to 7 unconditional minutes spent). The most common type of social activity was informal socializing with neighbors (2 to 3 percent of the respondents participating, an average of 2 to 3 unconditional minutes spent).

There were modest differences in respondents' civic and social engagement during the stages of the housing market cycle. Asterisks in exhibit 2 denote when the likelihood or average minutes of engagement in one stage was statistically different enough from the other two stages at the 5-percent level or higher. Respondents were more likely to volunteer during the recession stage. About 7 percent of respondents interviewed during the recession stage volunteered on the previous day compared with about 6 percent of respondents interviewed during the expansion and recovery stages. Respondents spent an average of 9 unconditional minutes volunteering during the recession stage compared with 8 unconditional minutes during the expansion and recovery stages. Respondents also were more likely to participate in social activities with neighbors and spent more time on these activities during the recovery stage. About 5 percent of respondents interviewed during the recovery stage participated in social activities with neighbors on the previous day compared with about 4 percent of respondents interviewed during the expansion and recession stages. Furthermore, participants spent more time on social activities with neighbors during the recovery stage than the expansion or recession stages (126 conditional and 7 unconditional minutes spent compared with 105 conditional and 4 unconditional minutes spent respectively). Most of the disaggregated social activities with neighbors were more intensively engaged in during the recovery stage (eating and drinking, playing sports, attending religious activities, volunteering, socializing, and traveling).

Exhibit 2

Differences in Participants' Average Daily Likelihood and Minutes of Civic and Neighborhood Social Engagement During the Housing Market Cycle

Types of Engagement	Expansion			Recession			Recovery		
	Percent Engaging	Average Minutes for Participants	Average Total Minutes	Percent Engaging	Average Minutes for Participants	Average Total Minutes	Percent Engaging	Average Minutes for Participants	Average Total Minutes
Civic activities with anyone	0.2	71.5	0.2	0.2	57.1	0.1	0.2	70.1	0.1
	(0.0)	(22.1)	(0.0)	(0.0)	(17.8)	(0.0)	(0.0)	(20.2)	(0.0)
Volunteering activities with anyone	6.6	126.1*	8.4	7.1**	131.6	9.3*	6.1**	137.4*	8.4
	(0.1)	(2.7)	(0.2)	(0.2)	(3.6)	(0.3)	(0.1)	(3.2)	(0.3)
Social activities with neighbors (sum of time spent on activities below)	3.9**	105.5**	4.1**	3.9**	105.1**	4.1**	5.2**	125.9**	6.6**
	(0.1)	(3.1)	(0.2)	(0.1)	(3.9)	(0.2)	(0.1)	(3.1)	(0.2)
Eating and drinking	0.7**	61.4	0.5*	0.6**	54.4	0.4**	1.1**	62.9	0.7**
	(0.0)	(3.7)	(0.0)	(0.1)	(4.0)	(0.0)	(0.1)	(3.7)	(0.1)
Playing sports	0.4**	119.3	0.4*	0.4*	105.7	0.4*	0.6**	110.3	0.7**
	(0.0)	(11.3)	(0.1)	(0.0)	(11.6)	(0.1)	(0.1)	(6.6)	(0.1)
Shopping	0.2	53.2	0.1	0.2	54.9	0.1	0.2*	43.8	0.1
	(0.0)	(6.9)	(0.0)	(0.0)	(18.1)	(0.0)	(0.0)	(8.4)	(0.0)
Attending religious events	0.3**	114.4	0.3**	0.2**	108.8	0.3**	0.6**	125.4	0.7**
	(0.0)	(9.4)	(0.0)	(0.0)	(7.4)	(0.0)	(0.0)	(7.4)	(0.1)
Volunteering	0.4**	125.7	0.5**	0.5	141.8	0.8	0.7**	136.2	0.9**
	(0.0)	(9.4)	(0.1)	(0.1)	(13.1)	(0.1)	(0.0)	(8.2)	(0.1)
Socializing	2.4	82.5**	2.0**	2.2**	80.9**	1.8**	2.8**	103.1**	2.9**
	(0.1)	(3.5)	(0.1)	(0.1)	(4.4)	(0.1)	(0.1)	(3.5)	(0.1)
Travel	0.6**	43.4	0.3	0.7	38.3	0.3	0.9**	42.8	0.4**
	(0.0)	(4.4)	(0.0)	(0.1)	(5.6)	(0.0)	(0.1)	(5.3)	(0.0)

** $p < 0.05$. ** $p < 0.01$.*

Notes: n = 133,633. Survey sampling design and weights accounted for. Standard errors in parentheses. Asterisks denote when the likelihood or average minutes of engagement in one stage is statistically different enough from the other two stages at the 5-percent level or higher.

Sources: Bureau of Labor Statistics (2014); Hofferth, Flood, and Sobek (2013); ATUS-X Extract Builder

Effects by Tenure During the Housing Market Cycle

We next conducted the two-stage Cragg hurdle regression analysis to examine whether being a homeowner has an effect on the likelihood and duration of civic and social engagement during the housing market cycle, controlling for other factors. Statistically significant results are shaded in light gray (see exhibits 3 and 4). Estimates for controls included in the models are suppressed but listed on bottoms of exhibits 3 through 7. These estimates are available on request.

Exhibit 3

Effect of Being a Homeowner on Participants' Average Daily Likelihood of Civic and Neighborhood Social Engagement During the Housing Market Cycle

Types of Engagement	Effect of Being a Homeowner on Likelihood of Engaging in Activity	Interaction Effect Model (Homeownership Separately Interacted With Recession and Recovery)			Best Fit Hypothesis (Refer to Exhibit 1)
		Effect of Being a Homeowner on Likelihood of Engaging in Activity	Additional Effect of Being a Homeowner During the Recession Period Relative to the Expansion Period	Additional Effect of Being a Homeowner During the Recovery Period Relative to the Expansion Period	
Civic activities with anyone	0.044	0.118	– 0.123	– 0.096	3
	(0.073)	(0.113)	(0.157)	(0.150)	
Volunteering activities with anyone	0.104**	0.124**	– 0.035	– 0.028	2
	(0.022)	(0.031)	(0.049)	(0.042)	
Social activities with neighbors (sum of time spent on activities below)	0.013	0.006	0.061	– 0.014	3
	(0.021)	(0.032)	(0.047)	(0.041)	
Eating and drinking	– 0.035	0.015	0.070	– 0.120	3
	(0.036)	(0.058)	(0.084)	(0.076)	
Playing sports	– 0.004	– 0.074	0.185	0.063	3
	(0.051)	(0.072)	(0.120)	(0.096)	
Shopping	– 0.060	– 0.075	0.129	– 0.020	3
	(0.055)	(0.099)	(0.140)	(0.138)	
Attending religious events	0.090*	0.219**	0.008	– 0.205*	2
	(0.041)	(0.071)	(0.103)	(0.098)	
Volunteering	0.032	0.039	0.008	– 0.017	3
	(0.053)	(0.091)	(0.132)	(0.115)	
Socializing	– 0.002	0.017	0.020	– 0.049	3
	(0.025)	(0.036)	(0.053)	(0.048)	
Travel	– 0.072*	– 0.071	0.064	– 0.032	4
	(0.035)	(0.057)	(0.089)	(0.074)	

** p < 0.05. ** p < 0.01.*

Notes: n = 133,633. Survey sampling design and weights accounted for. Standard errors in parentheses. Demographic, socioeconomic, temporal, and geographic characteristics associated with homeownership controlled but estimates suppressed. Controls included stage of housing market cycle (expansion stage omitted), age, sex, household income (adjusted by household size), education, race and ethnicity, nativity status, marital status, number of children, employment status, geographic type (urban/rural), and region.

Sources: Bureau of Labor Statistics (2014); Hofferth, Flood, and Sobek (2013); ATUS-X Extract Builder

Exhibit 4

Effect of Being a Homeowner on Participants' Conditional Average Daily Minutes of Civic and Neighborhood Social Engagement During the Housing Market Cycle

Types of Engagement	Effect of Being a Homeowner on Minutes Spent on Activity	Interaction Effect Model (Homeownership Separately Interacted With Recession and Recovery)			Best Fit Hypothesis (Refer to Exhibit 1)
		Effect of Being a Homeowner on Minutes Spent on Activity	Additional Effect of Being a Homeowner During the Recession Period Relative to the Expansion Period	Additional Effect of Being a Homeowner During the Recovery Period Relative to the Expansion Period	
Civic activities with anyone	– 0.600*	– 1.318**	1.143*	0.935	4
	(0.245)	(0.402)	(0.567)	(0.495)	
Volunteering activities with anyone	– 0.058	– 0.052	0.009	– 0.019	3
	(0.048)	(0.065)	(0.112)	(0.089)	
Social activities with neighbors (sum of time spent on activities below)	– 0.173**	– 0.189**	0.009	0.028	4
	(0.048)	(0.072)	(0.112)	(0.093)	
Eating and drinking	– 0.191**	– 0.173	– 0.054	– 0.014	4
	(0.063)	(0.131)	(0.168)	(0.153)	
Playing sports	– 0.031	0.148	– 0.088	– 0.284	3
	(0.088)	(0.145)	(0.217)	(0.171)	
Shopping	0.014	0.347	– 1.093*	– 0.237	3
	(0.204)	(0.323)	(0.435)	(0.387)	
Attending religious events	0.020	– 0.177	0.240	0.241	3
	(0.098)	(0.170)	(0.250)	(0.183)	
Volunteering	– 0.313*	0.012	– 0.509	– 0.373	4
	(0.127)	(0.185)	(0.308)	(0.209)	
Socializing	– 0.176**	– 0.291**	0.090	0.199	4
	(0.057)	(0.089)	(0.133)	(0.116)	
Travel	– 0.002	0.090	– 0.110	– 0.129	3
	(0.123)	(0.170)	(0.222)	(0.207)	

** $p < 0.05$. ** $p < 0.01$.*

Notes: n = 133,633. Survey sampling design and weights accounted for. Standard errors in parentheses. Demographic, socioeconomic, temporal, and geographic characteristics associated with homeownership controlled but estimates suppressed. Controls included stage of housing market cycle (expansion stage omitted), age, sex, household income (adjusted by household size), education, race and ethnicity, nativity status, marital status, number of children, employment status, geographic type (urban/rural), and region.

Sources: Bureau of Labor Statistics (2014); Hofferth, Flood, and Sobek (2013); ATUS-X Extract Builder

Two observations are in order. First, homeownership was in most cases not significantly associated with propensities to engage in civic and social activities after controlling for factors associated with being a homeowner. Homeownership was, however, significantly associated with a higher propensity to volunteer (see exhibit 3). The typical homeowner had a 5- to 6-percent chance of reporting volunteering on the previous day during the stages of the housing market cycle compared with a 4- to 5-percent chance for the typical renter (predictions generated using marginal effects at the means of the control variables; see exhibit 5). Although homeowners spent less time volunteering,

Exhibit 5

Predicted Daily Likelihood of Civic and Neighborhood Social Engagement for Homeowners and Renters During the Housing Market Cycle

Types of Engagement	Predicted Probability of Engaging in Activity (%)					
	Expansion		Recession		Recovery	
	Typical Homeowner	Typical Renter	Typical Homeowner	Typical Renter	Typical Homeowner	Typical Renter
Civic activities with anyone	0.2	0.1	0.2	0.2	0.2	0.2
Volunteering activities with anyone	5.8	4.5	6.1	5.1	5.1	4.2
Social activities with neighbors (sum of time spent on activities below)	3.8	3.8	3.9	3.4	4.9	5.0
Eating and drinking	0.6	0.6	0.6	0.5	0.9	1.1
Playing sports	0.3	0.4	0.3	0.2	0.5	0.5
Shopping	0.2	0.2	0.2	0.1	0.2	0.3
Attending religious events	0.3	0.1	0.2	0.1	0.5	0.5
Volunteering	0.3	0.3	0.5	0.4	0.6	0.5
Socializing	2.4	2.4	2.3	2.1	2.6	2.8
Travel	0.5	0.6	0.5	0.5	0.7	0.9

Notes: n = 133,633. Survey sampling design and weights accounted for. Standard errors in parentheses. "Typical" denotes a person at the mean for all control variables except tenure. Demographic, socioeconomic, temporal, and geographic characteristics associated with homeownership controlled but estimates suppressed. Controls included stage of housing market cycle (expansion stage omitted), age, sex, household income (adjusted by household size), education, race and ethnicity, nativity status, marital status, number of children, employment status, geographic type (urban/rural), and region. Predictions are based on mariginal effects at the means. All estimates are statistically significant at the 1-percent level and higher.
Sources: Bureau of Labor Statistics (2014); Hofferth, Flood, and Sobek (2013); ATUS-X Extract Builder

when they did engage in it (see exhibit 4), in total these two effects translate into a meaningful additional amount of time spent volunteering by homeowners across the cycle (on average, about 1.25 minutes a day, or 38 minutes a month, a nontrivial amount; see exhibit 7). Homeowners also were more likely to attend religious events with neighbors (see exhibit 3) and spent much more time in total doing so, particularly in the expansion and recession phases of the cycle. These findings are consistent with evidence of the civic benefits of homeownership reported by existing research, considering that some scholars group religious activities with civic activities (DiPasquale and Glaeser, 1999).

Homeownership versus renting was not associated with the propensity to participate in social activities with neighbors, but homeownership was associated with less time spent on social activities for participants (see exhibits 3 and 4). Renters on average were predicted to spend about 45 more seconds a day (24 minutes a month) on social activities with their neighbors (see exhibit 7).

Exhibit 6

Predicted Daily Conditional Minutes of Civic and Neighborhood Social Engagement for Homeowners and Renters During the Housing Market Cycle

Types of Engagement	Predicted Minutes Spent on Activity					
	Expansion		Recession		Recovery	
	Typical Homeowner	Typical Renter	Typical Homeowner	Typical Renter	Typical Homeowner	Typical Renter
Civic activities with anyone	40	152	40	47	48	70
Volunteering activities with anyone	153	161	157	164	164	177
Social activities with neighbors (sum of time spent on activities below)	108	130	110	132	137	161
Eating and drinking	56	67	52	65	62	75
Playing sports	107	92	104	98	106	121
Shopping	67	47	42	88	43	38
Attending religious events	111	133	108	101	124	116
Volunteering	143	141	134	220	152	218
Socializing	78	105	81	99	108	118
Travel	41	37	38	39	37	39

Notes: n = 133,633. Survey sampling design and weights accounted for. Standard errors in parentheses. "Typical" denotes a person at the mean for all control variables except tenure. Demographic, socioeconomic, temporal, and geographic characteristics associated with homeownership controlled but estimates suppressed. Controls included stage of housing market cycle (expansion stage omitted), age, sex, household income (adjusted by household size), education, race and ethnicity, nativity status, marital status, number of children, employment status, geographic type (urban/rural), and region. Predictions are based on mariginal effects at the means. All estimates are statistically significant at the 1-percent level and higher.
Sources: Bureau of Labor Statistics (2014); Hofferth, Flood, and Sobek (2013); ATUS-X Extract Builder

Homeownership was associated with a lower likelihood of engaging in travel with neighbors and less time spent socializing, volunteering, and eating and drinking with neighbors, conditional on performing these activities.[4] No other meaningful differences emerged between homeowners' and renters' civic and social engagement across the housing cycle (see exhibits 3, 4, and 7). Taken as whole, our findings on neighborhood civic engagement confirm prior research, but our findings on social time run counter to the narrative in some of the literature that homeowners are more socially engaged in their communities than renters.

[4] It is possible that the effect of homeownership on traveling is a false negative or artifact rather than a true effect. Researchers risk obtaining false positive or negative results when they model many effects. We have no expectations on what the effect of homeownership should be on traveling with neighbors, as the activity is not usually studied in existing research on the social benefits of homeownership.

Exhibit 7

Predicted Daily Unconditional Minutes of Civic and Neighborhood Social Engagement for Homeowners and Renters During the Housing Market Cycle

Types of Engagement	Predicted Minutes Spent on Activity					
	Expansion		Recession		Recovery	
	Typical Homeowner	Typical Renter	Typical Homeowner	Typical Renter	Typical Homeowner	Typical Renter
Civic activities with anyone	0.1	0.2	0.1	0.1	0.1	0.1
Volunteering activities with anyone	8.9	7.2	9.6	8.4	8.4	7.3
Social activities with neighbors (sum of time spent on activities below)	4.1	4.9	4.3	4.5	6.8	8.1
Eating and drinking	0.4	0.4	0.3	0.3	0.5	0.8
Playing sports	0.3	0.3	0.4	0.2	0.5	0.6
Shopping	0.1	0.1	0.1	0.1	0.1	0.1
Attending religious events	0.3	0.2	0.3	0.1	0.6	0.6
Volunteering	0.5	0.4	0.6	0.9	0.9	1.2
Socializing	1.9	2.5	1.9	2.1	2.8	3.4
Travel	0.2	0.2	0.2	0.2	0.3	0.3

Notes: n = 133,633. Survey sampling design and weights accounted for. Standard errors in parentheses. "Typical" denotes a person at the mean for all control variables except tenure. Demographic, socioeconomic, temporal, and geographic characteristics associated with homeownership controlled but estimates suppressed. Controls included stage of housing market cycle (expansion stage omitted), age, sex, household income (adjusted by household size), education, race and ethnicity, nativity status, marital status, number of children, employment status, geographic type (urban/rural), and region. Predictions are based on mariginal effects at the means. All estimates are statistically significant at the 1-percent level and higher.
Sources: Bureau of Labor Statistics (2014); Hofferth, Flood, and Sobek (2013); ATUS-X Extract Builder

Second, differences in the likelihood of civic and social engagement by tenure usually did not vary during the stages of the housing market cycle. Thus, hypothesis 3, that no difference exists in civic and social engagement by tenure during the housing market cycle, is most supported by our analysis (see exhibit 1 and the rightmost column of exhibit 3). Of the 20 interaction terms between period and tenure, 19 are insignificant in our models predicting likelihood of activity participation, and 18 of these terms were insignificant in the conditional time models. These outcomes strongly suggest that the effect of homeownership on community engagement changed little during the housing cycle.

Two exceptions were that, relative to renting, homeownership was associated with (1) a modestly lower likelihood of attending religious events with neighbors in the recovery period and (2) less conditional time spent shopping during the recession period. However, these effects do not fit our expectations on how homeowners' civic and social engagement should vary during the housing market cycle if changing property values influences their engagement. Specifically, hypotheses 1a

and 1b do not predict that (1) homeowners have a lower propensity to engage in religious activities during recovery periods but not recession periods relative to expansion periods, or that (2) homeownership has no constant positive effect on conditional minutes spent shopping across the stages of the housing market cycle (see exhibit 1). It also is noteworthy that homeownership was associated with more conditional time participating in civic activities during the recession. However, being a homeowner had a statistically significant negative effect on civic time during the entirety of the cycle (hypothesis 4). This finding is contrary to the main thrust of existing research.

Hypothesis 2, that homeownership has a constant, positive effect on civic and social engagement during the housing market cycle due to homeowners' greater residential stability, is fully supported by our findings on volunteering and largely supported by our findings on attending religious events, as engagement in both activities is positively associated with homeownership across the housing cycle. However, our findings show that homeownership is associated with less time eating and drinking, volunteering, and socializing with neighbors, and less time in overall social engagement with neighbors. These results best fit hypothesis 4. The reason why homeowners' intensity of participation in neighborhood social life should be less than that of renters is unclear, but in any event this finding supports some prior research that calls into question the common assertion that homeownership builds stronger communities, at least to the extent that informal socialization is an important contributor to neighborhood cohesion.

These nuances illustrate the complexity of dynamics between civic and social engagement and tenure. The fact that many of the effects for variables measuring the extent of civic and social engagement by tenure do not match to our existing theories (hypotheses 1a, 1b, 2, and 3) reveals the need for additional theory building on this topic. However, these nuances should not overshadow two notable trends: (1) homeowners were more likely than renters to volunteer but spent less time on social activities with neighbors than renters, regardless of the housing market stage; and (2) differences in civic and social engagement by tenure did not vary in consistent or expected ways across the stages of the cycle.

Discussion

This research helps to fill a gap in the literature on the social benefits of homeownership by testing whether (1) homeowners were more civically and socially engaged than renters with similar characteristics during a 10-year period, and (2) whether any differences between homeowners' and renters' civic and social engagement fluctuated during the recent housing market cycle. In this section, we discuss the key findings and suggest directions for future research and policymaking.

Like previous studies, we find that homeowners were more likely to volunteer than renters when accounting for demographic differences between homeowners and renters. Thus, it is possible that homeownership may have some sort of morally uplifting effect, influenced potentially by homeowners' greater residential stability, or that persons more likely to be engaged in volunteering are more likely to become homeowners. Even if an uplifting effect exists, it is important to note that we cannot disaggregate volunteering to see which volunteering activities specifically relate to the local community, and thus we cannot confirm that homeownership contributes to neighborhood public spiritedness.

We find little reason to believe that homeowners make better neighbors, a finding that calls into question whether homeownership really does contribute to community life and positively affect the private provision of public goods. Contrary to some existing studies, we did not find that homeownership was associated with more social engagement with neighbors. Being a homeowner actually had a negative association with the overall time spent on neighborhood social engagement across the cycle. One explanation is that social engagement is less visible than civic engagement, so homeowners may feel fewer rewards from time invested in these activities. Another explanation is that homeowners simply have less time to get to know their neighbors than renters or find less value in doing so. Overall, our findings suggest that although there may be good reasons for the large subsidies for homeownership in the United States, promoting neighborhood cohesion may not be one of them.

Finally, we found that fluctuation in property values during the housing cycle may have little effect on the social benefits of homeownership, contrary to our expectations. Our preferred hypothesis (hypothesis 1a), which predicts a greater positive effect of homeownership on engagement during expansion periods, was wholly unsupported in the analysis. Hypothesis 1b, which predicts a greater positive effect of homeownership on engagement during recession periods, also lacked support. Our results on the likelihood of civic and social engagement by tenure most closely matched hypotheses 2 and 3, which predict a constant difference, or, more usually, a constant lack of difference in engagement by tenure during the housing market cycle. Our results on the extent of civic and social engagement by tenure also support hypothesis 4, which predicts a constant negative effect of homeownership on engagement during the housing market cycle unexplained by existing theory.

Further analyzing and explaining these different patterns, particularly for activities that vary in unexpected ways during the housing market cycle, is a worthy direction for further research. Another important direction is to examine potential subgroup variation in civic and social engagement (Holupka and Newman, 2012; Newman and Holupka, 2013). For instance, broad evidence exists that the stages of the recent housing market cycle transformed low-income and minority homeowners and neighborhoods the most, which may lead these groups to exhibit different community engagement patterns (Bocian et al., 2011; Rugh and Massey, 2010; Immergluck and Law, 2014).

Exploring variation in the potential social benefits of homeowners' greater civic engagement, for which we do find some evidence, is also worthwhile. To the extent that homeowners are volunteering for organizations that benefit their neighborhoods, homeowners' civic engagement may make places more inclusive or exclusive and regions more equitable or inequitable. For example, civic engagement may contribute to exclusionary zoning or protests against mixed-income development coming into a neighborhood (Fischel, 2001). There are reasons to believe that homeowners' civic engagement may be more exclusionary during recession periods, as homeowners may try to protect their property values and quality of life from people or land uses seen to diminish these public goods. Testing the link between more exclusionary civic engagement and recessions is a pressing pursuit. Because we cannot observe the character of neighbors or neighborhoods in our data set, we cannot comment on the effects of neighborhood homogeneity on civic and social engagement or on how the housing cycle may change that engagement over time. Future research should investigate these questions.

A final direction is to explore the drivers of changes in civic and social engagement during the housing market cycle, regardless of tenure. Homeowners and renters in our study were more likely to socialize with their neighbors, and spent more time socializing with them, during the recovery stage. One possible explanation is that, in the aftermath of the economic flux and residential transition of the recession, people tried more than in the other stages to get to know newcomers on their block, such as renters moving into former foreclosures.

Overall, it is important for housing scholars, planners, and policymakers to differentiate between civic and social engagement in conveying the social benefits of homeownership. Our finding that homeownership is associated with a higher likelihood of working to improve society through volunteering does suggest that homeownership may have benefits for the society as a whole, which in turn implies that public policy to promote homeownership has merits in this regard. In contrast, policies to promote homeownership may do little to maintain neighborhoods through the exercise of informal social control or improve sense of community. We do not find compelling evidence that the degree of intervention to promote homeownership should vary during the housing market cycle.

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A Research Note: The Housing Choice Voucher Program and Access to Opportunity in Florida's Nonmetropolitan Areas

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Abstract

Previous research on the Housing Choice Voucher program has found that recipients tend to be clustered in high-poverty, minority concentrated areas. Although these findings are consistent across study areas, much of the research has been conducted in large metropolitan areas. This study accounts for all locations across the state of Florida, including small metropolitan, micropolitan, and rural areas, to examine if place matters for voucher holders' ability to access high-opportunity neighborhoods. The findings reveal that voucher households in nonmetropolitan areas have lower incomes and tend to be younger with higher percentages of single mothers and families with children; however, nonmetropolitan voucher households are also less concentrated and access higher-opportunity neighborhoods. These differences in nonmetropolitan areas warrant the consideration of place for both future research and policy.

Introduction

The Housing Choice Voucher (HCV) program provides housing assistance to more than 2 million low-income households and is the largest tenant-based rental housing subsidy in the nation. A national objective of the HCV program is to provide voucher holders with the ability to move to the location of their choice. A body of research has emerged that focuses on the importance of providing low-income households access to opportunity-rich neighborhoods that include, for example, quality schools, access to employment, and healthy environmental conditions that facilitate self-sufficiency. Recent research documents that younger children who moved to higher-opportunity neighborhoods were more likely to attend college and experience greater earnings as adults

(Chetty, Hendren, and Katz, 2015). Nevertheless, previous nationwide studies have questioned the HCV program's ability to deconcentrate poverty (Devine et al., 2003; McClure, Schwartz, and Taghavi, 2015) and provide low-income households the ability to move to neighborhoods with higher opportunity after receiving a voucher (Walter, Li, and Atherwood, 2015).

A large body of research has found that voucher holders tend to be clustered in high-poverty, minority concentrated neighborhoods (Newman and Schnare, 1997; Pendall, 2000) and have limited access to high-opportunity neighborhoods. However, much of this research has examined large metropolitan statistical areas (MSAs). Little is known about locational patterns of voucher recipients who reside in small metropolitan, micropolitan, and rural areas.[1] This gap in the research raises an interesting question about the performance of the HCV program outside of large MSAs and if voucher recipients in nonmetropolitan areas access neighborhoods with higher opportunity than urban households. Furthermore, very little research focuses on small cities and regions that are not connected to the global network, and generalizing theories for large MSAs can lead to biased approaches for understanding localized areas (Bell and Jayne, 2009).

This study extends the query by examining voucher locational patterns in the state of Florida at a more granular scale, offering the opportunity to capture location heterogeneity across varying housing markets. This study utilizes administrative data from the U.S. Department of Housing and Urban Development (HUD) documenting location and sociodemographic information of individual voucher households residing in Florida in 2013. The data set is coupled with the opportunity indices provided in HUD's Affirmatively Furthering Fair Housing (AFFH) tool to address the following research questions: (1) What share of HCV households reside in smaller MSAs, micropolitan areas, and rural areas, and do household characteristics vary by location? (2) Does voucher dispersion or clustering in affordable rental neighborhoods vary by place? (3) Are voucher holders in MSAs accessing higher-opportunity neighborhoods than nonmetropolitan households?

Four large MSAs (population of more than 1 million) are in Florida: Jacksonville, FL; Orlando-Kissimmee-Sanford, FL (Orlando); Miami-Fort Lauderdale-West Palm Beach, FL (Miami); and Tampa-St. Petersburg-Clearwater, FL (Tampa) (based on the MSA definitions in OMB Bulletin 15-01, dated July 15, 2015). This study uses these MSAs for comparison purposes, but they are not the focus of the study. The remaining areas in the state of Florida are assigned to one of three categories: (1) small MSAs, (2) micropolitan areas, and (3) rural areas (counties that are not in a metropolitan or micropolitan area). Micropolitan and rural areas are also referred to as nonmetropolitan areas in this study. Taking Thrift's (2000) approach to the city that one size does not fit all, this study intends to advance rental housing policy for very low-income households by accounting for place. Understanding the dynamics of voucher household characteristics and locational outcomes in nonmetropolitan areas can help direct policy interventions to particular voucher subgroups in regions that have been given less attention.

[1] The Office of Management and Budget defines metropolitan and micropolitan statistical areas by grouping counties, including relatively high-density counties in urban areas, plus adjacent counties that have strong social and economic ties with the urban area. MSAs contain an urban area with a population of 50,000 or more, and the population within the urban area of a micropolitan statistical area is between 10,000 and 50,000 on average.

Literature Review

The body of literature on the HCV program is heavily focused on urban areas, leading to calls for more research on voucher holders who reside in different types of urban or nonurban settings (Carlson et al., 2012b). Only one study has focused on rural areas exclusively (Pistilli, 2001). The few studies that have accounted for voucher holders in nonmetropolitan areas found differences in household composition and neighborhood quality (Carlson et al., 2012b; Ross, Shlay, and Picon, 2012), suggesting the importance of location in analyzing the HCV program. No study, however, has examined the ability for voucher holders to access opportunity by location, comparing large MSAs, small MSAs, micropolitan areas, and rural areas.

The following information describes the differences in location that have been gathered from national studies. First, the share of voucher holders in nonmetropolitan census tracts in 2010 made up only 13.3 percent of all vouchers, with the majority residing in central city tracts (52.2 percent) and the remaining residing in suburban tracts (34.4 percent). Voucher holder presence in nonmetropolitan areas declined from 21.0 percent in the mid-1990s to 19.2 percent in 1997 and 13.3 percent by 2010 (McClure and Johnson, 2015; Newman and Schnare, 1997). Second, substantially more rent-burdened HCV households (families who spend more than 31 percent of income on rent) reside in nonmetropolitan areas (47.4 percent) than in metropolitan areas (36.0 percent; McClure, 2005). Third, although HCV households move from a nonmetropolitan area to a metropolitan area more often than in the other direction, from 1998 to 2005, portability from metropolitan areas to nonmetropolitan areas accounted for 5.5 percent of all portability moves (Climaco et al., 2008). Fourth, nonmetropolitan areas have the fewest high-opportunity neighborhoods by both census tract and block group as compared with central cities and suburban cities. Nonmetropolitan areas also have the fewest neighborhoods with low poverty and minimum assisted housing as compared with central cities and suburban cities (McClure, 2011). HCV households residing in rural and suburban areas were less satisfied with their housing unit than those residing in central cities but were more satisfied with their neighborhoods (Ross, Shlay, and Picon, 2012).

State HCV studies are less common, and only two state studies distinguish between rural and urban regions (Carlson et al., 2012a, 2012b). Carlson and colleagues found the number of households that applied and did not receive a rent subsidy in Wisconsin was lower in rural areas. Also, nearly one-third of urban-residing applicants did not receive assistance (excluding Milwaukee) compared with only slightly more than one-fifth of applicants in rural areas (Carlson et al., 2012a). Household composition and neighborhood quality for voucher holders were different in rural areas than in large urban areas in Wisconsin. One year after voucher receipt, households in rural areas moved to neighborhoods of lower quality, whereas households in urban areas moved to neighborhoods with higher quality (Carlson et al., 2012b).

The only study the authors found that focused on rural areas was conducted nearly 15 years ago and commissioned by HUD. The five areas include: Troy, Alabama; Creston, Iowa; Great Falls, Montana; Blossburg, Pennsylvania; and Del Rio, Texas. That study largely focused on voucher success rates and found that HCV waiting lists tended to be shorter than the average wait time for the voucher program and had fewer applicants (Pistilli, 2001). Turnover was high in the program, creating issues of program utilization for housing authorities. Success rates varied from 96 percent in Del Rio to

35 percent in Creston. Most rental units passed the initial inspection or required minor repairs, deflating the perception that rural areas contain a large stock of substandard units. Housing availability was a concern with fewer rental units than the national average. The degree of rurality did not appear to affect lease-up rates for voucher holders, but proximity to colleges and universities created competition for voucher holders to find affordable rental units. Manufactured housing in rural areas increased the number of affordable housing options for voucher holders. Discrimination based on family size and race may have lowered lease-up rates in rural areas (Pistilli, 2001).

Past research indicates that the HCV program shares similarities in nonmetropolitan areas and urban areas, albeit with stark differences. The limited information comparing neighborhood conditions between urban and rural regions reveals some indication that the socioeconomics of neighborhoods in which voucher holders reside are similar (high poverty, cheaper housing, and low levels of educational attainment). Factors such as discrimination based on family size and race appear to reduce lease-up rates for both urban and rural households. Significant differences are seen in neighborhood and housing unit satisfaction, the extent of the rent burden, the demand for vouchers, and mobility. These differences warrant research that accounts for place to help guide policymaking. This study expands on the previous literature on the HCV program by examining voucher household characteristics, degrees of clustering, and the ability for voucher holders to access opportunity by location, comparing large MSAs, small MSAs, micropolitan, and rural areas.

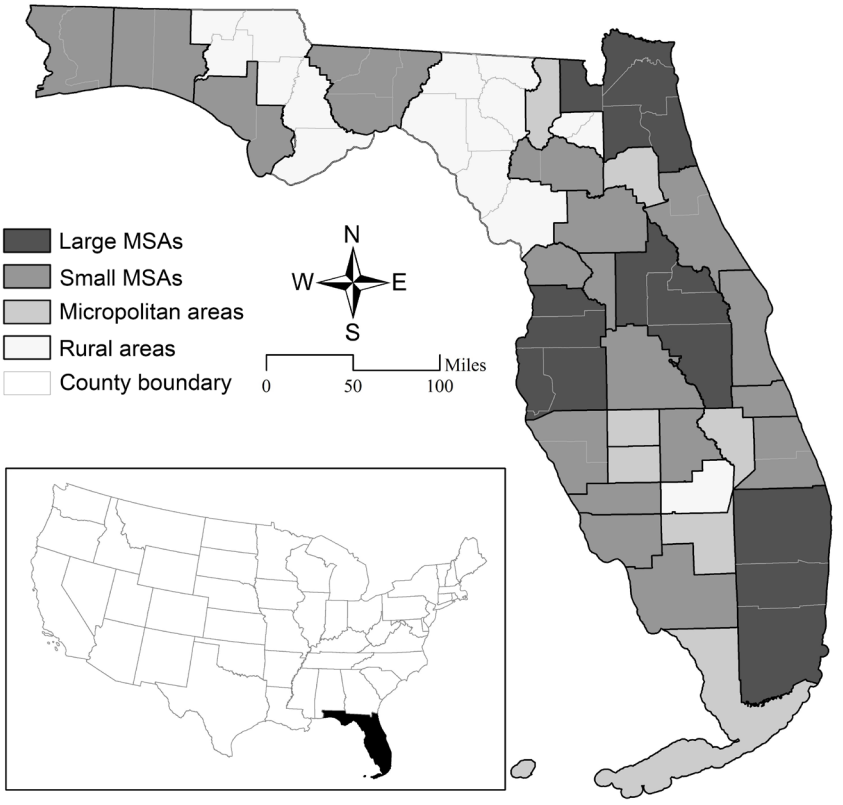
Data and Methodology

The authors obtained calendar year 2013 HCV administrative data for the entire state of Florida from HUD. The variables include individual tenant characteristics (age, gender, race or ethnicity, income sources and amounts, disability status, and relation of each household member to the head of household); household characteristics (whether any member was formerly homeless, household income, and total tenant payment); and unit and location information (number of bedrooms, home address, geocoded latitude and longitude, gross rent, and utility allowance). Gross rent includes contract rent and a utility allowance estimate. Total tenant payment equals gross rent minus the voucher amount. Only tenant-based vouchers were used. The moderate rehabilitation category was excluded, because it provides project-based rental assistance. This procedure resulted in a study population of 105,466 voucher households that were geocoded in ArcGIS based on the geocoordinates provided by HUD.

To determine the share of Florida HCV households that reside in places outside large MSAs, the state's counties were classified into the following categories: large MSA, small MSA, micropolitan area, and rural area. A county population of at least 1 million distinguished a large MSA from a small MSA. The definitions used by the Office of Management and Budget were applied to classify micropolitan counties. Out of 67 counties in Florida, 44 fall within a MSA. Four MSAs, including Jacksonville, Miami, Orlando, and Tampa, meet the definition for a large MSA and cover 16 counties. The remaining 18 small MSAs cover 28 counties and have populations of approximately between 100,000 and 1 million. The 7 micropolitan areas in Florida have populations of approximately 10,000 to 100,000 and encompass 7 counties. The remaining 16 counties that did not fall within a metropolitan or micropolitan area were categorized as rural. All but 1 of the rural counties are in northern Florida (exhibit 1).

Exhibit 1

Study Area by Location



MSA = metropolitan statistical area.

To understand the heterogeneity of voucher households by location, descriptive statistics from the 2013 HUD data on household characteristics were examined. Specifically, voucher distribution was analyzed by household racial or ethnic composition; household type (including age, disability status, whether children are present, and household size); economic status including income level and income source; and unit size (number of bedrooms). Although the focus of this article is on voucher holders outside of large MSAs, data on voucher holders in the four large MSAs, as well as statewide information, are provided for comparison.

To determine if HCV recipients are more dispersed in affordable rental neighborhoods by location, the proportion of HCV households to total fair market rental units was calculated at the census block group level. The total fair market rental units were estimated using the total rental units derived from 2009–2013 American Community Survey 5-year estimates and 2013 Fair Market Rents (FMRs) published by HUD. Specifically, the total rental units were generated by adding occupied units with cash rent, occupied units without cash rent, vacant for-rent units, and rented-not-occupied housing units. The calculation was based on two-bedroom FMRs, because HUD typically uses the two-bedroom FMRs to derive the other bedroom sizes (HUD, 2007).

To calculate the number of fair market rental units, the first step was to calculate the number of occupied units with cash rent of less than the two-bedroom FMR. For example, if the FMR was $780, all units in the rent categories from $1 to $749 were included, plus 60 percent of the units falling under the $750–$799 category. Next, a multiplier was generated by dividing the number of occupied units with cash rent of less than the FMR (results from step one) by the total number of occupied units with cash rent. The last step was to apply this multiplier to the number of total rental units. Census block groups with no vouchers and no fair market rental units were removed. Because the count of fair market rental units was an estimate, some census block groups had zero fair market rental units and at least one HCV household. In this case, the ratio of the number of HCV households to the number of fair market rental units was assigned the value 1.

Taking a similar approach as Wang and Varady (2005), hot spot analysis was conducted at the state level using the HCV household and fair market rental unit ratio to determine statistically significant hot spots (areas that have high concentrations of HCV households) and cold spots (areas that have a low number of HCV households relative to under-FMR units). The parameters for the hot spot analysis included a fixed distance band with a band size of 15,000 meters to conceptualize the spatial relationship.[2] The results of the hot spot analysis were overlaid on a map of Florida's 67 counties to determine if HCV households are concentrated in areas that have affordable rental units or if location reveals differences.

Neighborhoods of opportunity are defined and measured by using the opportunity indices provided in HUD's AFFH tool and include the School Proficiency Index, Jobs Proximity Index (provided at the census block group level), Low Poverty Index, Labor Market Engagement Index, Low Transportation Cost Index, Transit Trips Index, and Environmental Health Index (census tract level). The values in the indices range from 0 to 100, and higher scores indicate more opportunity.[3] For each index, the median and 25th and 75th percentile scores were calculated by location (large MSA, small MSA, micropolitan, and rural) based on where voucher holders reside using the 2013 geocoded data set. This process allows for each index to be assessed by location to determine if voucher holders in MSAs access higher-opportunity neighborhoods than their counterparts in nonmetropolitan areas.

The median and 25th and 75th percentile scores were also calculated for each county, and the opportunity indices were converted to *z*-scores. This approach was used to standardize the data to produce an overall average opportunity score for each county in which the seven opportunity indices were weighted equally. The same process was repeated for each county but only accounting for the census tracts and block groups where voucher holders reside using the 2013 geocoded data set as done previously. The index scores for each county were then compared with the index scores for where voucher holders reside in that county. The purpose of this analysis was to further understand how voucher holders preform relative to the overall opportunity index score for each county to determine where voucher holders access the highest or lowest opportunity and to provide additional insight on variation across location.

[2] The fixed distance method was selected because it is a robust method for the large variation in size of census block groups, which is important for this study as it covers all census block groups in the state. The band size was selected with multiple trials to ensure that it reflects maximum spatial autocorrelation.

[3] Variables, data sources, formulas, and a complete description of the opportunity indices are in HUD's AFFH Data Documentation (HUD, 2016).

Results

This section first presents results on HCV household characteristics by location, then demonstrates how voucher clustering in affordable rental neighborhoods varies by place, and lastly discusses the findings comparing voucher holder access to opportunity neighborhoods in MSAs and nonmetropolitan areas.

Housing Choice Voucher Household Characteristics by Location

Approximately 98 percent of Florida HCV households live in large and small MSAs, and nearly three-fourths of those live in large MSAs specifically. Only 0.9 percent of HCV households live in micropolitan counties and 1.1 percent reside in rural counties, accounting for slightly more than 2,000 HCV households in 2013. The proportion of voucher households to households that earn 50 percent of the Area Median Income (AMI) is higher in large MSAs (7.0 percent) and small MSAs (5.0 percent) compared with 2.9 percent in micropolitan areas and 3.9 percent in rural areas. This finding is consistent with Arnold's (1990) argument that fewer households receive subsidy in nonmetropolitan areas.

Statewide, more than one-half of HCV households are Black, approximately 25 percent are Hispanic, and about 15 percent are White. Heterogeneity is prominent by location in household racial or ethnic composition, even though Black households are the primary racial group that use vouchers in Florida across the four different locations. Large MSAs have only about 10 percent of White HCV households, and this proportion substantially grows as the location becomes more rural. Nearly one-half, 43.5 percent, of all HCV households in rural areas are White. The difference between the proportions of Hispanic households in large MSAs compared with rural areas is also substantial (30.8 versus 2.0 percent, respectively). Black households make up more than one-half of the HCV population in all areas except micropolitan areas, where the proportion drops to 42.4 percent. The large proportion of White residents and few Hispanic residents in rural areas reflect the demographics in northern Florida.

Household type by age is fairly consistent across all locations. Large MSAs and micropolitan areas are similar in terms of age distribution. Rural areas, closely followed by small MSAs, have the most household heads or spouses who are young adults (34 years of age or younger). Large MSAs and micropolitan areas have the largest share of household heads, spouses, or both who are 62 years of age or older. Approximately one-half of all heads of household or spouses (whomever is older), regardless of location, are between the ages of 25 and 61. Nearly one-half of voucher households in MSAs have at least one disabled member, most with disabled members as the primary member in the household. This number drops slightly to approximately 39 percent in micropolitan and rural areas. The variation by location is very small when looking at only disability of the primary member in the household.

Nearly one-half of voucher households have children, and a large portion of these households consist of single mothers with children. Rural areas and small MSAs have relatively high proportions of families with children (58.0 and 53.5 percent, respectively). Both areas also have many single mothers with children, with one-half of all households in rural areas representing this dynamic. Statewide, the

primary household size for voucher holders is one member, which represents more than one-third of the population, followed by four or more members at 26 percent. Micropolitan areas have higher proportions of one- and two-member households compared with all other areas. The largest household sizes (four or more members) are most often in MSAs. The primary bedroom sizes for HCV households are two and three bedrooms (34 and 32 percent, respectively). In rural areas, a significantly lower proportion of HCV households live in one-bedroom units (7 versus 23 percent statewide), but a much higher percentage live in three-bedroom units (47 versus 32 percent statewide).

Statewide, the median income is about $10,300 for voucher households. The highest median income is in micropolitan areas, at $12,300, and the lowest median income is in rural areas, at $9,400. In terms of the primary source of income, about one-third of households have no income, which is consistent across all locations. Another one-third of voucher households' primary income is from wages, and for another one-third, it is from social security or supplemental security income. Very little variation exists by location in all income sources. On average, across the state, the HCV program serves households with income levels at 25 percent of the AMI; this percentage ranges from 24 percent in large MSAs to 27 percent in micropolitan and rural areas. More than 70 percent of HCV households in Florida are extremely low-income and earn 30 percent of the AMI or less, and about 23 percent of HCV households are very low-income, which ranges from 31 percent to 50 percent of the AMI (exhibit 2).

In summary, a larger share of households that earn less than 50 percent of AMI are served in MSAs compared with nonmetropolitan areas. A greater share of minorities comprises HCV households in urban areas, and, as the location changes and becomes more rural, White households make up a larger share in the program. Rural areas contain more HCV households with single mothers and children. The largest share of extremely low-income HCV households is in large MSAs. Many of these findings are consistent with and reflect state demographics.

Exhibit 2

Florida Housing Choice Voucher Profiles by Location (1 of 2)

	State	Large MSAs	Small MSAs	Micropolitan Areas	Rural Areas
Overall HCV count	105,466	77,578	25,857	906	1,125
Percentage of HCV households	100.0	73.6	24.5	0.9	1.1
Land area (square miles)	56,778	15,462	24,331	6,052	10,933
Percentage of land area	100.0	27.2	42.9	10.7	19.3
HCV households as percent of households with 50% AMI or less	6.3	7.0	5.0	2.9	3.9
Race/ethnicity (%)					
Black[a]	55.6	54.1	60.7	42.4	51.0
White[a]	14.3	10.2	24.5	31.0	43.5
Hispanic[a]	25.3	30.8	10.1	22.1	2.0
Other[b]	4.9	5.0	4.7	4.5	3.6
Household type (%)					
Age category[c]					
34 or younger	24.0	21.9	30.0	22.2	33.8
35–61	51.5	51.3	52.0	53.4	49.1
62 or above	24.5	26.8	17.9	24.4	17.2

Exhibit 2

Florida Housing Choice Voucher Profiles by Location (2 of 2)

	State	Large MSAs	Small MSAs	Micropolitan Areas	Rural Areas
Disabled households (any member)	46.5	48.5	41.1	39.4	39.1
Disabled households (any primary member)[d]	38.5	39.4	35.8	36.1	37.7
Households with child(ren)	49.5	48.0	53.5	45.6	58.0
Single mother with child(ren)	45.2	44.0	48.6	40.4	51.1
Household size					
1 member	36.5	36.9	35.1	40.7	32.6
2 members	20.8	21.1	19.9	23.0	20.9
3 members	17.1	16.7	18.2	14.6	21.4
4 or more members	25.6	25.3	26.8	12.0	15.1
Number of bedrooms (%)					
0 bedrooms	1.8	2.2	0.7	0.7	0.9
1 bedroom	23.4	25.1	19.1	25.1	7.4
2 bedrooms	34.3	33.4	36.8	38.0	39.1
3 bedrooms	31.7	30.0	36.2	31.0	47.0
4 or more bedrooms	8.7	9.3	7.2	5.3	5.6
Median income ($)	10,284	10,008	10,872	12,278	9,360
Income source (%)					
No income	32.1	31.3	34.6	32.8	30.0
Primary income—wage	31.3	30.6	33.3	34.5	31.4
Primary income—welfare	2.2	2.0	2.7	1.4	4.3
Primary income—social security/SSI	34.4	36.1	29.4	31.2	34.4
Income as percent of AMI					
Average percent of AMI	24.8	24.3	26.3	27.4	27.2
30% AMI or less	70.4	72.1	65.8	63.4	68.1
31–50% AMI	22.7	21.2	26.9	29.8	26.0
51–80% AMI	6.3	6.1	6.8	6.7	5.6
81% AMI or more	0.6	0.6	0.5	0.1	0.4

AMI = Area Median Income. HCV = Housing Choice Voucher. MSA = metropolitan statistical area. SSI = supplemental security income.

[a] *All household members have the same race or ethnicity.*

[b] *Other includes all other racial groups, interracial households, and mixed-race households.*

[c] *The age of household head or spouse, whoever is older.*

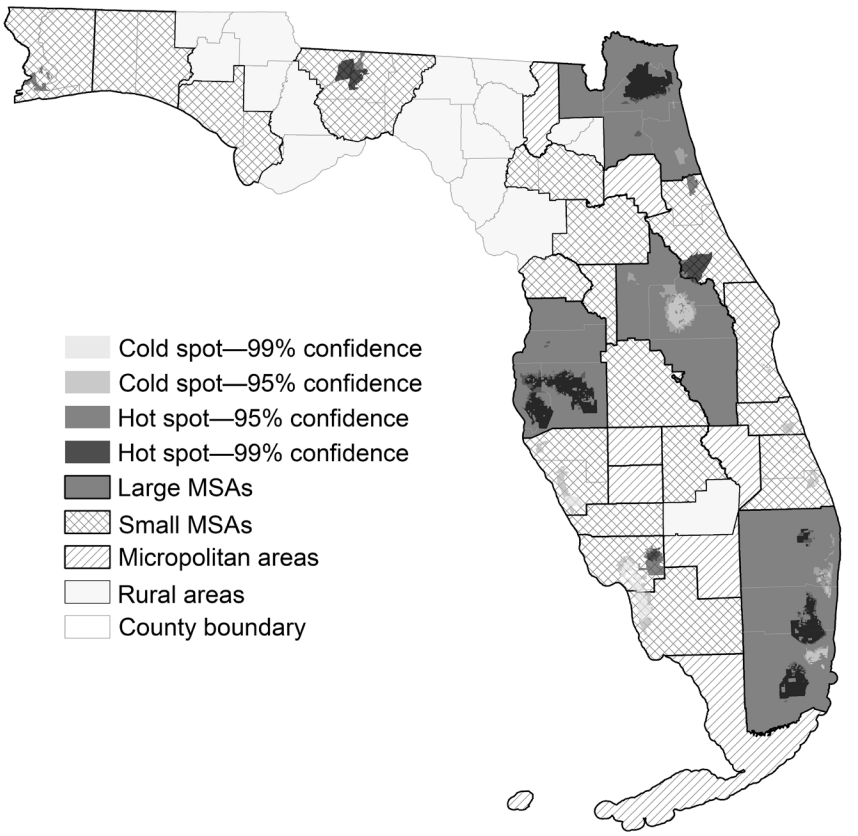
[d] *Primary member is defined as household head, spouse, or co-head.*

Housing Choice Voucher Distribution by Location

Exhibit 3 reveals statistically significant hot spots and cold spots of clusters of voucher holder concentration relative to under-FMR rental housing units. Hot spots have a high concentration of voucher holders relative to the number of fair market rental units. Cold spots have a low number of voucher holders relative to the number of fair market rental units, which indicates areas that are underrepresented by voucher holders. The confidence intervals indicate that a less-than 1-percent chance (99 percent confidence) or less-than 5-percent chance (95 percent confidence) that the clustering occurs by random chance.

Exhibit 3

Hot Spot Analysis of Voucher Holder Concentration Relative to Under-FMR Rental Housing



FMR = Fair Market Rent. MSA = metropolitan statistical area.

Most hot spots and cold spots are in large MSAs, and the distribution pattern is quite different across each large MSA. The Jacksonville and Tampa MSAs have mainly hot spots, indicating the proportion of HCV households compared with under-FMR rental units is relatively high, which represents a clustered pattern of a high concentration of voucher holders. The Orlando MSA has a very large cold spot, meaning the share of voucher holders is low where under-FMR rental units are. The Miami MSA includes a combination of hot spots and cold spots, with concentrations of voucher holders in the middle portion of South Florida counties in underserved neighborhoods. This pattern raises the question as to why voucher holders are not accessing neighborhoods where affordable units are. Although beyond the scope of this study, reasons that may be further assessed to explain this finding are that the lack of voucher acceptance in these areas, discrimination in the market, or the local housing authority's service area may be constricting voucher holders to certain areas during the first year of voucher receipt.

Besides focusing on where hot spots and cold spots exist, we also examine where no hot or cold spots exist. A lack of hot spots and cold spots indicates areas where voucher holders are randomly distributed relative to under-FMR units. Both micropolitan and rural areas have no hot spots or cold spots. This absence means voucher holders are randomly disbursed throughout areas that provide rental units for less than the FMR. The absence of visibly large clusters of poverty in nonmetropolitan areas helps explain why rural poverty is often considered forgotten in mainstream America. For more than five decades, the percentage of low-income people in nonmetropolitan areas has consistently been higher than in MSAs (USDA, 2017).

Housing Choice Voucher Access to High-Opportunity Neighborhoods

Exhibit 4 reveals that micropolitan areas provide the most opportunity to voucher holders in terms of access to employment, school quality, and labor force participation and human capital. On the other hand, large MSAs provide the least opportunity to employment and school quality for voucher holders, whereas rural voucher holders are where labor market engagement is the lowest. The Low Poverty Index, which assesses exposure to poverty in a neighborhood, performs the best in small MSAs and worst in large MSAs, although it is important to note that this index varies very little by location; the scores range from approximately 20 to 28. These scores are relatively low, which indicates voucher holders across the state of Florida are in neighborhoods with high poverty.

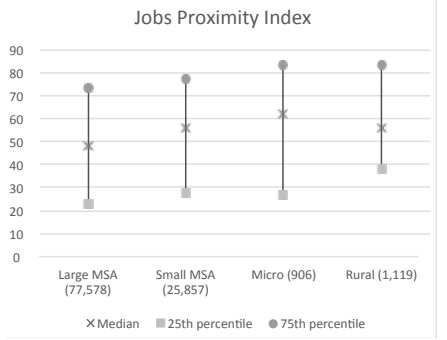
It is not surprising that the Low Transportation Cost Index and Transit Trips Index scores for voucher holders vary by location, with the highest scores in large MSAs and lowest scores in rural areas. This disparity is a result of the decline of public transit and higher transportation costs from inner cities to rural areas. The Environmental Health Index, which assesses environmental quality in neighborhoods using the National Air Toxics Assessment data, indicates that voucher holders in rural areas live in neighborhoods with the highest scores. The score drops rapidly for all other locations and is fairly consistent for large MSAs, small MSAs, and micropolitan areas, although voucher holders in small MSAs access neighborhoods with slightly better environmental quality. Again, this result is likely due to the fact that environmental quality is generally better farther away from urban areas where there are fewer pollutants.

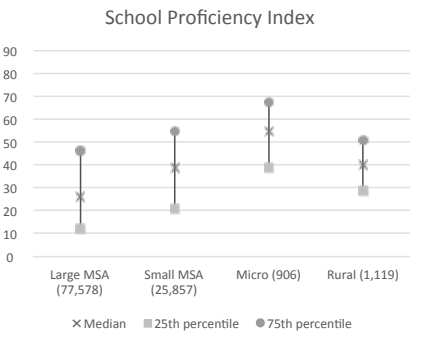
In summary, the finding that voucher holders live in neighborhoods that have high exposure to poverty is consistent with other studies (Devine et al., 2003; McClure, Schwartz, and Taghavi, 2015) and does not vary much by location. The transit and environmental results are also as expected and reflect the general locational differences of these factors. However, the ability for voucher holders to access the best employment opportunities and schools in micropolitan areas is a new finding. Is this finding also a reflection of overall locational differences? Do micropolitan areas generally provide more opportunity than large MSAs, where voucher holders have the hardest time accessing neighborhoods of opportunity? Or do voucher holders successfully access neighborhoods with higher opportunity in micropolitan areas? To better understand this finding, we consider the opportunity scores of voucher holders relative to the overall score for the location in which they live.

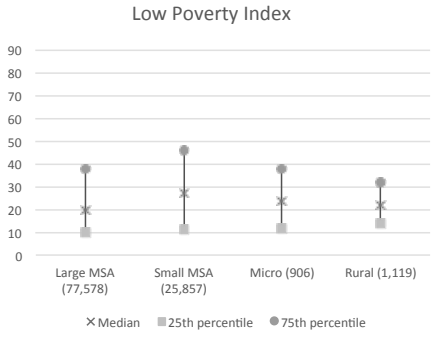
When accounting for the overall county index scores for each location, voucher holders in micropolitan and rural counties access higher-opportunity neighborhoods than their counterparts

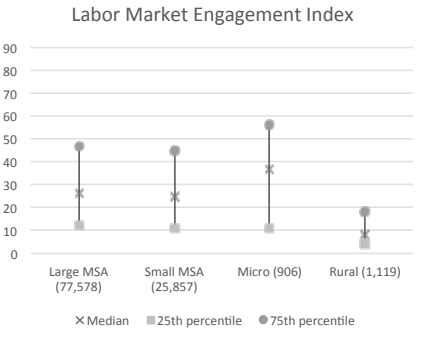
Exhibit 4

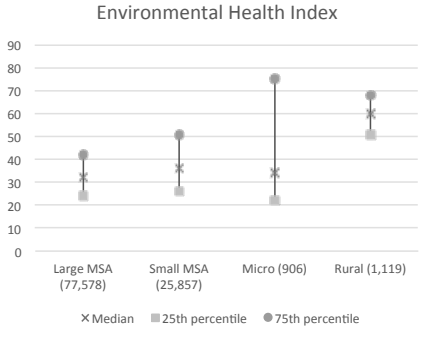
AFFH Opportunity Indices by Location

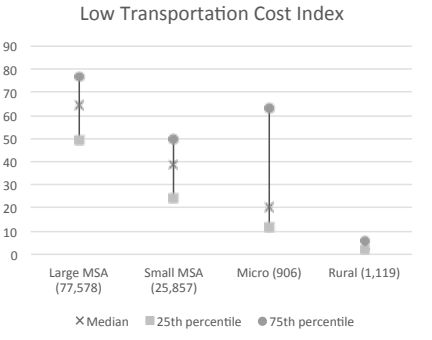


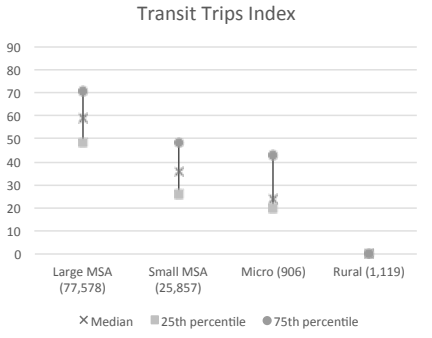












AFFH = Affirmatively Furthering Fair Housing. MSA = metropolitan statistical area.

in metropolitan counties (large and small MSAs). Voucher holders in 13 of the 16 rural counties and 6 of the 7 micropolitan counties reside in neighborhoods that have higher overall opportunity scores than the counties containing them. In large MSAs, voucher holders are in neighborhoods that have higher overall opportunity in only 4 of 16 counties, although the ratio is 9 to 28 counties in small MSAs. The top 10 counties where the overall index score for voucher holders is greatest compared with the average county index are all rural or micropolitan (exhibit 5).

Exhibit 5

Ten Highest Voucher Index Scores Relative to Overall County Opportunity Index

County	Location	County Index Score	Voucher Index Score	Difference
Holmes	Rural area	– 0.9749	0.6450	1.6198
Jackson	Rural area	– 0.1378	1.2307	1.3685
Columbia	Micropolitan area	– 0.4906	0.6748	1.1654
Bradford	Rural area	– 1.0747	– 0.0444	1.0302
Hamilton	Rural area	– 0.5772	0.4490	1.0262
Glades	Rural area	– 1.1198	– 0.1299	0.9899
Hendry	Micropolitan area	– 0.1430	0.7768	0.9197
DeSoto	Micropolitan area	– 0.5151	0.3882	0.9033
Washington	Rural area	– 0.4046	0.4554	0.8600
Taylor	Rural area	– 0.1887	0.6057	0.7944

Note: Scores in other Florida counties are available from the authors.
Source: Authors' computations

Discussion

The goal of this study is to better understand voucher household characteristics, concentration, and access to neighborhoods of opportunity by accounting for location, operationalized at the county level by degree of rurality. Many studies on the HCV program have evaluated large MSAs, implying that policy is guided by metropolitan findings. However, this study finds that the HCV program performs differently—at least in the state of Florida—across the rural-metropolitan gradient in terms of household composition, concentration, and ability for HCV households to move to neighborhoods of opportunity. Location may be an important consideration in the HCV program, and caution may be justified before assuming national HCV policies are equally effective for public housing authorities that service nonmetropolitan areas.

A primary finding of this study is that HCV households are not concentrated relative to units that rent for less than the FMR in micropolitan and rural areas, and the HCV program performs better in terms of allowing HCV households to access higher-opportunity neighborhoods in nonmetropolitan areas. This finding is particularly interesting given that McClure (2011) found that nonmetropolitan areas have the fewest high-opportunity neighborhoods as compared with central cities and suburban areas. This finding implies nonmetropolitan HCV households can access higher-opportunity neighborhoods, even though fewer are available.

Importantly, the federal deconcentration goal may not be as relevant to nonmetropolitan areas. For example, HCV households in rural areas have lower incomes, tend to be younger, and comprise higher percentages of single mothers and families with children than the statewide HCV average. A wider range of supportive services, rather than mobility options to move to a different

neighborhood, are likely needed for these households to reach self-sufficiency. Ross, Shlay, and Picon's (2012) finding that HCV households residing in rural areas are more satisfied with their neighborhoods than their urban counterparts supports this conclusion.

Equally important is the issue of housing availability in nonmetropolitan areas. Pistilli (2001) researched the HCV program's performance in rural areas and found that rural housing availability was a concern for renters, with fewer rental options compared with national averages. Also, recall that Ross, Shlay, and Picon (2012) found that HCV households residing in rural areas were less satisfied with their housing units. Because Pistilli (2001) used data that are now more than 15 years old and examined only six rural areas, a national paper that examines the HCV program and housing availability in nonmetropolitan areas is warranted.

Furthermore, the finding that voucher households access higher-opportunity neighborhoods in certain Florida counties is worth further exploration. For instance, what residential mobility push-and-pull factors enable voucher holders to access more high-opportunity neighborhoods in micropolitan and rural areas than in MSAs? A more indepth qualitative analysis is necessary to gain insight to the factors and barriers that enable or prevent access to high-opportunity neighborhoods for future HCV mobility policy.

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Departments

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Data Shop

Data Shop, a department of Cityscape, *presents short articles or notes on the uses of data in housing and urban research. Through this department, the Office of Policy Development and Research introduces readers to new and overlooked data sources and to improved techniques in using well-known data. The emphasis is on sources and methods that analysts can use in their own work. Researchers often run into knotty data problems involving data interpretation or manipulation that must be solved before a project can proceed, but they seldom get to focus in detail on the solutions to such problems. If you have an idea for an applied, data-centric note of no more than 3,000 words, please send a one-paragraph abstract to david.a.vandenbroucke@hud.gov for consideration.*

Measuring Disability

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The views expressed in this article are those of the authors and do not represent the official positions or policies of the U.S. Department of Housing and Urban Development or the U.S. government.

Abstract

Housing policy researchers studying the intersection of housing and disability must understand the relative strengths and limitations of the various types of administrative and survey data that can be used to identify persons with disabilities. This article describes traditional ways that disability has been measured in U.S. Department of Housing and Urban Development (HUD) administrative data and in relevant federally funded household surveys in the United States, while also highlighting newly available linked administrative survey data that can better identify persons with disabilities who participate in HUD-assisted housing programs. The article addresses various methods of measuring disability, including measures that are common across data sources (such as the sequence of six disability questions now included in the American Community Survey, American Housing Survey, and other federally funded surveys) and measures that are unique to specific sources of data (including HUD administrative data linked with population health surveys that include more detail on activity, functional, and social limitations). The article also discusses the strengths and limitations of various measures.

Introduction

Persons with disabilities represent a sizable and diverse population in the United States. Recent estimates suggest that 40 to 53 million Americans living in the community have some form of ambulatory, cognitive, developmental, intellectual, mental health, or sensory disability (Courtney-Long et al., 2015; Lauer and Houtenville, 2017a). In many cases, disability is associated with poverty (Brucker, Mitra et al., 2015). Persons with disabilities face a number of housing-related challenges, including disproportionately high levels of participation in federal rental housing assistance programs, reduced access to accessible and safe housing units, and lower levels of homeownership (Brucker and Houtenville, 2014); Brucker, Helms, and Souza, 2016; Hoffman and Livermore, 2012; Martin et al., 2011). Housing policy researchers must therefore consider disability status as a key demographic variable of interest.

Conceptual Models of Disability

Historically, disability has been defined using different conceptual models, which, in turn, led to the development of distinct measures to identify persons with disabilities. The medical model of disability posits that disability is caused by disease, injury, or other health conditions. Persons with any impairment are therefore considered to have a disability, regardless of whether their impairment is associated with limitations in their daily lives (WHO, 1980). Disability can alternatively be considered as a function of the social environment. The social model of disability suggests that an environment that is not inclusive of all persons and that limits participation for persons with impairments can result in disability (Shakespeare and Watson, 2001). A final conceptual model of interest is the International Classification of Functioning, Disability and Health (ICF) model developed by the World Health Organization. The ICF model integrates the models mentioned previously by considering impairments, functional limitations (such as difficulty walking), and participation restrictions (such as restrictions in employment) as equally important in defining disability. The ICF model has been adopted as an international standard for measuring disability (Altman, 2001; WHO, 2001).

In addition to the conceptual models described previously, specific definitions of disability exist that government programs have operationalized to meet legislative directives, eligibility criteria, and administrative necessity. Some examples of these definitions, included within HUD-assisted housing administrative data, are described in the following section.

Data Sources

Housing policy researchers seeking to explore empirical data that include measures of disability have the option of using administrative data, survey data, or some combination of the two.

Administrative Data

HUD administrative data capture detailed information about all household members participating in HUD-assisted programs, including HUD's three main program categories—public housing (PH),

Housing Choice Voucher (HCV), and multifamily (MF) programs. In all cases, the amount of information collected about disability is negligible, as data collection processes generally only include a yes-no question about disability.[1] Program staff are directed to gather information about disability status for every member of a HUD-assisted household as residents enter housing assistance and with every annual recertification.[2]

For households that participate in the PH or HCV program category, a person is considered to have a disability if they have—

- A disability as defined in section 223 of the Social Security Act.[3]
- A physical, mental, or emotional impairment, which is expected to be of long-continued and indefinite duration, substantially impedes his or her ability to live independently, and is of such a nature that such ability could be improved by more suitable housing conditions.
- A developmental disability as defined in section 102 of the Developmental Disabilities Assistance and Bill of Rights Act.[4]
- Acquired immune deficiency syndrome (AIDS) or any condition that arises from human immunodeficiency virus, the etiologic agent for AIDS.

The definition of disability used in MF programs varies according to specific programs, but generally overlaps with the definition used by PH and HCV programs.[5]

Household-level information on disability is aggregated and reported within the annually released "A Picture of Subsidized Households": (1) the percentage of households younger than age 62 in which the head, spouse, or co-head has a disability; (2) the percentage of households age 62 or older in which the head, spouse, or co-head has a disability; and (3) the percentage of all persons in assisted households who have a disability (HUD, 2016). Access to HUD restricted-use data, including the binary disability indicator, is accessible for researchers using HUD's data license process.[6]

Survey Data

Recognizing the need to standardize methods for measuring disability across household and population-based surveys, federal statistical agencies began proceedings in 2008 to develop and adopt a standardized series of questions to measure disability. The finalized metric that transpired from these discussions, alongside more comprehensive measures of disability, is discussed in the

[1] The disability data field is included in HUD FORM 50058 (*Family Report*), HUD MTW FORM 50058 (*MTW Family Report*), and HUD Form 50059 (*Owner's Certification of Compliance with HUD's Tenant Eligibility and Rent Procedures*).

[2] Program directives are outlined in the Housing Choice Voucher Program Guidebook (https://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/hcv/forms/guidebook), Public Housing Occupancy Guidebook (https://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/rhiip/phguidebook), and the Occupancy Requirements of Subsidized Multifamily Housing Programs (https://portal.hud.gov/hudportal/HUD?src=/program_offices/administration/hudclips/handbooks/hsgh/4350.3).

[3] Pub. L. 74-271, 49 Stat. 620, § 223. 42 U.S.C. 423. August 14, 1935.

[4] Pub. L. 106-457, 114 Stat. 1957, § 102. November 7, 2000.

[5] For more detail, consult appendix F of Lloyd and Helms (2016).

[6] For more information, see huduser.gov/portal/research/pdr_data-license.html.

following sections. Additionally, given the recent availability and promotion of the use of linked survey and administrative data for research purposes (for example, the Evidence-Based Policymaking Commission Act of 2016),[7] the following discussion highlights available data sources of interest to housing policy researchers.

Survey Data: Six-Question Screener

The adoption of the ICF model of disability is tied closely to the development of a series of survey questions currently used by many federally funded household surveys. A sequence of six questions, initially developed by the U.S. Census Bureau and the National Center for Health Statistics (NCHS) for inclusion in the American Community Survey, was designed to identify the population with disabilities (Sirken, 2002). The questions, shown in exhibit 1, include a mix of activity, functional, and sensory limitation questions. Persons identifying as having any one of these limitations are considered to have a disability. In 2010, Section 4302 of the Patient Protection and Affordable Care Act[8] mandated that all federally funded population-based health surveys adopt this standardized set of questions to identify people with disabilities.

As of 2017, these six questions are now available in many cross-sectional population-based surveys including the American Community Survey, American Housing Survey, Annual Social and Economic Supplement of the Current Population Survey, and the National Health Interview Survey (NHIS). Panel surveys such as the Survey on Income and Program Participation also include the six questions.

The benefit of the six questions is that they facilitate the standardized incorporation of disability measurement into federally funded population surveys. As an improvement over prior questions that narrowly focused solely on economic, medical, or social factors, the six questions reflect a broader understanding of disability as a condition which reflects the interaction of an individual person's health condition with his or her environment, a concept widely accepted by disability researchers.

The six questions have some limitations. First, when applied to the working-age population, the six questions fail to identify up to one-third of persons who receive public disability benefits, such as Social Security Disability Insurance or Supplemental Security Income (Burkhauser, Houtenville

Exhibit 1

Standardized Set of Disability Questions Used in Federally Funded Surveys

Limitation Type	Questions
Activity limitations	• Do you have difficulty dressing or bathing? • Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor's office or shopping?
Functional limitations	• Do you have serious difficulty walking or climbing stairs? • Because of a physical, mental, or emotional condition, do you have serious difficulty concentrating, remembering, or making decisions?
Sensory limitations	• Do you have serious difficulty hearing? • Are you blind or do you have serious difficulty seeing even when wearing glasses?

[7] Pub. L. 114-140, 130 Stat. 317. March 30, 2016.

[8] Pub. L. 111-148, 124 Stat. 119, § 4302. March 23, 2010.

and Tennant, 2014). Second, the six questions do not provide sufficient detail about either specific types of disabilities or the severity of disabilities. Researchers seeking information about persons with specific types of conditions, such as intellectual or developmental disabilities or psychiatric conditions, must use a broader array of questions. In addition, although some researchers have used the two activity limitation questions as proxies for severity (Brucker, Houtenville, and Lauer, 2015), additional detail, which is available from using a longer set of questions, can improve the measurement of severity. The next section describes examples of surveys that include some of these more detailed measures. Lastly, prior research suggests that population prevalence estimates vary slightly across surveys due to sampling strategies and instrument design features. When comparing disability prevalence for adults using these six questions across the American Community Survey, Annual Social and Economic Supplement of the Current Population Survey, NHIS, and Survey on Income and Program Participation, Lauer and Houtenville (2017b) found the highest estimates (17 percent) of disability in NHIS and the lowest (12 percent) in the Annual Social and Economic Supplement of the Current Population Survey.

Of importance for housing policy researchers, however, is how the measures of disability mentioned previously are integrated with available housing data. The inclusion of the six questions in the American Community Survey can help researchers interested in examining the association of disability with housing information, including financial and occupancy characteristics. The six-question screener is also incorporated into the American Housing Survey, a biannual, nationally representative survey that collects information about housing conditions, costs, supply, and demand in the United States (Eggers and Moumen, 2011). The inclusion of the six questions on other surveys that attempt to measure participation in public programs, such as federal rental assistance (for example, the Annual Social and Economic Supplement of the Current Population Survey and the Survey on Income and Program Participation), may also be of interest to housing policy researchers, although some underreporting of program participation is known to limit results (Gordon et al., 2005).

Survey Data: Expanded Measures of Disability

Researchers seeking more detailed information about disability can access a number of surveys, including the National Survey on Drug Use and Health (NSDUH) and the Medical Expenditures Panel Survey (MEPS). Each of these surveys contains more detailed questions about disability, including those that can be used to identify persons with specific conditions or persons with disabilities that vary in levels of severity. The NSDUH includes information not only about substance use disorders, but also about mental health conditions. The MEPS includes detailed information about health-related expenditures, including special healthcare needs. Both surveys, however, include only a limited amount of information about housing characteristics. This article highlights one population health survey that is particularly relevant for housing policy researchers, given its recent linkage with HUD administrative data: NHIS.

Prior to the adoption of the six-question disability screener, the nation's largest population health survey, the NHIS, utilized dozens of questions to assess disability. Although the NHIS now also includes the six-question screener, researchers interested in examining disability in more depth or from a historical perspective can utilize two detailed measures of disability that were

operationalized by NCHS: Basic Actions Difficulty (BAD) and Complex Activity Limitation (CAL) (Altman and Bernstein, 2008). These measures are based on the concept of disability as a multidimensional health problem associated with physical, mental, or social limitations.

The BAD disability metric measures disability by assessing the primary functioning that is necessary for a person to accomplish daily tasks, maintain independence, and successfully participate in social activities. NHIS data do not cover the full range of functional levels for all classes of basic actions, but the available questions can identify a range of difficulty levels in the following core areas of functioning, including movement and sensory, emotional, and cognitive functioning.

The CAL metric measures disability based on an individual's physical, mental, and emotional functioning as it integrates and coexists with participation in the environment and social world. More than other traditional disability measures, this method captures social participation. The elements identified in the CAL metric that are available in the NHIS include questions based on self-care, social limitation, and work limitation.

Linked Administrative and Survey Data

The NHIS is traditionally used by public health researchers; however, a recent interagency collaborative between HUD and NCHS resulted in a newly available linked data source for researchers interested in housing policy and disability. By linking HUD administrative data from the agency's largest housing assistance programs with NHIS, researchers can now examine disability among HUD-assisted residents for the first time. Preliminary research using these linked data suggests that adults with disabilities are dispersed throughout HUD assistance programs, not only within programs targeting persons with disabilities (Brucker, Helms, and Souza, 2016), suggesting that housing policy researchers who study housing assistance programs must consider disability as a key demographic variable regardless of program focus.[9]

Conclusion

Given the strong association among poverty, housing, and disability, housing policy researchers must consider persons with disabilities as a key population with unique housing needs. Exhibit 2 provides examples of disability prevalence from the key sources mentioned previously.

Due to varying theoretical models and the lack of consistent disability measurement adoption until recently, many measures exist to assess the relationship between disability status and housing across U.S. population-based, household surveys and HUD administrative data. Researchers should cautiously assess the strengths and limitations of disability metrics.

[9] To access this linked data source, researchers can visit https://www.cdc.gov/nchs/data-linkage/hud.htm.

Exhibit 2

Relevant Administrative and Survey Estimates of Disability

Source	Unit of Measure	Percent With a Disability (Year)
American Community Survey	Civilian noninstitutionalized population	13 (2015)[a]
American Housing Survey	Occupied housing units	22 (2015)[b]
Annual Social and Economic Supplement of the Current Population Survey	Civilian noninstitutionalized population	12 (2015)[c]
Picture of Subsidized Housing	HUD-assisted households of age 61 and younger with head or spouse with a disability	34 (2015)[d]
	HUD-assisted households of age 62 and older with head or spouse with a disability	42 (2015)[d]
HUD administrative data linked with National Health Interview Survey	Civilian adults ages 18 and older	44 (2010–2012)[e]
National Health Interview Survey	Civilian noninstitutionalized adults	15 (2014)[f]

[a] *Using the six disability questions screener and data from https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.*
[b] *Using the six disability questions screener and data from https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html#?s_areas=a00000&s_year=n2015&s_tableName=Table1&s_byGroup1=a1&s_byGroup2=a1&s_filterGroup1=t1&s_filterGroup2=g1.*
[c] *Using the six disability questions screener and data from King et al. (2010).*
[d] *Using HUD programmatic definitions of disability and data from https://www.huduser.gov/portal/publications/mdrt/disability-designatedHousing.html.*
[e] *Brucker, Helms, and Souza (2016).*
[f] *Lauer and Houtenville (2017b) using the six disability questions screener.*

Appendix A. Data Sources

Administrative Data

A Picture of Subsidized Households: huduser.gov/portal/datasets/assthsg.html.

U.S. Department of Housing and Urban Development restricted-use administrative data: huduser.gov/portal/research/pdr_data-license.html.

Survey Data

American Community Survey: http://www.census.gov/programs-surveys/acs/.

American Housing Survey: https://www.census.gov/programs-surveys/ahs/.

Annual Social and Economic Supplement of the Current Population Survey: http://www.census.gov/programs-surveys/cps/.

Medical Expenditures Panel Survey: https://meps.ahrq.gov/mepsweb/.

National Health Interview Survey: https://www.cdc.gov/nchs/nhis/.

National Survey on Drug Use and Health: https://www.samhsa.gov/data/population-data-nsduh.

Survey on Income and Program Participation: http://www.census.gov/sipp/.

Linked Data

U.S. Department of Housing and Urban Development administrative data linked with National Health Interview Survey: huduser.gov/portal/datasets/nchs-hud-data-linkage.html.

Acknowledgments

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Graphic Detail

Geographic information systems (GIS) organize and clarify the patterns of human activities on the Earth's surface and their interaction with each other. GIS data, in the form of maps, can quickly and powerfully convey relationships to policymakers and the public. This department of Cityscape *includes maps that convey important housing or community development policy issues or solutions. If you have made such a map and are willing to share it in a future issue of* Cityscape*, please contact john.c.huggins@hud.gov.*

A Cartographic Perspective on the Correlation Between Redlining and Public Health in Austin, Texas–1951

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U.S. Department of Housing and Urban Development

The views expressed in this article are those of the author and do not represent the official positions or policies of the Office of Policy Development and Research, the U.S. Department of Housing and Urban Development, or the U.S. government.

Consequences of historic redlining—the once federally sanctioned denial of services to residents of predominantly non-White neighborhoods—are often measured in terms of structural decay and economic stagnation. However, the effects of redlining are also evident in the health disparities observed between maligned neighborhoods and surrounding communities (Gee, 2008). With this fact in mind, in this article I juxtapose selected historic maps and data in an effort to examine the correlation between redlining and incidence of tuberculosis in 1950s Austin, Texas.

The impetus for this article was a 1952 fundraising flyer for a campaign sponsored by the Travis County Tuberculosis Association. On the back of the flyer was a supplemental map of reported cases and deaths resulting from the disease in the Austin area for the previous year (exhibit 1).

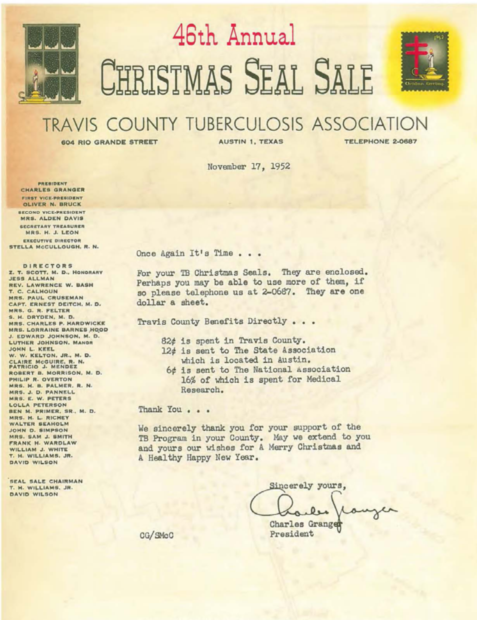
On examining the map, I was struck by a clear concentration of reported cases and deaths from the disease in the southeast area of the city, north of the Colorado River between East 1st and East 11th Streets. The high density of cases reported for that area suggested higher rates of the disease in those communities when compared with the rest of the map.

Certainly, maps drawn on the back of antique fundraising flyers found in used bookstores hardly constitute vetted data. However, the high density of cases shown for that part of the city was consistent with both the historic characteristics of the area and the behavior of the disease.

Exhibit 1

1952 Travis County Tuberculosis Association Fundraising Flyer (a) and Supplemental Map of Reported Cases and Deaths for the Previous Year (b)

(a)



46th Annual

CHRISTMAS SEAL SALE

TRAVIS COUNTY TUBERCULOSIS ASSOCIATION

604 RIO GRANDE STREET — AUSTIN 1, TEXAS — TELEPHONE 2-0687

November 17, 1952

PRESIDENT
CHARLES GRANGER
FIRST VICE-PRESIDENT
OLIVER N. BRUCK
SECOND VICE-PRESIDENT
MRS. ALDEN DAVIS
SECRETARY TREASURER
MRS. H. J. LEON
EXECUTIVE DIRECTOR
STELLA McCULLOUGH, R. N.

DIRECTORS
Z. T. SCOTT, M. D., HONORARY
JESS ALLMAN
REV. LAWRENCE W. BASH
T. C. CALHOUN
MRS. PAUL CRUSEMAN
CAPT. ERNEST DEITCH, M. D.
MRS. G. R. FELTER
S. H. DRYDEN, M. D.
MRS. CHARLES P. HARDWICKE
MRS. LORRAINE BARNES HOOD
J. EDWARD JOHNSON, M. D.
LUTHER JOHNSON, MANOR
JOHN L. KEEL
W. W. KELTON, JR., M. D.
CLAIRE McGUIRE, R. N.
PATRICIO J. MENDEZ
ROBERT B. MORRISON, M. D.
PHILIP R. OVERTON
MRS. H. B. PALMER, R. N.
MRS. J. D. PANNELL
MRS. E. W. PETERS
LOLLA PETERSON
BEN M. PRIMER, SR., M. D.
MRS. H. L. RICHEY
WALTER SEAHOLM
JOHN D. SIMPSON
MRS. SAM J. SMITH
FRANK H. WARDLAW
WILLIAM J. WHITE
T. H. WILLIAMS, JR.
DAVID WILSON

SEAL SALE CHAIRMAN
T. H. WILLIAMS, JR.
DAVID WILSON

Once Again It's Time . . .

For your TB Christmas Seals. They are enclosed. Perhaps you may be able to use more of them, if so please telephone us at 2-0687. They are one dollar a sheet.

Travis County Benefits Directly . . .

82¢ is spent in Travis County.
12¢ is sent to The State Association which is located in Austin.
6¢ is sent to The National Association 16% of which is spent for Medical Research.

Thank You . . .

We sincerely thank you for your support of the TB Program in your County. May we extend to you and yours our wishes for A Merry Christmas and A Healthy Happy New Year.

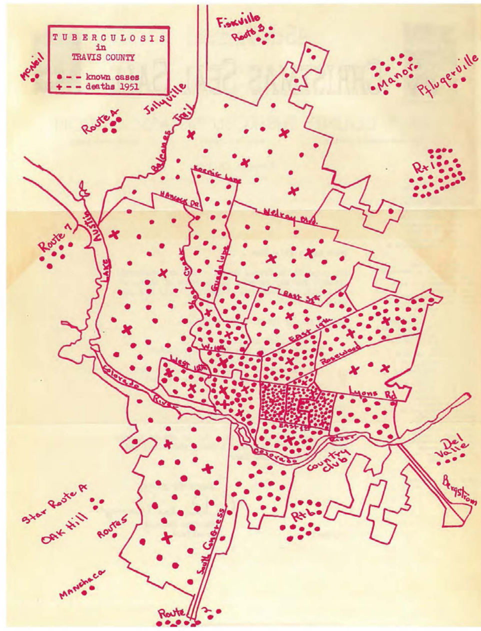
Sincerely yours,

Charles Granger
President

CG/SMcC

AFFILIATE OF THE STATE AND NATIONAL TUBERCULOSIS ASSOCIATIONS

(b)



Southeast Austin, which contains the city's traditional enclaves of African-American and Hispanic communities, has typically exhibited higher rates of socioeconomic distress than have surrounding neighborhoods. For example, data gathered from the 1950 U.S. census (exhibit 2) describe high rates of dilapidated housing with no private baths and no running water for tracts in southeast Austin (Minnesota Population Center, 2016).

Moreover, tuberculosis—an airborne pathogen commonly thought of as a disease of low-income people—is more readily transmitted between people living in poorly ventilated, close quarters (Schmidt, 2008). Although the data illustrated in exhibit 2 provide no indication of indoor air quality, we can assume that, given the lack of basic services in the area like running water, housing in those particular neighborhoods was older, dilapidated, and likely occupied by low-income residents.

While looking over the fundraising flyer, I was reminded of another historic map well known to those concerned with housing policy—The Home Owners' Loan Corporation (HOLC) map for the city of Austin. Published in 1934, the map (and several like it) classified sections of the city according to an appraised risk for home financing. The HOLC map of Austin categorized and

Exhibit 2a

Map of 1950 U.S. Census Tracts in Austin, Texas, Depicting Dilapidated Homes With No Running Water

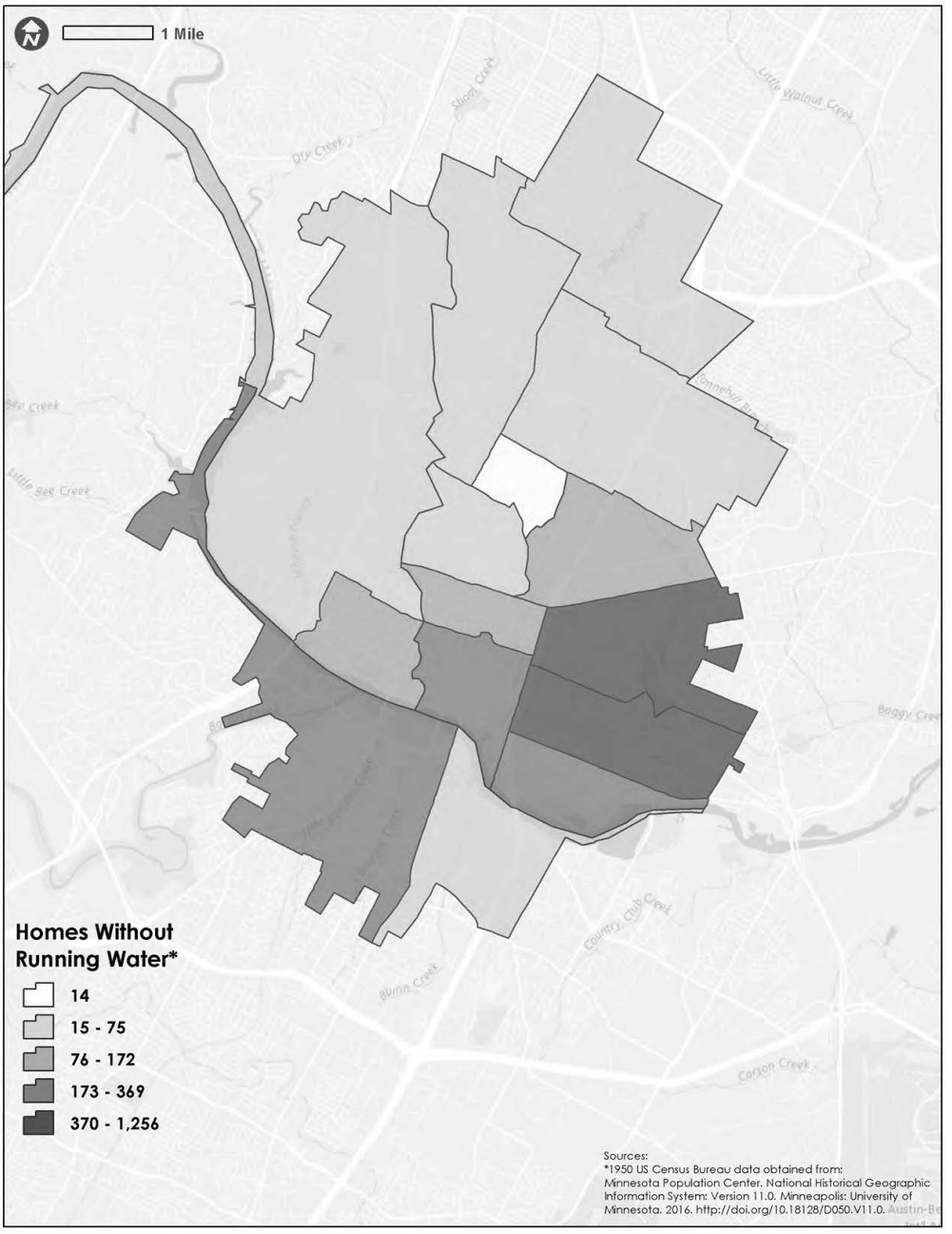
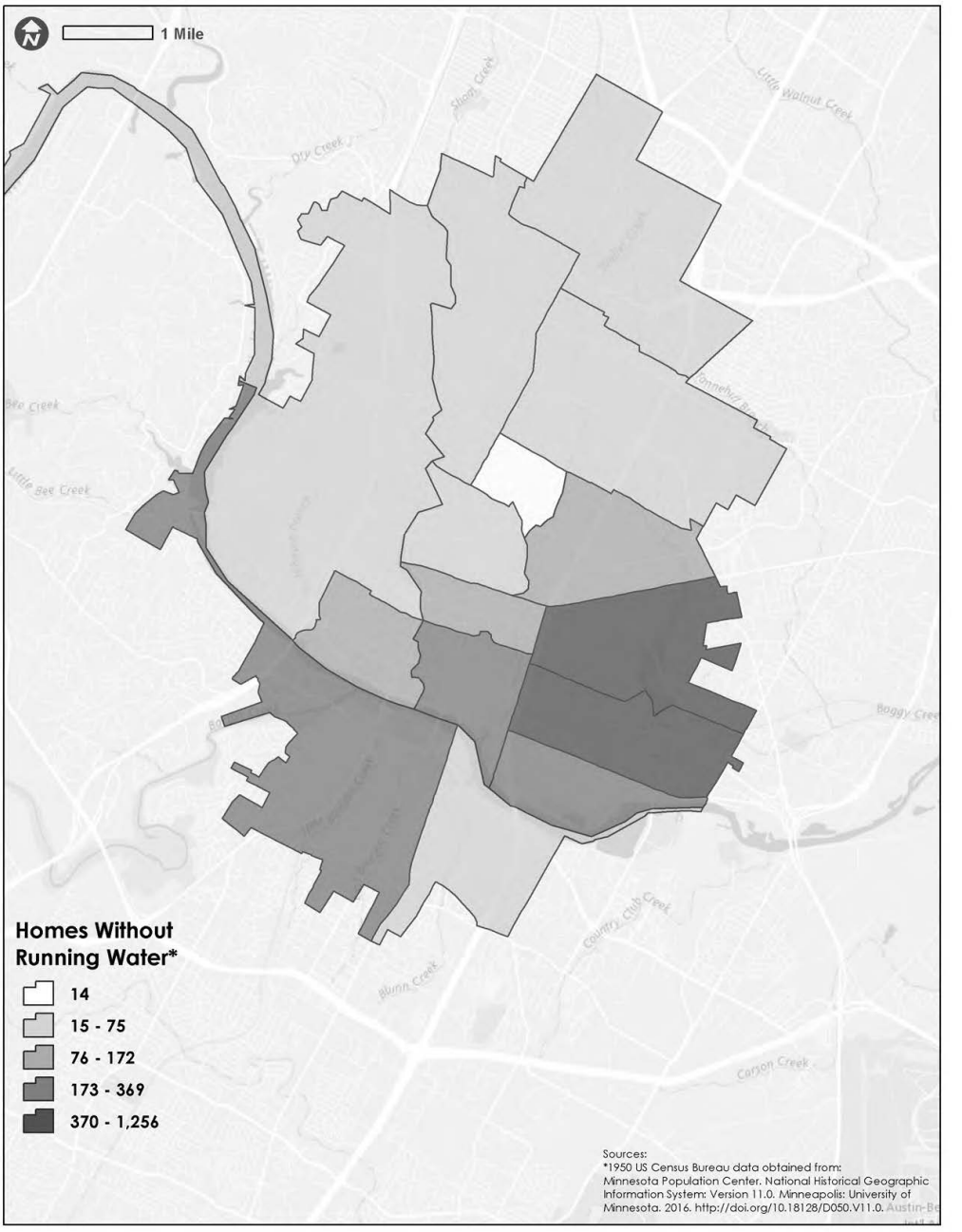


Exhibit 2b

Map of 1950 U.S. Census Tracts in Austin, Texas, Depicting Dilapidated Homes With No Private Bath



mapped neighborhoods as either best (green), still desirable (blue), definitely declining (yellow), and hazardous (red).[1] Communities were often deemed hazardous by the HOLC solely on the basis of the race and ethnicity of its residents. Hence the term "redlining."

Studying both the tuberculosis and HOLC maps makes it clear that the high rates of tuberculosis reported on the flyer coincided with Austin's historic redlined communities. To examine the relationship further, I georeferenced digital images of both maps relative to spatially referenced data of present-day Austin. Fortunately, many of Central Austin's present-day rights of way have changed little in the past 75 years, and the digital images of the tuberculosis and HOLC maps overlaid present-day geographies with little error. Once the maps were aligned, I digitized reported cases of the disease (exhibits 3 and 4) and the boundaries of HOLC-redlined neighborhoods (exhibits 5 and 6).

After digitizing point data from the tuberculosis flyer, area data from the HOLC map, and gathering socioeconomic information from the 1950 U.S. Census, I added the data sets to a single model to view the information in tandem (exhibits 7 and 8). Although the final maps do not demonstrate causation, they do present what appears to be a clear alignment of socioeconomic distress, structural dilapidation, and poor physical health with the institutional maligning of minority communities that officially began nearly 20 years earlier.

To more effectively demonstrate contrasts in the distribution of cases throughout the city relative to redlined neighborhoods, I aggregated cases according to an overlaid mesh of 1/4-mile hexagons, a process known as hexbinning (exhibit 9).[2] I then used graduated symbols classified at equal intervals of five to visualize the resulting count per hexbin (exhibit 10).

In examining the occurrences of cases from this perspective, it becomes clear that (in general) the prevalence of the disease appears to have peaked at between one and five cases within a given 1/4-mile radius. As expected, the exception to this occurred in the redlined neighborhoods in the southeast area of the city, where the number of cases per 1/4-mile was as many as 16 to 20.

However, rates were not consistently higher across all of Austin's redlined communities, which raises additional questions about the differences between redlined communities that perpetuated or prevented transmission of the disease.

[1] A color version of the map can be found at the University of Texas' Perry-Castañeda Library Map Collection. http://www.lib.utexas.edu/maps/texas/austin-redlining-small-1935.jpg.

[2] Hexagons measured from the center of the shape.

Exhibit 3

Digital Copy of the 1951 Tuberculosis Map Georeferenced and Overlaid on a Base Map of Austin, Texas

Exhibit 4

Reported Cases and Deaths From Tuberculosis in 1951 Digitized From the Georeferenced 1951 Map of Austin, Texas

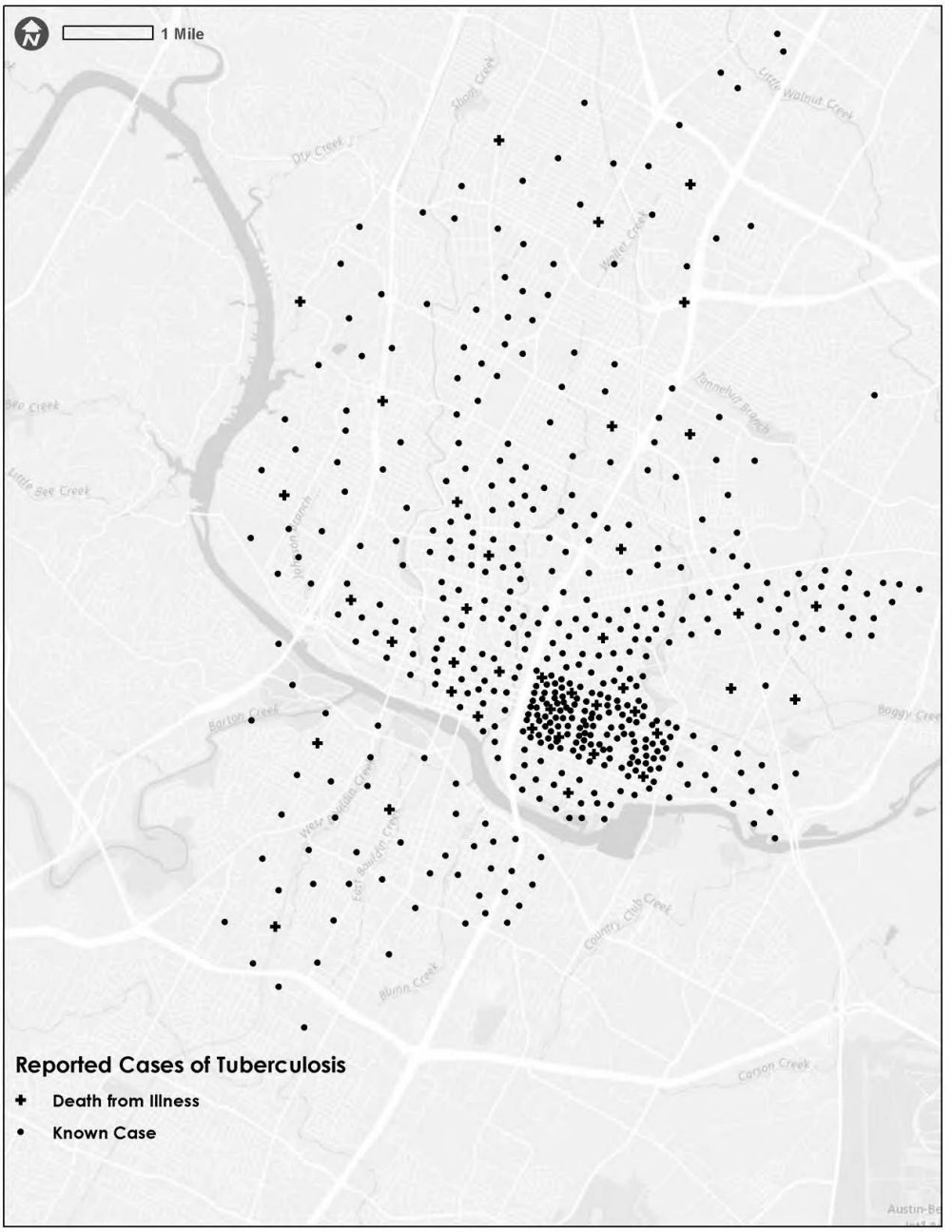


Exhibit 5

Digital Copy of the 1934 Home Owners' Loan Corporation Map Georeferenced and Overlaid on a Base Map of Austin, Texas

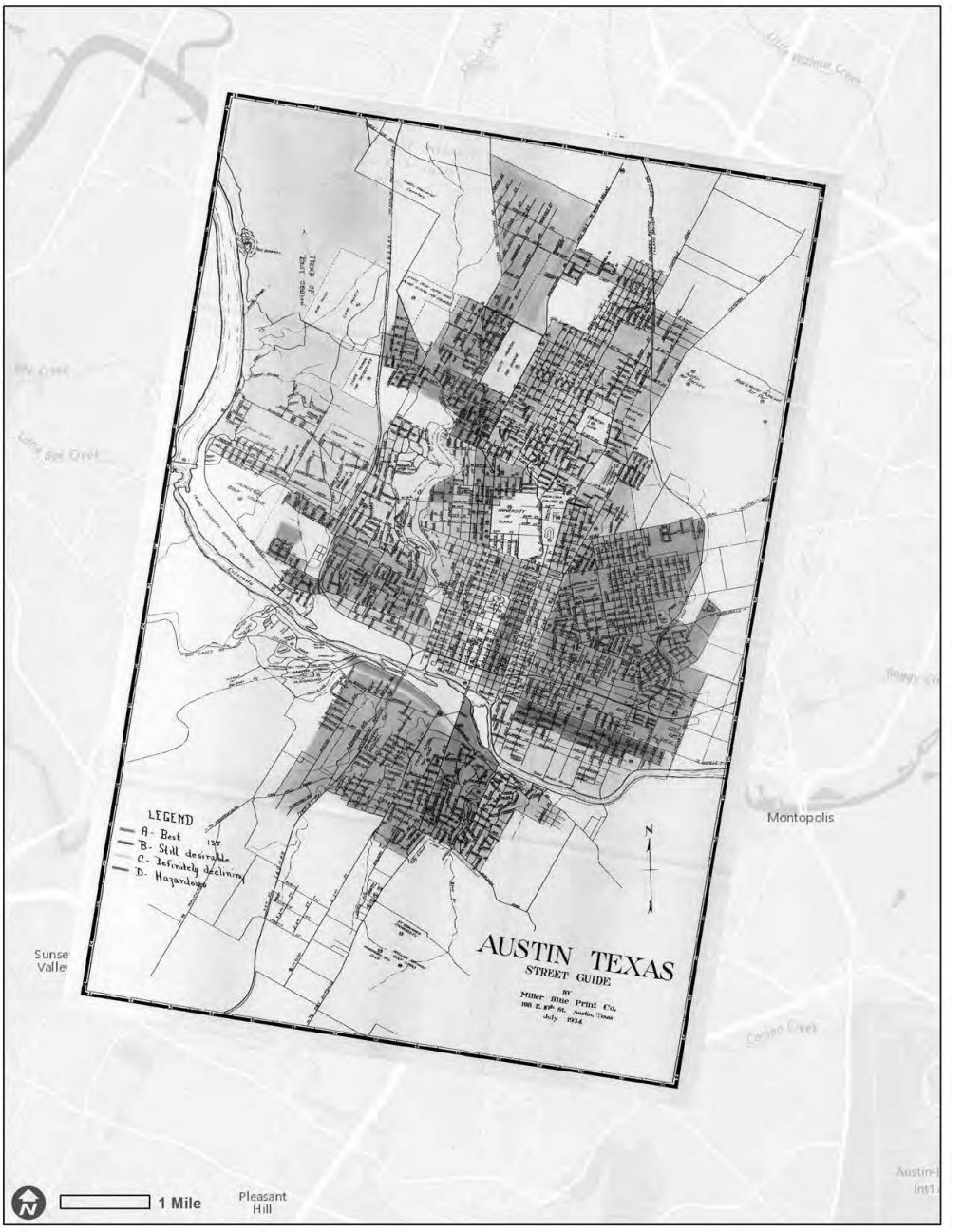


Exhibit 6

Digitized Areas of "Hazardous" Redlined Communities From the Georeferenced 1934 Map of Austin, Texas

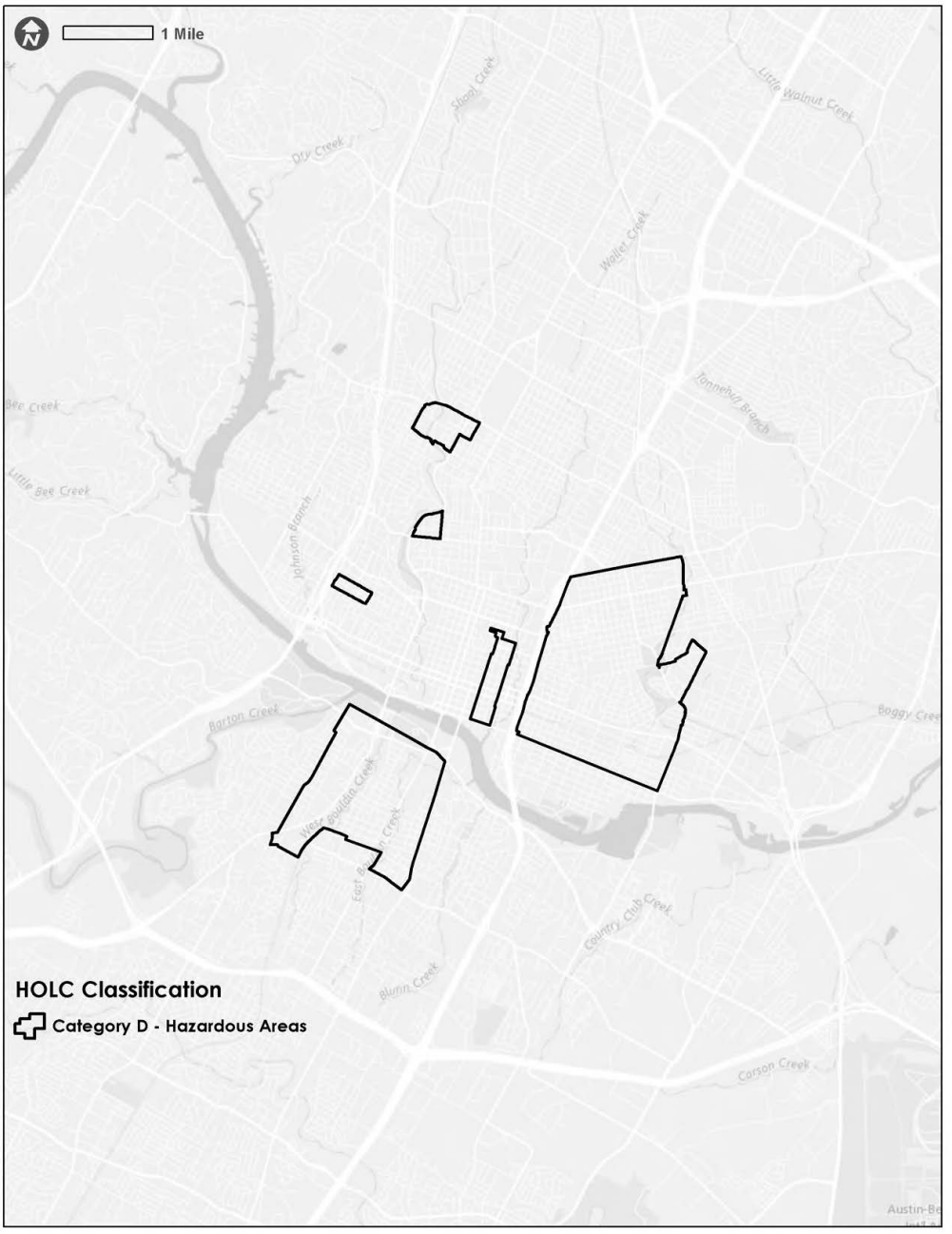
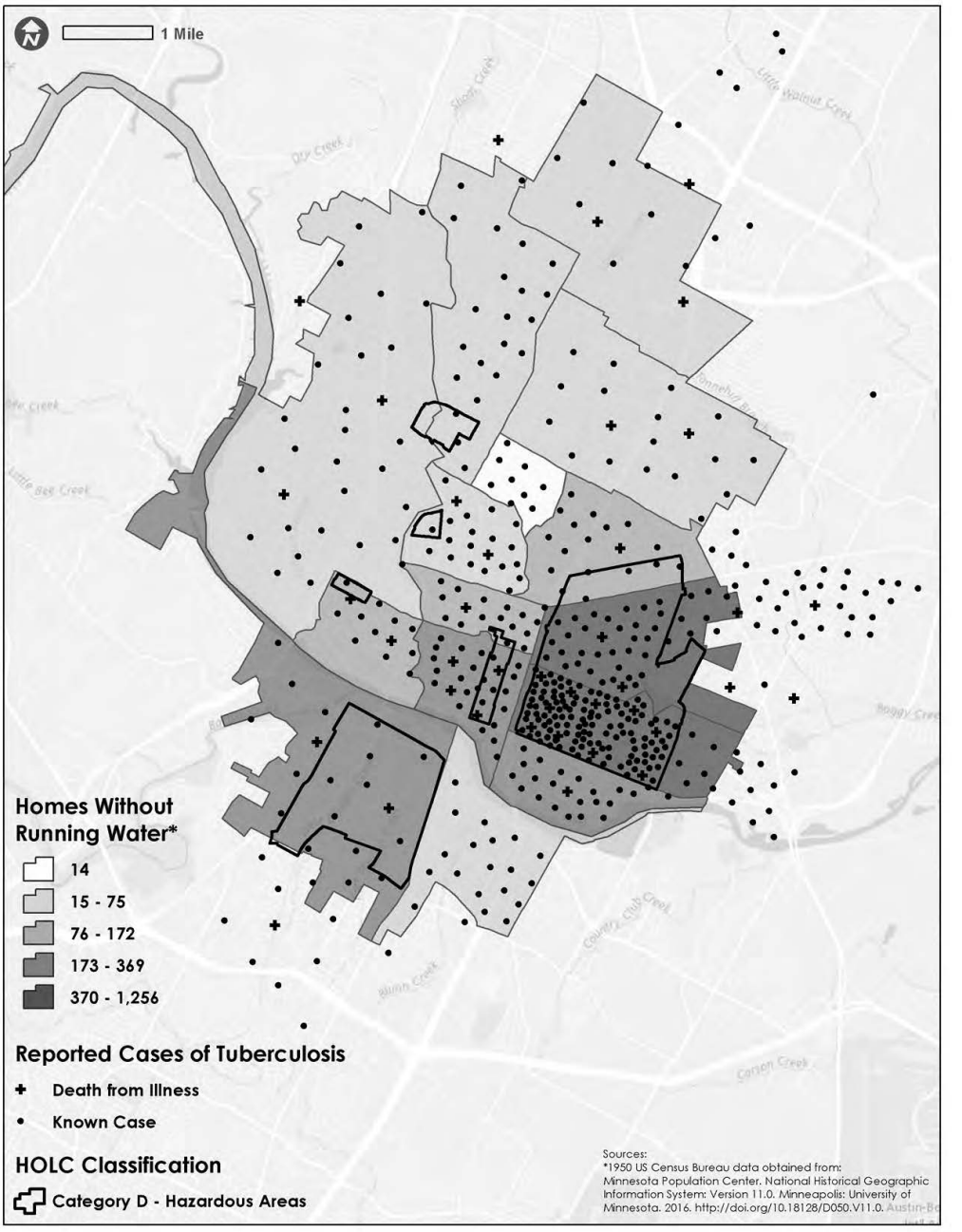


Exhibit 7

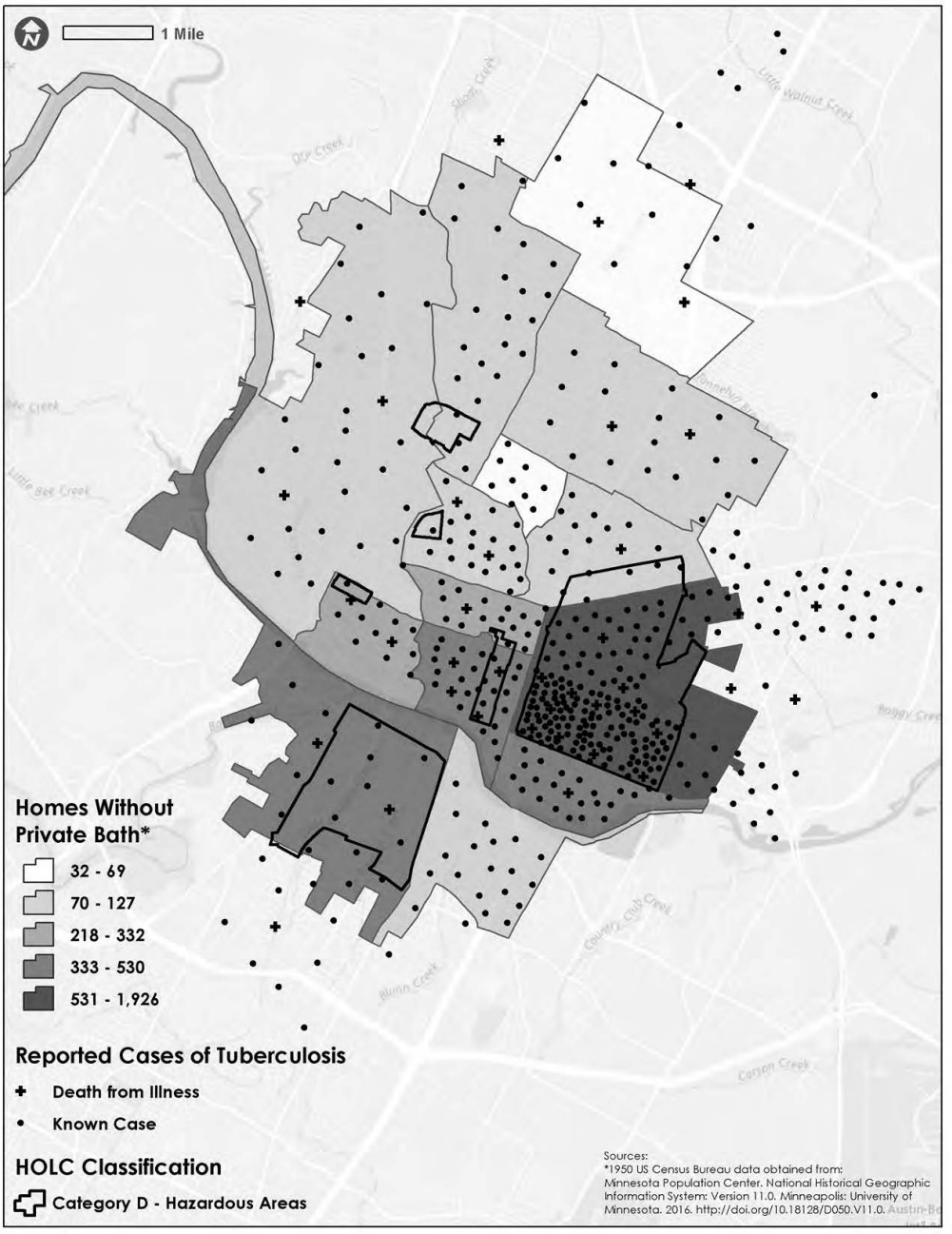
Reported Cases of Tuberculosis in 1951 Relative to Dilapidated Homes With No Running Water and HOLC-Designated Redlined Communities in Austin, Texas



HOLC = Home Owners' Loan Corporation.

Exhibit 8

Reported Cases of Tuberculosis in 1951 Relative to Dilapidated Homes With No Private Bath and HOLC-Designated Redlined Communities in Austin, Texas



HOLC = Home Owners' Loan Corporation.

Exhibit 9

One-Fourth Mile Hexagonal Partition of City and Reported Cases of Tuberculosis in 1951 in Austin, Texas

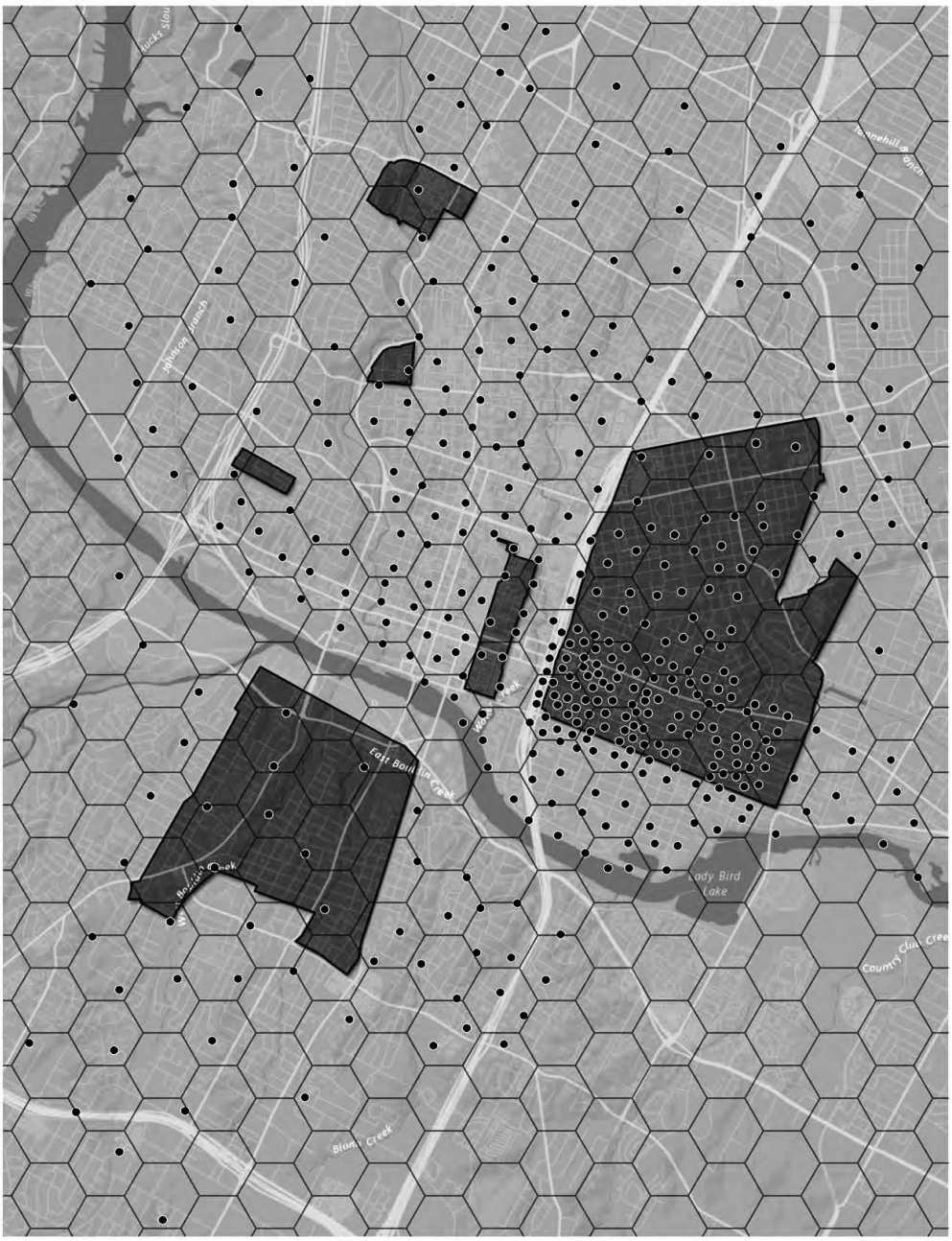
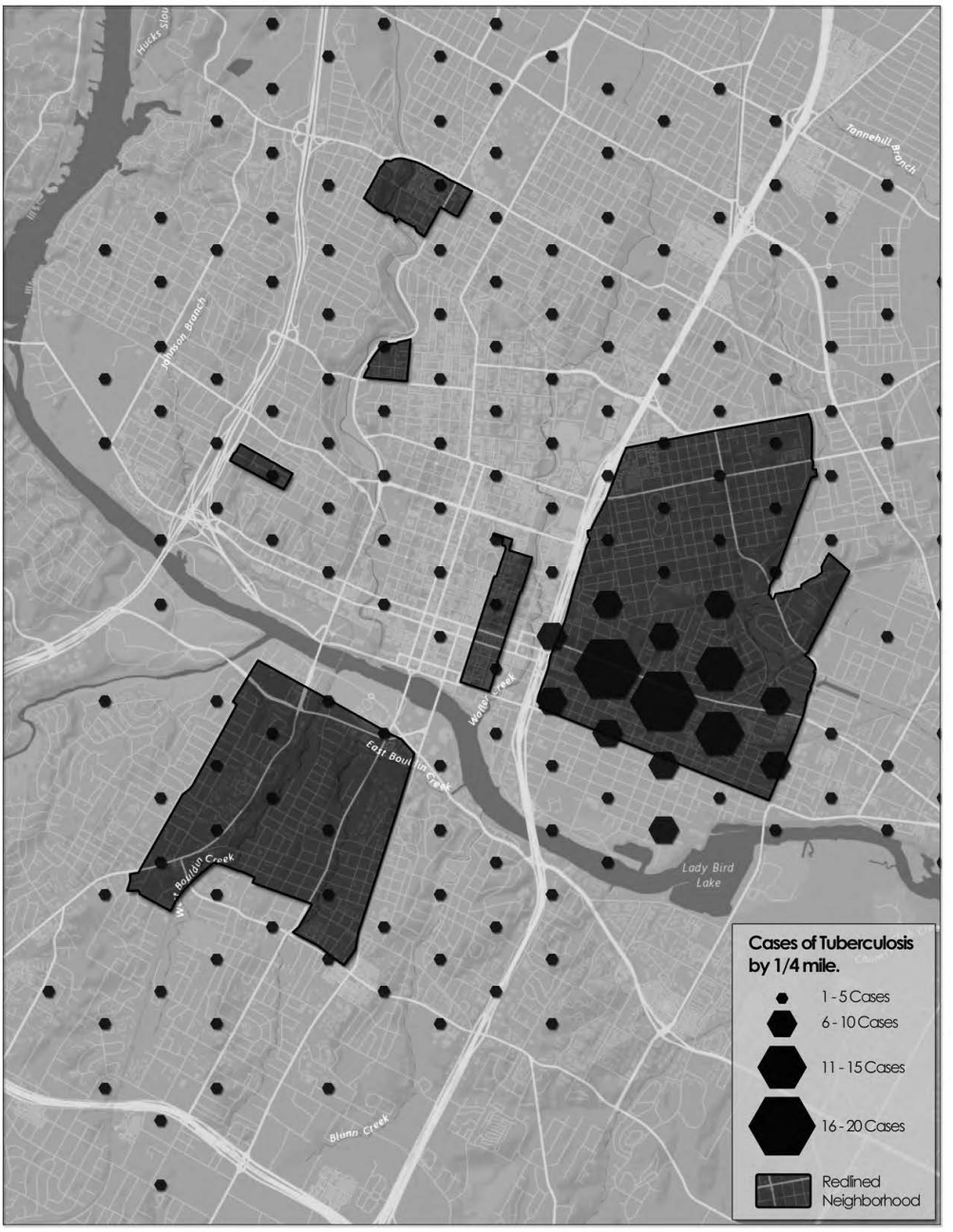


Exhibit 10

Graduated Symbols Indicating the Number of Reported Cases of Tuberculosis in 1951 per One-Fourth Mile in Austin, Texas



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Impact

A regulatory impact analysis must accompany every economically significant federal rule or regulation. The Office of Policy Development and Research performs this analysis for all U.S. Department of Housing and Urban Development rules. An impact analysis is a forecast of the annual benefits and costs accruing to all parties, including the taxpayers, from a given regulation. Modeling these benefits and costs involves use of past research findings, application of economic principles, empirical investigation, and professional judgment.

Reducing the Flood Hazard Exposure of HUD-Assisted Properties

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The views expressed in this article are those of the author and do not represent the official positions or policies of the Office of Policy Development and Research, the U.S. Department of Housing and Urban Development, or the U.S. government.

Background

Following the extensive flood damage caused by Hurricane Sandy, Executive Order 13690[1] directed federal agencies to reduce risk associated with floodplain development. In response, the Mitigation Framework Leadership Group (MitFLG), which coordinates flood mitigation efforts across Federal agencies, studied evidence on past and predicted sea level changes and riverine flooding and established the Federal Flood Risk Management Standard (FFRMS).[2] The new standard requires that buildings be constructed with at least 2 feet of freeboard[3] above base flood elevation (BFE), or BFE+2. Critical actions, such as construction or substantial rehabilitation of hospitals and assisted living facilities, should be constructed with at least 3 feet of freeboard above

[1] "Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input."

[2] "Revised Guidelines for Implementing Executive Order 11988, Floodplain Management, and Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input."

[3] Freeboard is defined by FEMA in 44 CFR 59.1 as "a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. 'Freeboard' tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed."

BFE (BFE+3) or to the 0.2 percent annual chance (500-year) floodplain,[4] whichever is higher. Finally, nonresidential structures that are not critical actions, including multifamily structures without residential units below BFE+2, may be floodproofed instead of elevating to the new standard. The U.S. Department of Housing and Urban Development (HUD) proposed the adoption of this standard.[5]

Impetus for Policy Change

HUD's previous standard, which did not require elevation beyond BFE, was insufficient for two reasons. First, the rise in sea level and riverine flooding is slowly increasing the BFE. According to U.S. Global Change Research Program (2014), the global sea level has risen about 8 inches since reliable recordkeeping began in 1880 and is expected to rise another 1 to 4 feet by 2100. The frequency of inland and riverine floods is also increasing. IPCC (2013) also confirmed that the sea level is expected to continue rising throughout the 21st century.

Second, flood maps drawn by the U.S. Federal Emergency Management Agency (FEMA) are updated infrequently and therefore do not indicate the true BFE at the time of construction for much of the country. Thus, many buildings are inadvertently constructed with the lowest floor below the 1-percent annual chance (100-year) flood plain. Requiring an additional 2 feet of elevation would offset these deficiencies.

The proposed floodplain standard not only addresses the rising sea level and flood map deficiencies; it also addresses inefficiencies created by federal disaster assistance and the provision of flood insurance. Federal flood insurance suffers from a market failure of information in which homeowners do not understand the true flood risk and therefore do not take actions, particularly maintaining active flood insurance policies, to reduce this risk. Flood insurance, similar to other types of insurance, also suffers from problems arising from asymmetric information and moral hazard. Many sellers and developers know the risk of flood damage, but buyers or—in the case of multifamily buildings—renters do not always know the risk. Moral hazard occurs as policyholders decrease flood mitigation efforts, knowing that flood insurance will cover the costs of flood damage. This section explains the inefficiencies inherent in the provision of federal disaster assistance and the market for flood insurance.

Market Failure

Many homeowners lack information and understanding regarding the risks of locating in the floodplain, resulting in inefficient pricing whereby house and land prices do not reflect the true flood risk, leading to overdevelopment in the floodplain and underinsured homes. Numerous studies indicate that many homeowners are either not fully aware of the risk of a flood occurring or that they discount the cost of a flood if it occurs. In some cases, owners simply underestimate the risk of flooding. Rosenbaum (2005) noted that many studies find homeowners underestimate the risk of floods, and even when informed few owners react to offset the risk. For example, Chivers and

[4] As defined in 24 CFR§55.2(b)(3)(i), "critical action" means any activity for which even a slight chance of flooding would be too great, because such flooding might result in loss of life, injury to persons, or damage to property. Applicable critical actions include but are not limited to HUD-insured hospitals and assisted care facilities.

[5] 81 FR 74967. October 28, 2016.

Flores (2002) surveyed homebuyers in Boulder, Colorado, and found a market failure of information in which homeowners did not fully understand the flood risks or cost of insuring against the risk when purchasing their homes. Michel-Kerjan (2010: p.179) also noted that, despite the occurrence of floods or natural disasters, homeowners take no action to fortify their homes, likely due to "a lack of accurate knowledge about risk; budget constraints; and myopia." This effect is evident through the actions of homeowners. Michel-Kerjan, Lemoyne de Forges, and Kunreuther (2012) found that homeowners allowed their flood policies to lapse typically after 2 to 4 years, even for federally backed mortgages, which require flood insurance.[6] This lapse occurs despite the "one bite rule," which prohibits parties from applying for flood disaster assistance a second time unless flood insurance has been maintained.[7]

This market failure is also found empirically in the price of homes in floodplains. In an efficient market, in which the flood risk is fully known, the sales prices of residential properties in the floodplain should reflect this risk, selling for a lower price than identical homes located outside of the floodplain. Further, the occurrence of a 1-percent annual chance (100-year) flood should not affect house prices. However, several studies, including Muckleston (1983), Holway and Burby (1990), and Tobin and Montz (1997), found that residential property values in the floodplain do not incorporate this risk. Chivers and Flores (2002) concluded that, despite the notification of flood risk per National Flood Insurance Program (NFIP) regulations, this risk is only incorporated after a flood has occurred. If house prices do not reflect full flood risks, then more settlement would occur in floodplains than if the market were efficient.

Evidence suggests, however, that home prices do include the flood risk discount in some markets. Kousky (2010) examined the response of home prices in St. Louis County, Missouri, following the Great Flood of 1993. Prior to the flood, she found a flood risk discount between 3.2 and 4.5 percent for homes in the 1-percent annual chance (100-year) floodplain, but no such discount for homes in the 0.2-percent annual chance (500-year) floodplain. Home prices did not change in response to the flood in the 1-percent annual chance (100-year) floodplain. Prices did decline, however, by 2.6 percent in the 0.2 percent annual chance (500-year) floodplain. Since NFIP requires homebuyer notification of flood risk in the 1-percent annual chance floodplain but not the 0.2-percent annual chance floodplain, this finding indicates that home prices reflected the risk in the former, but the flood event provided new information to owners in the latter. This implies that not all markets are priced inefficiently, and owners in these markets more fully internalize the costs related to flooding.

[6] For loans made by federally regulated lenders, lenders are responsible for enforcing the flood insurance requirement. However, as explained by Michel-Kerjan, Lemoyne de Forges, and Kunreuther (2012), some banks do not ensure the policies remain in force.

[7] Under section 582 of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 5154a), HUD disaster assistance that is made available in a special flood hazard area may not be used to make a payment (including any loan assistance payment) to a person for repair, replacement, or restoration for flood damage to any personal, residential, or commercial property if (1) the person had previously received federal flood disaster assistance conditioned on obtaining and maintaining flood insurance, and (2) the person failed to obtain and maintain flood insurance.

Asymmetric Information

Asymmetric information about the precautionary behavior of an insured household allows homeowners and property managers to reduce flood mitigation efforts. Flood insurance policies are priced at an actuarially fair rate to reflect the risk of damage based on location, elevation, and other structural characteristics. However, insurers do not observe the behavior of individuals, who may act riskier or safer than the insurer expects. For riskier individuals, additional flood risk is transferred to the insurer. As explained by Stiglitz (1983: p.6), "the more and better insurance that is provided against some contingency, the less incentive individuals have to avoid the insured event, because the less they bear the full consequences of their actions." The inability to adjust rates for individual risk allows some owners and developers to act riskier without bearing the full cost of their actions.

Moral Hazard

In the absence of disaster assistance and federal flood insurance, owners would bear the full cost of locating in a floodplain. The federal government, however, has a long history of providing disaster assistance and relief to individuals affected by flooding, which has allowed individuals to avoid the full cost of flooding. In order to reduce the cost of this assistance and ensure landowners assume more of the inherent flood risk, Congress created NFIP in 1968. A government-run insurance program was necessitated to resolve market failures caused by information asymmetries. Although Congress initially limited FEMA's ability to charge actuarial rates, allowing owners to bear only part of the cost, recent statutory changes require FEMA to phase out these subsidies.

The financial damage imposed upon a household by a severe flood can be extensive, and the potential severity underlying the loss should lead households to guard against this risk through insurance, preventative measures, or both. Households can reduce their vulnerability by living in less risky areas and by investing in floodproofing. However, many private citizens do not appear to take precautions that would be in their own best interest. As an example, Moore (2016) found that approximately 2,100 properties across the United States that are enrolled in NFIP have been flooded and subsequently rebuilt more than 10 times since 1978. An outlier in Louisiana flooded 40 times. Some of the residents of these homes may have been able to reduce their losses through flood mitigation.

In addition, many homeowners implicitly expect disaster assistance in the event of severe flooding, even if they are perfectly informed of flood risks (Burby, 2006; Kunreuther and Michel-Kerjan, 2010). This expectation leads to the underprovision of flood mitigation, encourages underinsurance, and increases the liability to the federal government.

Two studies (Browne et al., 2015; Cordes and Yezer, 1998) studied flood insurance specifically. Cordes and Yezer (1998) estimated a model of development in 42 beach communities from Florida to New York across three decades and found strong evidence of induced development during the emergency phase of a community's participation in NFIP. After controlling for various demand factors, storm damage and shore protection projects, the authors found that building permits were 50 percent higher in the emergency phase of participating NFIP communities. Development during

the regular phase of the program, however, was unchanged. The large effect found by Cordes and Yezer contrasts with the marginal impact concluded by the U.S. Government Accountability Office but is not inconsistent with the positive influence. Cordes and Yezer found that initial approval of a community for NFIP appears to be the driving factor of development, underscoring the importance of having national standards in place before any further development surges. The findings of these studies illustrate the excessive risk sharing of the government and the corresponding need for development standards.

Browne et al. (2015) studied the effect of NFIP in coastal and noncoastal Florida communities from 1975 to 1998 during the regular phase of these communities' NFIP participation. Estimating a model of development similar to the one employed by Cordes and Yezer, except at the county level, the authors found that NFIP participation increased development in noncoastal counties by 55 to 60 percent but decreased development in coastal counties by the same amount, despite the higher risk associated with coastal areas. The authors believe this may result from the higher costs of regulations in coastal communities. However, if the coastal development occurred earlier than otherwise planned in communities that participated in an emergency phase of the program, as indicated by Cordes and Yezer, it is not surprising to find that the development during the regular phase was lower. In addition, estimating the model at the county level, rather than the community level, may bias the results toward areas out of the floodplain or near the edge, where the flood risk is lower but more stringent building codes still apply.

Analysis

HUD's assistance in floodplains generally consists of only noncritical actions, assisting or insuring the new construction or substantial improvement of single-family and multifamily properties. Because HUD does not routinely insure or fund critical actions, such as mortgage insurance of hospitals and assisted-living facilities, in flood zones, this analysis focuses on the impact to noncritical actions in a typical production year. Developers receiving HUD assistance who are not currently building to the proposed standard of BFE+2 can meet the proposed standards either by elevating the lowest floor of the structure or by floodproofing to the new standard and limiting the first floor to nonresidential uses. Alternatively, developers could choose to locate outside of the floodplain and the affected horizontal expansion or reduce substantial improvement projects to less than 50 percent of the market or predisaster value of the structure, which would no longer classify the project as "substantial."

The proposed standards will increase the construction cost of HUD's assisted and insured new construction and substantially improved properties located in the 1-percent annual chance floodplain. This amends HUD's current standard, which requires elevation to at least the BFE. Thus, the elevation standards are not new, but rather revised to an increased height.[8] Therefore, the costs of the new standard increase the marginal cost of construction for the affected properties.

[8] The determination of whether a property is located in the floodplain is made using FEMA's flood maps, as HUD already requires. The determination of whether a property is located in the horizontal expansion can be determined by comparing the property's elevation, using Google Earth or topographic maps, for example, and the height of BFE identified in FEMA's flood maps.

Developers of new single-family and multifamily structures are expected to meet the new standard by elevating the lowest floor.[9] Owners of existing single-family homes undergoing substantial improvement would also likely meet the standard through elevation due to the relatively low cost. Although the cost of elevating multifamily apartment buildings could be prohibitive, most of HUD's assisted and insured multifamily properties located in the floodplain are lowrise, garden-style buildings. Thus, HUD also expects these properties to elevate. However, for larger buildings, developers of substantially improved multifamily structures would likely choose to meet the new standard by floodproofing and excluding residential units below the new standard from the building's first occupied floor.

Twenty states, plus the District of Columbia and Puerto Rico, already require elevation exceeding HUD's current standard of BFE+0.[10] A further four states—Indiana, Montana, New York, and Wisconsin—already require residential structures elevated with a minimum of BFE+2. Thus, the cost of compliance in these states would be less than in those that have no minimum elevation requirements in the floodplain. In addition, its likely that some of the HUD-assisted properties in the remaining states, which do not impose elevation above BFE, do in fact build to a higher elevation than HUD's minimum standards. To the extent that such building occurs, the effect of this rule would be less than the following estimate.

The costs of floodproofing for a substantial improvement project are greater than for new construction because an existing structure has less flexibility for modification. The economic benefit of elevation—that is, the avoided damage—will be the same whether newly built or rehabilitated (see exhibit 3 in the Costs of Rule section). Because a rehabilitation project brings the level of housing capital to the same level of newly built housing, the cost of restoring a building is the same for newly built or redeveloped housing. Thus, we would expect the net benefit of floodproofing to be greater for new construction because the cost is lower.

Exhibit 1 shows the estimated number of single-family and multifamily properties that would be affected by the standard proposed at their current state elevation standards. During Federal Housing Administration (FHA) insurance year 2012, 116 newly constructed and 821 substantially rehabilitated single-family properties were located in flood zones of states that require less than 2 feet of freeboard. Geocodable information, which is required to determine location in floodplains, is available for HUD's largest production programs, including public housing and properties financed with FHA multifamily insurance. Geocoded information for multifamily properties receiving funds

[9] Alternatively, a developer could choose to locate outside of the floodplain. Doing so would likely not change revenue since many of HUD's multifamily programs set income and rent limits by metropolitan area. In addition, Holway and Burby (1990) found that land values decrease $74 per 1,000 square feet in response to elevation requirements of 1 foot. For a typical FHA-insured home of 1,800 square feet on a lot between three and four times the house size, the decrease in land value, before the developer purchases the land, would total approximately $400 to $500. This amount is within in the range of increased costs of elevation. Thus, the change in location is unlikely to result in different costs to the developer and therefore the developer is unlikely to choose an alternate location.

[10] Arizona, Colorado, Georgia, Illinois, Iowa, Kansas, Maryland, Maine, Michigan, Minnesota, North Dakota, Nebraska, New Jersey, Oregon, Puerto Rico, and Rhode Island require BFE+1. The District of Columbia and Pennsylvania require BFE+1.5. Indiana, Montana, New York, and Wisconsin require BFE+2. See www.floods.org/ace-files/documentlibrary/FloodRiskMngmtStandard/States_with_freeboard_and_CRS_Communities_with_Freeboard_in_Other_states_2-27-15.pdf.

Exhibit 1

Annual Average Number of FHA-Insured Single-Family and HUD-Assisted Multifamily Properties Located in 1-Percent Annual Chance Floodplain

State Construction Standard	FHA-Insured Single-Family Properties		HUD-Assisted Multifamily Properties			
			New Construction		Substantial Rehabilitation	
	New Construction	Substantial Rehabilitation	Properties	Units	Properties	Units
No standard specified	101	581	117	1,725	3	117
Coastal states	95	552	117	1,725	3	117
Inland states	6	29	0	0	0	0
BFE +1 foot	15	220	46	366	7	128
Coastal states	11	147	46	366	7	128
Inland states	4	73	0	0	0	0
BFE +1.5 feet	0	20	0	0	0	0
Coastal states	0	20	0	0	0	0
Inland states	0	0	0	0	0	0
All properties	232	1,622	163	2,091	10	245

BFE = base flood elevation. FHA = Federal Housing Administration. HUD = U.S. Department of Housing and Urban Development.

from one of HUD's grant programs, such as the Community Development Block Grant (CDBG)[11] and HOME programs, is available only for properties that also received low-income housing tax credits. Annual production averages for these programs rely on production years 2011 through 2013, which are the most recent available. Overall, approximately 163 newly constructed and 10 substantially rehabilitated multifamily properties each year were located in the 1-percent annual chance (100-year) floodplain of states that require less than 2 feet of freeboard.

Costs of Rule

The estimated costs of elevating newly constructed single-family and multifamily structures are shown in exhibit 2. HUD estimates the construction cost of elevating for new construction projects based on findings from two engineering studies conducted for FEMA.[12] These studies examine the construction cost of elevation for new residential structures in Coastal A Zones, V Zones, and A Zones for various foundation types, building sizes, elevation levels of the lowest floor, and flood conditions. The term *Coastal A Zone* is used to differentiate areas that are subject to breaking waves up to 3 feet and conditions similar to, but less severe than, V Zones. Base flood conditions in A Zones resemble those in riverine areas. Thus, although these studies focus on coastal areas, the results are equally applicable to riverine areas.

[11] Nonresidential actions funded by CDBG that are located in the floodplain are subject to an eight-step environmental review process but not elevation requirements. Thus, expanding the affected area beyond the 1-percent annual change floodplain to include horizontal expansion would subject more CDBG projects to the review process. The cost of compliance for these projects, however, would be negligible.

[12] See Jones et al. (2006) and updated in FEMA (2013).

Exhibit 2

Cost of Elevation for Newly Constructed HUD-Assisted and HUD-Insured Properties in 1-Percent Annual Chance Flood Zone

State Construction Standard	New Construction		Cost of Freeboard		Increase in Construction Costs Per Property		Aggregate Increase in Construction Costs	
	Properties (#)	Units (#)	Minimum (%)	Maximum (%)	Minimum ($)	Maximum ($)	Minimum ($)	Maximum ($)
Single-family								
No standard specified	101	NA						
Coastal states	95	NA	0.30	4.80	317	5,074	30,125	481,992
Inland states	6	NA	0.30	4.50	317	4,757	1,903	28,539
BFE +1 foot	15	NA						
Coastal states	11	NA	0.20	3.90	211	4,122	2,325	45,345
Inland states	4	NA	0.20	2.30	211	2,431	846	9,724
BFE +1.5 feet	0	NA						
Coastal states	0	NA	0.10	1.95	106	2,061	0	0
Inland states	0	NA	0.10	1.15	106	1,216	0	0
All properties	116	NA					35,198	565,601
Multifamily								
No standard specified	117	1,725	0.30	4.80	4,423	70,769	517,500	8,280,000
BFE +1 foot	46	366	0.20	3.90	1,591	31,030	73,200	1,427,400
BFE +1.5 feet	0	0	0.10	1.95	0	0	0	0
All properties	163	2,091					590,700	9,707,400
Increase due to horizontal expansion							99,238	1,630,843
Overall total							689,938	11,338,243

BFE = base flood elevation. HUD = U.S. Department of Housing and Urban Development. NA = not applicable.

Based on these findings, the construction cost of increasing the base of a new residential structure 2 additional feet of vertical elevation varies from 0.3 to 4.8 percent of the base building cost. The increased cost as a percentage of construction cost is highest in Coastal A Zones, although the cost range is generally similar across the three flood zones. Although HUD's geocoding identifies whether buildings are located in the 1-percent annual chance floodplain, details are not available on which flood zone the building is located. Thus, for coastal states, HUD applies the full cost range across the three flood zones. For inland states, HUD applies only the A Zone cost.

Based on the median mortgage amount for FHA-insured properties in the 1-percent annual chance (100-year) flood zone, the estimated average cost of construction for FHA-insured single-family properties totals approximately $105,700 for newly constructed homes. Construction costs of new multifamily properties average approximately $100,000 per unit. Applying the previously discussed construction cost range, the cost of elevating a single-family home an additional 2 feet would add as much as $5,074 to the total cost of construction. The additional cost per multifamily property, based on a weighted average of HUD-assisted and HUD-insured properties located in the floodplain, for an additional 2 feet of elevation would cost up to $70,769 per property. These costs should generally be considered a maximum because most HUD-assisted or HUD-insured substantial improvement projects already involve elevation to the current standard, BFE+0. Thus,

the cost of elevating a structure an additional 2 feet would be marginal compared with the initial cost of elevation to the floodplain level. The aggregate increased costs of construction for newly constructed FHA-insured properties would range from $0.035 million to $0.566 million for single-family properties and from $0.591 million to $9.707 million for multifamily properties.

Adding 2 feet of freeboard would extend the floodplain and the area impacted by this rule horizontally, except in the case of the FHA single-family mortgage insurance program for one- to four-unit properties. The distance of this horizontal expansion depends on the topography of local jurisdictions. Based on available data from 20 coastal counties in six states,[13] FEMA estimates that the horizontal expansion from the additional 2 feet of freeboard would increase the area of the floodplain, and thus the affected area, by 16.8 percent on average across the country. For purposes of this analysis, HUD assumes that the number of affected properties would also increase by this percentage. This estimate, however, likely overestimates the impact because HUD's assisted and insured properties are not evenly distributed across space, and the counties in the sample are more concentrated in higher-flood-risk areas than HUD's stock. Furthermore, none of these counties includes riverine floodplains, which would likely have a smaller extension. Also, less than 1 percent of HUD-assisted multifamily properties and less than 2 percent of single-family properties that are in the floodplain are in these counties. Including the 16.8-percent increase from horizontal expansion, the aggregate increased construction cost for multifamily properties ranges from $0.690 million to $11.338 million.

Substantial improvement projects require a more involved process of lifting the structure and extending the foundation. The cost of elevating single-family homes depends on factors such as the foundation type, but costs of elevation generally range from $7,682 to $22,022 per foot that the house is elevated.[14] Owners of multifamily properties could choose to either elevate or floodproof and use any floor below the standard for nonresidential purposes. Because virtually all HUD-assisted and HUD-insured multifamily properties are two-story, garden-style apartments, HUD expects these properties to opt for elevating. Based on the elevation of larger structures noted in ASFPM (2002), HUD estimates that the cost of elevating small multifamily buildings ranges from $4,097 to $11,745 per unit per foot of elevation. These costs should be considered a maximum because most HUD-assisted or HUD-insured substantial improvement projects already involve elevation to the current standard, BFE+0. Thus, the cost of elevating a structure as much as an additional 2 feet would be marginal compared with the initial cost of elevation to the floodplain level.

As stated previously, HUD expects multifamily properties to meet the standard by raising the building base elevation rather than by eliminating residential units on the first floor. Choosing the latter, however, could lead to lost revenue either because fewer units are produced or because of the higher construction costs of adding a floor to maintain the same number of units. Alternatively, some developers may choose to locate outside of the floodplain and construct the same number of units. Revenue would likely remain the same in this case, because many of HUD's multifamily programs set rent limits by metropolitan area. Any change in rent, however, would be offset by

[13] The counties included in the horizontal expansion calculation are San Francisco County, California; Flagler and Nassau Counties, Florida; Charlton, Chatham, Douglas, Effingham, and Forsyth Counties, Georgia; Beaufort, Brunswick, Carteret, Craven, Hyde, New Hanover, Onslow, Pamlico, and Pender Counties, North Carolina; Colleton and Horry Counties, South Carolina; and Grays Harbor County, Washington.

[14] See ASFPM (2002). Estimates are adjusted for inflation.

further decreased flood insurance premiums and avoided damage. Furthermore, this change would affect only properties at the margin with viable alternatives to locating inside and outside the flood zone. HUD does not have an estimate for the number of properties that may choose this option.

Exhibit 3 shows the cost of elevating substantially rehabilitated, HUD-insured single-family homes and HUD-assisted multifamily properties. In FHA insurance year 2012, HUD insured 581 single-family properties in the 1-percent annual chance floodplain in states that do not require elevation above the BFE. Another 220 homes were insured in states that require construction to at least BFE+1 and 20 homes in states that require at least BFE+1.5. The aggregate increased construction cost for these single-family homes to meet the proposed standard ranges from $10.693 million to $30.655 million.

HUD assists far fewer substantial improvement projects of multifamily properties in the floodplain. Annually, only 10 properties containing 245 units are typically assisted in the floodplain. Most of these properties, comprising slightly more than one-half of the units, are in states that require construction to at least BFE+1. Overall, the aggregate costs of the proposed standard ranges from $1.483 million to $4.252 million, and from $1.732 million to $4.966 million if including horizontal expansion.

Exhibit 3

Cost of Elevation for HUD-Assisted and HUD-Insured Substantial Improvement Properties in the 1-Percent Annual Chance Flood Zone

State Construction Standard	New Construction		Cost of Freeboard per Unit		Aggregate Increase in Construction Costs	
	Properties (#)	Units (#)	Minimum ($)	Maximum ($)	Minimum ($)	Maximum ($)
Single-family						
No standard specified	581	NA				
Coastal states	552	NA	15,365	44,045	8,481,396	24,312,824
Inland states	29	NA	15,365	44,045	445,581	1,277,304
BFE +1 foot	220	NA				
Coastal states	147	NA	7,682	22,022	1,129,316	3,237,305
Inland states	73	NA	7,682	22,022	560,817	1,607,641
BFE +1.5 feet	20	NA				
Coastal states	20	NA	3,841	11,011	76,824	220,225
Inland states	0	NA	3,841	11,011	0	0
All properties	1,622	NA			10,693,934	30,655,300
Multifamily						
No standard specified	3	117	8,195	23,491	958,766	2,748,406
BFE +1 foot	7	128	4,097	11,745	524,453	1,503,402
BFE +1.5 feet	0	0	2,049	5,873	0	0
All properties	10	245			1,483,220	4,251,808
Increase due to horizontal expansion					249,181	714,304
Overall total					1,732,401	4,966,112

BFE = base flood elevation. HUD = U.S. Department of Housing and Urban Development. NA = not applicable.

Benefits of Rule

The standard proposed in this rule that requires that buildings be constructed with at least 2 feet of freeboard above BFE is intended to protect HUD-assisted and HUD-insured structures and the owners and tenants in these units. Thus, the benefits of the rule include reduced building damage and decreased costs to tenants temporarily displaced due to flooding, the latter of which includes avoiding search costs for temporary replacement housing and lost wages. The annual reduction in insurance premiums provides an adequate measure of the reduction in expected damages, assuming that NFIP rates are calculated to maintain a nonnegative balance. In this case, the premiums for catastrophic insurance would be slightly higher than, but similar to, the expected value of the claim to pay for administrative costs. It is not clear whether NFIP will operate without deficits or need for appropriations after the most recent reforms[15] (GAO, 2014). If the reduction in the insurance premium is not equivalent to the change in the risk-adjusted expected cost of claim (higher or lower), then a transfer to or from the insured will come from or go to the insurer.

Flood insurance premiums vary based on a variety of factors, such as the structure's height above BFE. Estimation of the expected reduction in damage for both new construction and substantial improvement projects, measured by the reduction in premiums, rely on the engineering studies discussed previously, which examine the effect of freeboard on new residential buildings in floodplains. As previously mentioned, although the studies focus on coastal areas, they separately model the effects in the Coastal A Zone and the A Zone. Flood conditions in the A Zone are subject to stillwater flooding and have a low threshold for wave damage. Therefore, the results of these studies are equally applicable to riverine areas. Similarly, HUD also applies findings to both new construction and substantial improvement projects because substantial improvement increases the value of the structure, with all else equal, to be near the new construction value.

FEMA (2013) estimated that the average annual premium savings as a percentage of construction cost ranges from 0.24 to 0.87 percent. The savings are greatest in the V Zone (0.87 percent) compared with the Coastal A (0.24 percent) and A (0.26 percent) Zones. Exhibit 4 shows the aggregate savings for a range of BFE levels, based on a typical production year for FHA-insured single-family properties, and exhibit 5 shows the same for HUD-assisted multifamily properties. These estimates reflect compliance with the minimum standard of 2 feet of freeboard. On learning of the benefits related to elevation, owners may choose to elevate to a level higher than the minimum required or take other precautions to minimize the flood risk.

For single-family properties, moving to the BFE+2 standard will decrease NFIP premiums in aggregate by a minimum of $142,987 ($28,687 + $114,300) and a maximum of $453,231 ($95,088 + $3,587,144) annually. Assuming a 30-year useful life, the aggregate discounted savings range from $1.717 million to $9.150 million, assuming a 3-percent discount rate, and $1.208 million to $6.018 million, assuming a 7-percent discount rate.

[15] The Biggert Waters Flood Insurance Reform Act of 2012 (Pub. L. 112–141, 126 Stat. 916. July 6, 2012) included provisions requiring FEMA to charge actuarial rates in order to allow the agency to repay the $24 billion loaned from the U.S. Treasury. The Homeowner Flood Insurance Affordability Act of 2014 (Pub. L. 113–89, 128 Stat. 1020. March 21, 2014), however, restricted the amount premiums could increase, slowing FEMA's ability to charge full risk rates and repay the loan.

Exhibit 4

Avoided Damage to FHA-Insured Single-Family Properties in 1-Percent Annual Chance Floodplain

State Construction Standard	Number of Properties		Average Premium Savings[a] (%)	Per Property Annual Savings ($)		Aggregate Annual Savings ($)		Discounted Savings[b] ($)	
	New Construction	Substantial Rehabilitation		New Construction	Substantial Rehabilitation	New Construction	Substantial Rehabilitation	3%	7%
Miniumum estimated savings									
No standard specified									
Coastal states	95	552	0.24	254	150	24,100	82,800	1,283,707	903,408
Inland states	6	29	0.26	275	163	1,649	4,713	76,391	53,760
BFE +1 foot									
Coastal states	11	147	0.18	190	113	2,093	16,538	223,723	157,445
Inland states	4	73	0.20	211	125	846	9,125	119,732	84,261
BFE +1.5 feet									
Coastal states	0	20	0.09	95	56	0	1,125	13,510	9,507
Inland states	0	0	0.10	106	63	0	0	0	0
All properties	116	801				28,687	114,300	1,717,064	1,208,382
Maxiumum estimated savings									
No standard specified									
Coastal states	95	552	0.87	920	544	87,361	300,150	7,823,249	5,145,245
Inland states	6	29	0.26	275	163	1,649	4,713	128,427	84,465
BFE +1 foot									
Coastal states	11	147	0.45	476	281	5,232	41,344	940,295	618,420
Inland states	4	73	0.20	211	125	846	9,125	201,291	132,386
BFE +1.5 feet									
Coastal states	0	20	0.23	238	141	0	2,813	56,780	37,343
Inland states	0	0	0.10	106	63	0	0	0	0
All properties	116	801				95,088	358,144	9,150,043	6,017,860

BFE = base flood elevation. HUD = U.S. Department of Housing and Urban Development.

[a] *Decrease in annual flood insurance premiums as percentage of construction costs.*

[b] *Discounted annual insurance premium savings based on 30-year useful life of buildings.*

Exhibit 5

Avoided Damage to HUD-Assisted Multifamily Properties Located in 1-Percent Annual Chance Floodplain

State Construction Standard	Number of Properties		Substantial Rehabilitation		Average Premium Savings[a] (%)	Per Property Annual Savings ($)		Aggregate Annual Savings ($)		Discounted Savings[b] ($)	
	Properties	Units	Properties	Units		New Construction	Substantial Rehabilitation	New Construction	Substantial Rehabilitation	3%	7%
Miniumum estimated savings											
No standard specified	117	1,725	3	117	0.24	3,538	4,212	414,000	12,636	8,613,122	5,664,734
BFE +1 foot	46	366	7	128	0.18	1,432	1,481	65,880	10,368	1,539,329	1,012,396
BFE +1.5 feet	0	0	0	0	0.09	0	0	0	0	0	0
All properties	163	2,091	10	245				479,880	23,004	10,152,451	6,677,130
Including horizontal expansion										11,858,063	7,798,888
Maxiumum estimated savings											
No standard specified	117	1,725	3	117	0.87	12,827	15,269	1,500,750	45,806	31,222,565	20,534,660
BFE +1 foot	46	366	7	128	0.45	3,580	3,703	164,700	25,920	3,848,323	2,530,990
BFE +1.5 feet	0	0	0	0	0.23	0	0	0	0	0	0
All properties	47	1,000	117	5,499,000				1,665,450	71,726	35,070,889	23,065,650
Including horizontal expansion										40,962,798	26,940,679

BFE = base flood elevation. HUD = U.S. Department of Housing and Urban Development.

[a] *Decrease in annual flood insurance premiums as percentage of construction costs.*

[b] *Discounted annual insurance premium savings based on 30-year useful life of buildings.*

NFIP premiums for multifamily properties will decrease in aggregate from $0.503 million ($0.480 million + $0.023 million) to $1.737 million ($1.665 million + $0.071 million) annually. Over a 30-year structure life, the aggregate discounted savings ranges from $10.152 million to $35.071 million, assuming a 3-percent discount rate, and $6.677 million to $23.066 million, assuming a 7-percent discount rate.

In addition to savings on insurance premiums, homeowners and tenants would also accrue significant benefits by avoiding the costs of moving from a flooded property. The family cost of moving a two-bedroom apartment costs approximately $800 plus lost wages. According to the American Moving and Storage Association (Williams 2014), an average in-state move costs $1,170, based on an average move weight of 7,100 pounds, or approximately $0.16 per pound. Based on a review of typical apartment weights, the median estimate for a two-bedroom apartment is 5,000 pounds.[16] Thus, the cost of moving a two-bedroom apartment is approximately $800 ($0.16 x 5,000). Using the national median hourly wage reported by the U.S. Bureau of Labor Statistics of $16.71, if affected households' wage earners are unable to work for a cumulative 40 hours each, due to time spent doing flood-related apartment searching and moving, a family would lose $668. Moving costs and lost wages combined would cost each tenant an estimated $1,468.

Homeowners and tenants living in the 100-year floodplain face a 1-percent chance each year that a flood will occur and that they will need to temporarily relocate. Increasing the base elevation by 2 feet would place the building, on average, at the 250-year floodplain, which has a 0.4-percent probability of experiencing a flood each year. Based on the weighted average of FHA-insured and HUD-assisted multifamily properties located in the floodplain each year—based on current state and local standards—this rule decreases the annual risk by 0.67 percent. The expected value of decreased owner and tenant costs is $9.88 per household ($1,468 x 0.67 percent). The discounted 30-year value of these avoided costs is $199 per household, assuming a 3-percent discount rate, and $131 per household, assuming a 7-percent discount rate. Aggregating over the combined 3,273 units (both single-family and multifamily), the total benefit to owners and tenants is $0.643 million, assuming a 3-percent discount rate, and $0.423 million, assuming a 7-percent discount rate. Including horizontal expansion, the benefits increase to $0.751 million using a 3-percent discount rate and $0.494 using a 7-percent discount rate.

Exhibit 6 summarizes the expected benefits generated from the proposed standard of 2 feet of freeboard. Overall, the maximum valued benefits of this rule, including horizontal expansion (where applicable) and higher estimates of damage avoided, total $50.657 million, assuming a 3-percent discount rate, and $33.317 million, assuming a 7-percent discount rate.

In addition to the benefits discussed previously, tenants experience unvalued benefits of avoiding temporary relocation. Being forced to relocate on short notice creates considerable stress and uncertainty for families. Furthermore, some families may not be able to find affordable housing in their immediate area and could be forced to move farther away, sometimes out of state. Long-distance moves remove a family from their local social network and add additional stress not only on adults, but also on children who may be required to enroll in different schools.

[16] Average apartment weights are calculated from a range of industry estimates, including www.citytocitymoving.us, www.movers.com, and www.movingcompanies.us.

Exhibit 6

Valued Benefits of BFE+2 Standard

Benefits	Excluding Horizontal Expansion Discount Rate ($)		Including Horizontal Expansion Discount Rate ($)	
	3%	7%	3%	7%
Avoided damage				
Minimum	11,869,515	7,885,512	13,575,126	9,007,270
Maximum	44,220,932	29,083,510	50,112,841	32,958,539
Avoided tenant costs	642,599	422,629	750,555	493,630
Total				
Minimum	12,335,648	8,192,082	14,119,571	9,365,343
Maximum	44,687,065	29,390,080	50,657,285	33,316,613

BFE = base flood elevation.

Coastal Versus Inland States

As explained previously, one concern about the applicability of the study (Jones et al., 2006) on which HUD's analysis relies is that the data were collected from coastal states, where costs and damage due to flooding may differ from inland states. Thus, it is important to consider how using data from coastal states may affect our estimates. Coastal states will possess A Zones, Coastal A Zones, and V Zones; however, inland states will possess only A Zones.[17]

The Coastal A Zone distinction was developed to encourage more effective flood mitigation. A FEMA (2005: p.1) study of damage during Hurricane Katrina found that "typical A Zone construction techniques … are subject to damage when exposed to less than 3-foot breaking waves, which is the current threshold for V Zone conditions." Higher standards, roughly equivalent to V Zone standards, are recommended but not required for A Zones in coastal areas. The Coastal A Zone is not shown on Flood Insurance Rate Maps because the federally mandated design standards are the same for all A Zones.

A more recent report (FEMA, 2009: p.1) after Hurricane Ike defined the Coastal A Zone as one that is "landward of a V Zone, or landward of an open coast without mapped V Zones." The Coastal A Zone's source of flooding ranges from "astronomical tides, storm surges, seiches or tsunamis, not riverine flooding." According to the report, "communities, designers, and owners, will have to determine whether a site lies within a Coastal A Zone" (FEMA, 2009: p.2). Without any geographic data, it is difficult to analyze the frequency of development in Coastal A Zones.

A Zones in coastal areas (as opposed to Coastal A Zones) are characterized as "areas with shallow flooding only, where potential for damaging waves and erosion is low" (FEMA, 2005: p.1). This definition is identical whether the zone is inland or near a coast. Fortunately, the FEMA report differentiates between A Zones and Coastal A Zones so that the increase in compliance costs can be calculated for properties in A Zones of inland states as well as those in coastal states.

In a typical production year, all HUD-assisted new construction in flood zones occurs in coastal states, and nearly 60 percent of HUD-assisted single-family development in flood zones occurs in

[17] HUD recognizes that flooding in inland states with major rivers may be more severe than in some coastal states.

coastal states. According to FEMA (2013), the cost of adding 2 feet of freeboard (BFE+2) is lower in A Zones than in Coastal A Zones (0.3 to 4.5 percent of construction cost for A Zones compared with 0.7 to 4.8 percent for Coastal A Zones). The maximum cost in V Zones of BFE+2 is 3.6 percent of total construction cost. The benefits may be different as well. Although A Zones and Coastal A Zones are expected to experience similar insurance savings as a percentage of the cost of construction, development in V Zones may experience significantly greater benefits. Thus, both the costs and benefits of the rule could be lower in inland areas, which have only A Zones.

Deaths Prevented and Health-Related Benefits

Although the purpose and expected impact of this rule is the protection of HUD investments and the uninterrupted provision of affordable housing, it is reasonable to expect that building to higher construction standards would prevent injuries or deaths related to tenant evacuation during or soon after a dangerous flood. According to National Weather Service data (NWS n.d.a, n.d.b), from 1995 to 2015, 82 deaths occurred per year due to flash and river floods. A large portion of these deaths occurred in vehicles as drivers tried to cross flooded roads or hydroplaned. In 2015, 176 deaths occurred due to floods, and 64 percent of these involved a vehicle. In contrast, 11 deaths, or 6.3 percent, occurred within an individual's permanent home. Since 1995, flooding was involved in 76 deaths in permanent homes and 35 deaths in mobile homes, making up 4.4 and 2.0 percent of total flood-related deaths in that time period, respectively. Of these flood-related deaths, 373, or 21.7 percent, were of elderly people (those over the age of 60).

Ashley and Ashley (2008) found that between 1959 and 2005, 4,586 flood-related fatalities occurred in the contiguous United States. On average, approximately 97.6 flood-related fatalities occurred per year, with a median value for reported deaths of 81. Most of these flood-related fatalities occurred due to flash floods, followed by traditional floods and tropical systems. Fewer than 200 of the 4,586 flood-related deaths occurred in a permanent structure, although this report did not distinguish between residential and nonresidential structures. This report also noted that people between the ages of 10 and 29 and people older than age 60 were more vulnerable to floods. However, the data used for this study, from the National CDs of Environmental Information Storm Events database, contained unknown ages for 63 percent of the fatalities.

Rappaport (2014) examined the fatalities that occurred in the United States from Atlantic tropical cyclones and found that, between 1963 and 2012, approximately 2,544 people died in the United States due to tropical cyclones, equating to roughly 50 deaths per year on average.[18] Roughly 90 percent of these deaths occurred in water-related incidents like drowning, 49 percent were caused by storm surge, and 27 percent were caused by freshwater floods and mudslides. In an overview of deaths caused by Hurricane Katrina, the report noted than many died due to drowning and entrapment in attics in the home.

Aside from decreasing deaths, the higher standards proposed in this rule will also decrease the incidence of mold. The additional 2 feet of freeboard will prevent water damage from a 1-percent annual chance flood. As FEMA, the Centers for Disease Control and Prevention (CDC), and other

[18] Atlantic tropical cyclones affect only coastal areas in the Eastern United States.

federal agencies have noted (CDC, n.d.; Hurricane Sandy Rebuilding Task Force, 2015), mold after flooding can cause a number of health issues to residents. Children, elderly people, pregnant women, and people with respiratory conditions such as asthma are at high risk for adverse health effects from mold.

The CDC also notes that floodwater can bring harmful contaminants into a home. For example, contaminated water can contain bacteria that cause infectious diseases and diarrhea. Also, floods can wash chemicals; displaced insects, reptiles, and other animals; and sharp objects into a home. Residents also face electrical hazards from downed power lines and flooded electrical equipment; if not property ventilated, diesel- and gasoline-powered generators can cause carbon monoxide poisoning. Floods can also cause indirect impacts, such as destruction of infrastructure that could help provide medicine, food, public services, or other needed supplies in an emergency.

Summary of Benefits, Transfers, and Costs

HUD proposed new elevation standards for its funded and assisted residential properties, due to the increased sea level and frequency of riverine flooding. The new standard also addresses issues that affect the insurance industry, including a market failure of information, asymmetric information on occupant flood mitigation efforts, and the moral hazard associated with insured properties and the assumption of governmental disaster relief. Increasing the required minimum elevation of HUD-assisted structures located in and around the floodplain will prevent or reduce damage caused by flooding and avoid relocation costs to tenants associated with temporary moves when HUD-assisted structures sustain flood damage and are temporarily uninhabitable. These benefits, which are realized throughout the life of HUD-assisted structures, are offset only by the one-time increase in construction costs.

As explained previously, HUD estimates that requiring developers to construct or floodproof HUD-funded and HUD-insured properties to BFE+2 will increase construction costs by $12.803 million to $47.525 million total. Benefits of the increased standard include avoided damage to buildings, as measured by decreased insurance premiums, and avoided costs associated with tenants being displaced. These benefits occur annually over the life of the structures. Over a 30-year period, the present value of aggregate benefits total between $12.336 million to $50.657 million, assuming a 3-percent discount rate, and between $8.192 million to $33.317 million, assuming a 7-percent discount rate.

These estimates are based on the annual production of HUD-assisted and HUD-insured structures in the floodplain and accounts for the 20 states, plus the District of Columbia and Puerto Rico, with existing freeboard requirements. The cost of compliance and expected benefits are lower in these states than in states that have no minimum elevation requirements above the BFE. HUD's analysis does not consider benefits due to further coastal sea level or riverine rise. Further increase in the sea level rise or inland and riverine flooding would increase the benefits of this rule.

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Project-Based Vouchers

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Note From the Editor

David Hardiman

This article by Brent D. Mast presents a highly useful snapshot of project-based vouchers (PBVs), which includes information on both assisted household characteristics and the locations of PBVs. These snapshot data are also presented alongside a comparison with the larger Housing Choice Voucher (HCV) tenant-based program.

Both aspects of the article—the snapshot of PBVs and the comparison—present useful information to consider; however, in this introduction I present some caveats with the comparison aspect of the information provided.

Background and Legislative History

The Quality Housing and Work Responsibility Act of 1998[1] (QHWRA) enacted a major PBV program authority that allowed public housing agencies (PHAs) to attach a portion of their allocated vouchers to specific buildings. This authorization was part of a larger set of streamlining improvements in QHWRA that included consolidating two previously separate Section 8 programs (vouchers and certificates) and delegating additional decisionmaking authority to the local level (PHAs),

[1] Pub. L. 105–276, 112 Stat. 2519, 42 U.S.C. 1437. October 21, 1998.

while reducing U.S. Department of Housing and Urban Development (HUD) micromanagement.[2] This PBV authority was further amended, clarified and improved in the VA-HUD-Independent Agencies Appropriations Act for FY 2001.[3]

The number of PBVs has increased dramatically in only a few years, as PHAs have made increasing use of this flexible authority and as units have been converted from other rental programs. As shown in exhibit 1, PBVs have increased from only about 43,000 in 2010 to more than 140,000 in 2016.

This rapid increase is important to keep in mind while considering the information presented in this article, particularly those portions comparing PBVs to the overall HCV tenant-based program. For instance, in terms of the data on assisted households themselves, the comparisons will not always be parallel in nature. PBV units that are newly issued by a PHA often show a shorter "length of stay" for assisted tenants. Differences in length of stay, therefore, will likely reflect differences in when the units were issued rather than any difference in tenant outcomes or behavior. Alternatively, PBVs used for a special purpose, such as supportive housing for the homeless, or PBVs issued in conjunction with Low-Income Housing Tax Credits as a set-aside for persons with disabilities or the elderly, will reflect the tenant characteristics of those specific populations.

In addition, for PBV units that converted from another HUD rental housing program, the comparisons do not include data tracking existing tenants' experiences (for example, length of stay) while in those previous programs. I will discuss this concept more in the next part of this introductory note.

Exhibit 1

Project-Based Vouchers, MTW and non-MTW, 2010 to 2016

	Year						
	2010	2011	2012	2013	2014	2015	2016
All	43,393	55,759	66,383	77,504	91,478	119,605	140,043
MTW PBV	11,383	16,163	20,917	21,987	25,557	32,033	38,210
Non-MTW PBV	32,010	39,596	45,466	55,517	65,921	87,572	101,833

MTW = Moving to Work. PBV = project-based voucher.
Note: Data are as of December of each year.
Sources: Public and Indian Housing Information Center; Voucher Management System

[2] A previous version of the PBV program authority—project-based certificates (PBCs)—was seldom used, largely due to complex and time-consuming HUD requirements. PBCs were first enacted in the Housing and Urban-Rural Recovery Act of 1983 (Pub. L. 98–181) and later amended in the National Affordable Housing Act of 1990 (Pub. L. 101–625; better known as Cranston-Gonzalez). HUD itself stated in a 1995 attempt at regulatory improvement, "HUD agrees that the HUD oversight is excessive for a five-year subsidy commitment, especially considering the limited HUD field office staff capacity to perform PBC reviews. The final rule significantly decreases HUD review responsibilities for the PBC program, and simplifies program administration" (*Federal Register* 60 (127): 34692).

[3] Pub. L. 106–377, 114 Stat. 1441, 1 U.S.C. 12 note. October 27, 2000.

Additional Considerations for Specific Types of PBVs: Moving to Work and Rental Assistance Demonstration Conversions

Moving to Work Demonstration

A large portion of PBVs are administered by PHAs that are participants in the Moving to Work (MTW) demonstration. MTW provides a range of programmatic flexibilities, including greater opportunities for PHAs to waive regulatory requirements and undertake innovative practices, many of which involve the use of PBVs.

As shown in exhibit 1, of the approximately 119,000 PBVs as of December 2015, approximately 32,000 were in MTW PHAs and 87,600 were in non-MTW PHAs.

The high number of PBVs in MTW PHAs likely reflects the additional programmatic authority and flexibility available to these agencies. For instance, several MTW PHAs have undertaken innovative practices such as using sponsor-based vouchers for providing assistance to homeless persons in permanent supportive housing. Other agencies have converted their public housing units to PBVs while also pursuing partnerships for private management arrangements.

Rental Assistance Demonstration Conversions

Of the approximately 87,600 non-MTW PBVs, about 10,200 are units that were converted from other project-based rental programs. Thus, these units were previously either public housing or Rent Supplement/Rental Assistance Payments (Rent Supp/RAP) units. This has important implications for the findings in the article that relate to locational information (that is, poverty rate and proximity to opportunity assets).

In addition, PBV units that were converted from other programs do not include data for their assisted residents as related to their length of stay in a rental assistance program. The data used in this article consider only assisted households' length of stay in the PBV program itself and do not count any previous time they may have been assisted by the housing program (public housing or Rent Supp/RAP) from which the unit was converted. Nevertheless, the information is included, as it still offers some utility, despite this noted limitation.[4]

Note also that other PBVs may have been converted from other housing programs that did not include a Rental Assistance Demonstration (RAD) transaction. Several MTW PHAs, for example, converted their public housing units to PBVs. Without an additional indepth inventory analysis, it is not known how many additional converted units fall into this category. The caveat that applies to the length of stay data therefore applies to an unknown additional number of PBVs that were converted without a RAD transaction.

[4] A final consideration on the length of stay comparison is that both sides of the program data are based on programwide snapshots (that is, all PBVs compared to all tenant-based HCVs) and not individual cohorts of assisted residents tracked over time. As such, impact on tenant outcomes or behavior is hard to estimate from these data alone. At the time of writing, HUD is undertaking a separate study on this topic.

Note Conclusion

The significant amount of information on PBVs in this article sheds additional light on the growing use of this important program flexibility. As more PHAs take advantage of the authority to use PBVs, including in conjunction with other programs and for specific public policy purposes, this article may help guide informed decisionmaking at the federal, state, and local levels.

The Utilization of Project-Based Vouchers

Brent D. Mast

Introduction

This article explores the use of project-based vouchers (PBVs), primarily using HUD Public and Indian Housing Information Center (PIC) data for December 2015. The analysis is motivated by the conflict between public housing agencies (PHAs)—which would like more discretion to use PBV funding—and advocates that have pressed for restrictions on project-basing, because of concerns about the consequences for fair housing and economic opportunity if project-basing absorbs more of the Housing Choice Voucher appropriations. I address the following questions—

- What are the differences between the types of households that are served by PBVs and those served by tenant-based vouchers (TBVs)?
- Are there differences in the types of PHAs that use PBVs and those that use TBVs? I pay particular attention to the distinction between Moving to Work (MTW) demonstration PHAs and non-MTW PHAs, as the MTW PHAs are less constrained in the use of PBVs.
- Are there differences in household outcomes, such as subsidies, rent burdens, and length of stay, between PBV and TBV households?
- Are there differences in neighborhood indicators, such as poverty rates, environmental quality, and school proficiency, between PBV households and TBV households?

Background

PBVs are a type of voucher for which the subsidy is assigned to a unit, in contrast to TBVs, for which households can use the voucher to rent an affordable unit of their choice.[5] Under the PBV program, a PHA enters into an assistance contract with the owner for specified units for a specified term. Any PHA operating a voucher program can have up to 20 percent of vouchers be PBVs.

According to PIC data for December 2015, 119,613 vouchers were PBVs, representing 5.4 percent of total vouchers. Among the 604 PHAs using PBVs, 7.6 percent of vouchers were PBVs. Of the 40 MTW PHAs, 35 operated PBV programs. Among the 35 MTW agencies with PBV programs, 11.8 percent of vouchers were PBVs. Among the 569 non-MTW agencies with PBVs, 6.7 percent of vouchers were PBVs.

[5] For more information on the PBV program, see portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/hcv/project.

Key Findings

In the next section, I explore differences in tenant and PHA characteristics in the PBV program with those in the TBV program. Some notable differences are—

- Elderly households are much more likely to use PBVs.
- Nonelderly households with disabilities are not more common in the PBV program than the TBV program.
- Households with children and large households are much more prevalent in the TBV program than the PBV program.
- PBV use is much more common among MTW PHAs.
- PBVs are most common in the Northeast and West census regions.
- PBV use is much more prevalent in larger PHAs.

In the third section, I compare household and neighborhood outcomes for PBV households with children to those for a weighted national sample of TBV households with children. Results indicate that—

- Rent burdens are considerably lower for PBV households.
- Length of stay is much shorter, on average, for PBV households, and length of stay is longer for elderly households in both programs.
- Total income and wage income distributions are very similar between PBV and TBV households.
- PBV households tend to live in higher-poverty neighborhoods than TBV households.
- Environmental risks are greater for PBV households.
- PBV households tend to have better job proximity.
- PBV households tend to have lower transportation costs and better transit access.

In the fourth section, I compare length of stay, rent burden, and poverty rates for TBV families with children to those for PBV families with children within the 604 PHAs with PBV programs. I make comparisons with multivariate regression models with PHA controls, so that the comparisons of PBV and TBV households are within-PHA comparisons.

I present my conclusions in the final section.

Comparison of PBV- and TBV-Assisted Tenants

In this section, I explore differences in the types of households and PHAs that the PBV and TBV programs serve. I present summary statistics on PBV and TBV households for numerous tenant and PHA characteristics, including disability status, elderly status, census region, and PHA size. All statistics except those on homelessness are reported for MTW and non-MTW agencies.

Tenant Characteristics

PBVs comprise 5.4 percent of total vouchers; the share is much larger in MTW agencies. Exhibit 2 shows percentage frequencies for program type (PBV or TBV) by MTW status. PBVs are 11.2 percent of vouchers in MTW agencies compared with 4.5 percent in non-MTW agencies. One possible explanation for this difference, which I explore in a following section, is that MTW agencies may have clients that are harder to house with TBVs. Another possible explanation is that some ceilings on PBVs do not apply to MTW agencies, and those agencies prefer PBVs for one or more reasons; for instance, PBVs may be easier to administer than TBVs.

Two groups that may be harder to house, as compared to other voucher households, are elderly households and nonelderly households in which the household head or spouse has a significant disability.

Elderly households comprise 39.3 percent of PBV households compared with 22.0 percent of TBV households. Elderly households' share of total vouchers is slightly higher in MTW agencies (23.8 percent) than in non-MTW agencies (22.8 percent). Exhibit 3 shows percentage frequencies for MTW status by program type and elderly status. The percentage of elderly households that are PBV households is very similar for both MTW and non-MTW PHAs. In non-MTW agencies, 39.3 percent of PBV households are elderly households. In MTW agencies, elderly households are 39.0 percent of PBV households. The shares of TBV households that are elderly are very similar between MTW and non-MTW agencies.

Nonelderly households with disabilities constitute a slightly lower share of vouchers in the PBV program than in the TBV program. Nonelderly households with disabilities comprise 24.9 percent of PBVs compared with 27.7 percent of TBVs. Nonelderly households with disabilities, as a share of total vouchers, are 26.5 percent in MTW agencies compared with 27.7 percent in non-MTW

Exhibit 2

Program Type by MTW Status Frequencies

MTW Status	Program	
	PBV (%)	TBV (%)
MTW	11.2	88.8
Non-MTW	4.5	95.5
Total	5.4	94.6

MTW = Moving to Work. PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

Exhibit 3

Elderly Household Frequencies

MTW Status	Program	Elderly (%)	Nonelderly (%)
Non-MTW	PBV	39.3	60.7
Non-MTW	TBV	22.0	78.0
MTW	PBV	39.0	61.0
MTW	TBV	21.9	78.1
Total	PBV	39.3	60.7
Total	TBV	22.0	78.0

MTW = Moving to Work. PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

agencies. Exhibit 4 shows percentage frequencies for MTW status by program type and disability status. In non-MTW agencies, nonelderly households with disabilities comprise 25.9 percent of PBV households. In MTW agencies, nonelderly households with disabilities comprise 22.1 percent of PBV households.

Another group that may be relatively harder to house is families with children, yet families with children are more likely to use a TBV. Families with children are 30.4 percent of PBV households and 46.7 percent of TBV households. The share of total vouchers held by families with children is 2 percentage points lower in MTW agencies (44.1 percent) than in non-MTW agencies (46.1 percent). Exhibit 5 shows percentage frequencies for MTW status by program type and presence of children. Households with children are more likely to use a PBV in MTW agencies than in non-MTW agencies. In MTW agencies, households with children hold 32.6 percent of PBVs and 45.5 percent of TBVs. In non-MTW agencies, households with children hold 29.7 percent of PBVs and 46.9 percent of TBVs.

Large households may also be relatively hard to house. Large households, defined as those with at least five household members, comprise 10.6 percent of total vouchers—10.5 percent in non-MTW agencies and 10.9 percent in MTW agencies. Large households are more prevalent in the TBV program; they comprise 6.0 percent of PBVs and 10.8 percent of TBVs. Exhibit 6 shows percentage frequencies for MTW status by program type and large household status. Large households are more likely to use a TBV in both MTW and non-MTW agencies. In MTW agencies, large households hold 6.3 percent of PBVs and 11.5 percent of TBVs. In non-MTW agencies, large households hold 5.9 percent of PBVs and 10.7 percent of TBVs.

Exhibit 4

Nonelderly Households With Disabilities Frequencies

MTW Status	Program	Nonelderly Households With Disabilities (%)	Other Households (%)
Non-MTW	PBV	25.9	74.1
Non-MTW	TBV	27.7	72.3
MTW	PBV	22.1	77.9
MTW	TBV	27.1	72.9
Total	PBV	24.9	75.1
Total	TBV	27.7	72.4

MTW = Moving to Work. PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

Exhibit 5

Households With Children Frequencies

MTW Status	Program	Households With Children (%)	Other Households (%)
Non-MTW	PBV	29.7	70.3
Non-MTW	TBV	46.9	53.1
MTW	PBV	32.6	67.4
MTW	TBV	45.5	54.5
Total	PBV	30.4	69.6
Total	TBV	46.7	53.3

MTW = Moving to Work. PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

Exhibit 6

Large Household Frequencies

MTW Status	Program	Large Households (%)	Other Households (%)
Non-MTW	PBV	5.9	94.1
Non-MTW	TBV	10.7	89.3
MTW	PBV	6.3	93.7
MTW	TBV	11.5	88.5
Total	PBV	6.0	94.0
Total	TBV	10.8	89.2

MTW = Moving to Work. PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

Families that were homeless at admission may also have special circumstances that make them more likely to use a PBV. Unfortunately, homelessness data are not available in PIC for MTW agencies. Recent research has concluded that homeless-at-admission data for non-MTW agencies are not reliable for the period analyzed in this article, due to inconsistent collection and recording of household homeless status during participants' program enrollment and recertification. The information cited in the following section should be considered with the understanding that HUD Office of Policy Development and Research staff members who are most familiar with PIC data are not comfortable with the accuracy of the data in the homelessness element for that period.

In non-MTW agencies, 4.2 percent of all voucher households are coded as homeless at admission in the PIC system for December 2015. The share of PBV households coded as homeless at admission is much higher (10.6 percent) than the share of TBV households (3.9 percent).

Geography

The use of PBVs varies considerably in terms of geography. PBV use is highest in the Northeast and West census regions. In the Northeast region, 6.9 percent of vouchers are PBVs, and 30.1 percent of PBVs are in the Northeast. In the West region, 5.9 percent of vouchers are PBVs, and 25.6 percent of PBVs are used in the West. The geographic distribution of PBVs is driven in part by the location of MTW vouchers, which are concentrated in the west. Exhibit 7 shows percentage frequencies for MTW status by program type and census region (data for Puerto Rico are given separately in the table).

Exhibit 7

Census Region Frequencies

MTW Status	Program	Northeast (%)	Midwest (%)	South (%)	West (%)	Puerto Rico (%)
Non-MTW	PBV	31.4	18.8	25.2	22.4	2.3
Non-MTW	TBV	23.8	19.2	33.9	21.5	1.5
MTW	PBV	26.6	10.6	28.5	34.4	NA
MTW	TBV	17.5	20.4	26.7	35.4	NA
Total	PBV	30.1	16.6	26.1	25.6	1.7
Total	TBV	23.1	19.4	33.1	23.2	1.3

MTW = Moving to Work. NA = not applicable. PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

- Non-MTW agencies: 31.4 percent of PBVs are in the Northeast, 18.8 percent are in the Midwest, 25.2 percent are in South, and 22.4 percent are located in the West.
- MTW agencies: 26.6 percent of PBVs are in the Northeast, 10.6 percent are in the Midwest, 28.5 percent are in South, and 34.4 percent are located in the West.

PHA Size

Large PHAs dominate the utilization of PBVs. Almost one-half (46.2 percent) of PBVs are administered by PHAs with more than 10,000 total units (vouchers and public housing) compared with 32.3 percent of TBVs administered by those PHAs. MTW agencies greatly influence this discrepancy; 73.4 percent of MTW vouchers are in agencies with more than 10,000 total units compared with 27.1 percent of vouchers in non-MTW agencies.

Exhibit 8 shows percentage frequencies for MTW status by program type and by PHA size in five categories: 0 to 250, 251 to 550, 551 to 1,250, 1,250 to 10,000, and 10,001 or more units. "Qualified" (that is, small) PHAs are defined as those with no more than 550 units.

- Non-MTW agencies: Only 3.0 percent of PBVs are in qualified PHAs, although 11.2 percent of TBVs are in qualified PHAs. The largest concentration of PBVs and TBVs is in PHAs with 1,251 to 10,000 total units. Slightly more than one-third (35.7 percent) of PBVs are in the largest PHAs compared with 26.7 percent of TBVs.
- MTW agencies: No MTW agencies are qualified PHAs. About one-fourth of PBVs and TBVs are in medium-to-large MTW PHAs. The share of PBVs in the largest PHAs is 74.8 percent, which is similar to the share of TBVs (73.2 percent).

Exhibit 8

PHA Size Frequencies

MTW Status	Program	PHA Size (%)				
		0–250	251–550	551–1,250	1,251–10,000	> 10,000
Non-MTW	PBV	0.6	2.4	8.8	52.5	35.7
Non-MTW	TBV	4.0	7.2	14.5	47.6	26.7
MTW	PBV	NA	NA	2.1	23.1	74.8
MTW	TBV	NA	NA	1.1	25.7	73.2
Total	PBV	0.5	1.8	7.0	44.6	46.2
Total	TBV	3.5	6.4	12.9	44.9	32.3

MTW = Moving to Work. NA = not applicable. PBV = project-based voucher. PHA = public housing agency. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

Summary

To summarize, little evidence suggests PBVs are used for populations that are harder to house. PBV use is much more common among elderly households than nonelderly households. Nonelderly households with disabilities may also be harder to house, yet they comprise a greater share of TBVs. Families with children and large households may also be harder to house, yet they are much more prevalent in the TBV program than the PBV program.

Households that were homeless at admission may be the population that is hardest to house. Data availability and quality, however, make it difficult to draw conclusions regarding these households. No homelessness data are available for MTW agencies. In non-MTW agencies, households coded as homeless at admission are much more likely than other households to use a PBV.

PBV use is much more common in MTW agencies than in other PHAs. One possible explanation for the wider use of PBVs in MTW agencies is that their tenants are harder to house, yet little evidence supports this hypothesis. Elderly households are more likely to use PBVs, but elderly households' share of total vouchers is very similar for both MTW and non-MTW agencies. In a logistic regression predicting PBVs, the coefficient for MTW agencies was still highly significant when controlling for elderly households, nonelderly households with disabilities, households with children, large households, census region, and PHA size. MTW agencies might have more tenants that were homeless at admission, but no data are available on this topic.

Geographically, PBV use is most common in the Northeast and West census regions, in part due to the large concentration of MTW agencies in the West. PBV use is also much more common among the largest PHAs. Possible explanations are that negotiating PBV contracts and/or administering two voucher programs are too burdensome for smaller PHAs.

National Comparison of Selected Outcomes for Households With Children

Propensity Score Matching

In this section, I compare TBV families with children to PBV families with children on a national scale. To obtain a TBV comparison group more similar to PBV households, I weighted the TBV households by propensity score weights. The propensity scores were estimated by logistic regression. The model included two continuous predictors (household head age and number of children); binary indicators for married household heads, female household heads, elderly households, nonelderly households with a disabled spouse or co-head, and households in MTW PHAs; and categorical variables for census region and PHA size. I would have liked also to include an indicator for households homeless at admission, but this information is missing for MTW households.

Regression estimates are shown in exhibit 9. All predictors—except the indicator for nonelderly households with disabilities—had statistically significant predictive power. As household head age and number of children increased, the estimated probability of having a PBV decreased. Married household heads, elderly households, and MTW households were estimated to be more likely to have a PBV; female household heads were estimated to be less likely to have a PBV.

Households in the Northeast and West were most likely to use a PBV, and PBV use increased with PHA size.

The propensity score weight was computed as $N * p / \sum p$, where N is the number of TBV households with children and p is the estimated probability of being a PBV household. The formula was chosen so that the sum of weights equals N.

Exhibit 10 shows summary statistics for the continuous and binary matching variables by program; exhibits 11 and 12 show frequencies for census region and PHA size, respectively. TBV data are

Exhibit 9

Logistic Regression Estimates

Effect	Odds Ratio Estimate	Lower 95% CI	Upper 95% CI
Household head age	0.950	0.949	0.952
Number of children	0.903	0.895	0.911
Married household head	1.217	1.171	1.265
Female household head	0.576	0.555	0.598
Elderly household	2.751	2.533	2.987
Nonelderly household with disabilities	0.971	0.941	1.002
Moving to Work PHA	2.513	2.448	2.580
Census region: Northeast vs. PR	3.938	3.365	4.607
Census region: Midwest vs. PR	1.803	1.539	2.112
Census region: South vs. PR	1.958	1.674	2.291
Census region: West vs. PR	3.612	3.087	4.226
PHA size: 0–250 vs. > 10,000	0.176	0.152	0.202
PHA size: 251–550 vs. > 10,000	0.326	0.302	0.352
PHA size: 551–1,250 vs. > 10,000	0.618	0.593	0.644
PHA size: 1,251–10,000 vs. > 10,000	0.854	0.833	0.875

CI = confidence interval. PHA = public housing agency. PR = Puerto Rico.
Note: – 2 log likelihood = 312,428.47.
Source: Public and Indian Housing Information Center, December 2015

Exhibit 10

Matching Variable Summary Statistics

Variable	Program	N	25th Percentile	Median	Mean	75th Percentile	Std Dev
Number of children	PBV	36,252	1	2	2.170	3	1.295
	TBV	973,917	1	2	2.236	3	1.322
	TBV (w)	973,913	1	2	2.179	3	1.267
Household head age	PBV	36,251	28	34	35.649	42	10.289
	TBV	973,913	31	37	38.182	44	9.825
	TBV (w)	973,913	29	34	35.818	41	9.177
Married household head	PBV	36,252	0	0	0.114	0	0.318
	TBV	973,917	0	0	0.083	0	0.276
	TBV (w)	973,913	0	0	0.111	0	0.314
Female household head	PBV	36,252	1	1	0.878	1	0.327
	TBV	973,917	1	1	0.922	1	0.268
	TBV (w)	973,913	1	1	0.881	1	0.324
Nonelderly household with disabilities	PBV	36,252	0	0	0.142	0	0.349
	TBV	973,917	0	0	0.164	0	0.370
	TBV (w)	973,913	0	0	0.144	0	0.351
Elderly household	PBV	36,252	0	0	0.022	0	0.148
	TBV	973,917	0	0	0.026	0	0.159
	TBV (w)	973,913	0	0	0.023	0	0.149
Moving to Work PHA	PBV	36,252	0	0	0.288	1	0.453
	TBV	973,917	0	0	0.118	0	0.323
	TBV (w)	973,913	0	0	0.272	1	0.445

PBV = project-based voucher. PHA = public housing agency. Std Dev = standard deviation. TBV = tenant-based voucher.
Note: (w) indicates weighted TBV.
Source: Public and Indian Housing Information Center, December 2015

Exhibit 11

Census Region Matching Statistics

Program	Census Region (%)				
	Northeast	Midwest	South	West	Puerto Rico
PBV	29.9	14.1	26.9	28.6	0.4
TBV	21.0	20.4	37.7	19.3	1.7
TBV: weighted	29.3	14.5	27.6	28.1	0.5

PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

Exhibit 12

PHA Size Matching Statistics

Program	PHA Size (%)				
	0–250	251–550	551–1,250	1,251–10,000	> 10,000
PBV	0.5	2.0	8.5	44.6	44.4
TBV	3.3	6.0	12.8	47.3	30.6
TBV: weighted	0.6	2.1	8.7	45.2	43.4

PBV = project-based voucher. PHA = public housing agency. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

reported unweighted and weighted by propensity score weights. The gauge of the success of the propensity score weighting is how closely the weighted TBV matching variables mirror their PBV counterparts. In general, the distributions of the matching variables for TBV households are much closer to the PBV distributions after propensity score weighting. The mean number of children for PBV households with children is 2.171; the mean number for TBV households is 2.236 unweighted and 2.179 weighted. The mean household head age for PBV households with children is 35.649; the mean number for TBV households is 38.182 unweighted and 35.818 weighted.

The propensity score weighting was also quite successful for the indicator variables.

1. Marital status: The share of PBV married household heads with children is 11.4 percent; the share for TBV households is 8.3 percent unweighted and 11.1 percent weighted.

2. Gender: The share of PBV female household heads with children is 87.8 percent; the share for TBV households is 92.2 percent unweighted and 88.1 percent weighted.

3. Disability: The share of PBV households with children that are nonelderly households with disabilities is 14.2 percent; the share for TBV households is 16.4 percent unweighted and 14.4 percent weighted.

4. Elderly households: The share of PBV households with children that are elderly households is 2.2 percent; the share for TBV households is 2.6 percent unweighted and 2.3 percent weighted.

5. MTW: The share of PBV households with children in MTW PHAs is 28.8 percent; the share for TBV households is 11.8 percent unweighted and 27.2 percent weighted.

Propensity score weighting was also successful for the census region and PHA size variables. For example, 29.9 percent of PBV households with children are located in the Northeast compared with 21.0 percent of TBV households. The weighted share of TBV households in the Northeast is 29.3 percent.

Comparisons for Matched Samples

Exhibit 13 shows summary statistic comparisons for four household-level variables: subsidy, total household income, rent burden, and length of stay. All data are for households with children, with TBV statistics weighted by propensity score weights. Rent burden is defined as the tenants' contribution to gross rent (including utilities) divided by monthly adjusted income. Rent burden is undefined for households with 0 adjusted income.

Subsidies are slightly greater for PBV households with children (median of $787 and mean of $839) as compared with the matched sample of TBV households with children (median of $778 and mean of $830). Note that subsidies are calculated differently for PBV and TBV tenants. In the PBV program, the PHA pays the owner the difference between 30 percent of family income and the gross rent for the unit.[6]

Incomes tend to be slightly higher for the weighted sample of TBV households. Median income is $13,650 for TBV households compared with $12,918 for PBV households, and mean income is 15,718 for TBV households compared with $15,433 for PBV households.

Length of stay is noticeably longer for TBV households (median of 5.9 years and mean of 8.1 years) than for PBV households (median of 1.8 years and mean of 3.8 years). As discussed in the introductory note, this discrepancy may be due to considerations with the data and not due to actual differences in tenant experience or outcomes.

Exhibit 13

Families With Children Household Variable Comparisons

Variable	Program	N	25th Percentile	Median	Mean	75th Percentile	Std Dev
Subsidy	PBV	36,239	556	787	839.320	1,085	427.287
	TBV (w)	973,888	527	778	830.637	1,089	431.179
Total household income	PBV	36,252	6,492	12,918	15,433.295	21,480	12,312.044
	TBV (w)	973,913	7,113	13,650	15,718.443	21,938	11,879.412
Length of stay	PBV	36,252	0.822	1.755	3.825	3.775	11.631
	TBV (w)	973,913	2.208	5.929	8.094	10.238	12.866
Rent burden	PBV	30,081	29.981	30.003	31.210	30.028	10.136
	TBV (w)	906,656	30.000	30.081	36.874	37.760	16.233

PBV = project-based voucher. Std Dev = standard deviation. TBV = tenant-based voucher
Note: (w) indicates weighted TBV.
Source: Public and Indian Housing Information Center, December 2015

[6] http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_9157.pdf.

Length of stay is longer for elderly households in both programs. The mean length of stay for elderly households is 5.0 years in the PBV program and 14.1 years in the TBV program compared with 3.8 and 8.0 years, respectively, for nonelderly households.

TBV households are much more likely to be rent burdened than PBV households. Mean rent burden for TBV households is 36.9 percent compared with 31.2 percent for PBV households.

Exhibit 14 shows rent burden in five categories: 0 to 30 percent, 31 to 39 percent, 40 to 49 percent, 50 percent and above, and missing.

1. Rent burden of 0 to 30 percent: The share of PBV households with burdens in this category is 76.1 percent compared with 49.5 percent of TBV households.
2. Rent burdens between 31 and 39 percent: The share of PBV households with burdens in this category is 2.7 percent compared with 23.5 percent of TBV households.
3. Rent burdens between 40 and 49 percent: The share of PBV households with burdens in this category 1.3 percent compared with 9.4 percent of TBV households.
4. Rent burdens of 50 percent or more: The share of PBV households with burdens in this category is 2.9 percent compared with 10.4 percent of TBV households.
5. Missing rent burden: Rent burden could not be computed for 17.0 percent of PBV households and 7.2 percent of TBV households.

Although total household incomes are similar between the two groups, differences in wage income are also policy relevant. Higher wage income might indicate better economic progress for assisted tenants. For these comparisons, I exclude elderly households and include only households with children. The 25th percentile of wage income is $0 for both TBV and PBV households. Median wage income is $4,864 for PBV households and $5,200 for TBV households. Mean wage income is $10,904 for PBV households and $10,308 for TBV households. The 75th percentile of wage income is $18,590 for PBV households and $17,999 for TBV households.

Comparing wage income for nonelderly households with children in PHAs with PBVs, median wage income is $4,864 (mean is $10,904) for PBV households compared with a median of $5,130 (mean is $10,521) for the matched sample of TBV households.

Exhibit 14

Rent Burden Frequencies

Poverty Rate Category	PBV (%)	TBV: Weighted (%)
0–30%	76.1	49.5
31–39%	2.7	23.5
40–49%	1.3	9.4
50% and above	2.9	10.4
Missing	17.0	7.2

PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

To summarize, the most noticeable differences in household variables between the groups are much shorter lengths of stay and much lower rent burdens for PBV households with children than for the matched sample of TBV households. Subsidies are similar for both groups, and differences in both total income and wage income are modest.

Neighborhood Comparisons

To compare neighborhood conditions for TBV and PBV households with children, I analyze 10 variables: (1) Small Area Fair Market Rent (SAFMR), (2) the census tract poverty rate, (3) the percentage of the population that is non-White, (4) an indicator for *racially or ethnically concentrated areas of poverty* (R/ECAPs), (5) a school proficiency index, (6) a jobs proximity index, (7) a labor market engagement index, (8) an environmental health index, (9) a low transportation cost index, and (10) a transit trips index.

Data on R/ECAPs and the six opportunity indices are taken from HUD's Affirmatively Furthering Fair Housing (AFFH) database.[7] In metropolitan areas, R/ECAPs are defined as having at least 50 percent non-White residents and a poverty rate that is at least 40 percent or three times the average tract poverty rate for the metropolitan area. In nonmetropolitan areas, the non-White threshold is 20 percent and the poverty threshold is 40 percent.

The six opportunity indices are measured on a 0-to-100 scale, with greater values indicating higher opportunity. The block-group school proficiency index is based on the percentage of fourth-grade students that is proficient on state math and reading exams.

The jobs proximity index for a given residential block group is based on a ratio of jobs to workers measured across the metropolitan area. Both numerator and denominator are distance weighted, with jobs and workers in block groups farther away receiving less weight.

Computed at the tract level, the labor market engagement index is based on the unemployment rate, the labor force participation rate, and the percent of the population ages 25 and older with at least a bachelor's degree.

The tract-level environmental health index is a linear combination of standardized estimates of air-quality carcinogenic, respiratory, and neurological hazards.

Two indices measure transportation opportunity for a household profile consisting of a single-parent family of three, renting, with an income equal to 50 percent of Area Median Income. The transportation cost index is based on modeled transportation costs as a share of household income. The transit trips index is based on modeled annual household transit trips.

Exhibit 15 shows summary statistics for the neighborhood indicators for PBV and TBV households with children. TBV statistics are weighted by propensity score weights.

SAFMRs are very similar for PBV households with children and TBV households with children. Median SAFMR is $1,090 (mean is $1,182) for PBV households compared with $1,100 median ($1,183 mean) for TBV households.

[7] Sources and other information for the R/ECAP variable and six opportunity indices are available in the AFFH data documentation, www.hudexchange.info/resource/4848/affh-data-documentation/.

Exhibit 15

Neighborhood Variable Summary Statistics

Variable	Program	N	25th Percentile	Median	Mean	75th Percentile	Std Dev
SAFMR	PBV	32,636	880	1,090	1,182.252	1,390	409.371
	TBV (w)	842,085	890	1,100	1,183.297	1,370	423.901
Poverty rate	PBV	36,250	16.841	27.829	28.860	39.354	15.324
	TBV (w)	973,112	14.574	23.588	25.201	34.058	13.583
Non-White %	PBV	36,250	33.333	65.156	61.191	90.313	30.561
	TBV (w)	973,112	35.439	67.764	61.789	90.925	30.837
R/ECAP	PBV	36,250	0	0	0.233	0	0.423
	TBV (w)	973,112	0	0	0.140	0	0.347
School proficiency index	PBV	33,920	12	28	33.496	53	25.598
	TBV (w)	930,578	12	27	32.100	48	24.052
Jobs proximity index	PBV	33,615	26	53	51.618	77	29.316
	TBV (w)	925,615	22	48	47.656	72	29.033
Labor market engagement index	PBV	36,250	9	26	34.834	58	29.482
	TBV (w)	973,112	12	27	33.224	50	25.148
Environmental health index	PBV	36,181	12	25	32.978	53	26.043
	TBV (w)	973,072	13	27	34.066	53	25.568
Low transportation cost index	PBV	36,030	55	79	70.350	91	24.726
	TBV (w)	955,856	47	69	65.158	88	25.364
Transit trips index	PBV	36,030	52	75	68.365	90	25.318
	TBV (w)	955,856	49	71	66.008	89	26.015

PBV = project-based voucher. PHA = public housing agency. R/ECAP = racially or ethnically concentrated area of poverty. SAFMR = Small Area Fair Market Rent. Std Dev = standard deviation. TBV = tenant-based voucher.
Note: (w) indicates weighted TBV.
Sources: Public and Indian Housing Information Center, December 2015; U.S. Department of Housing and Urban Development (HUD), Small Area FMR database 2016; 2009–2013 American Community Survey 5-year estimates; Great Schools 2012; Longitudinal Employer-Household Dynamics 2012; U.S. Environmental Protection Agency, National Air Toxics Assessment 2005; HUD Local Affordability Index database, 2008–2012

Compared to TBV households with children, PBV households with children tend to live in higher-poverty census tracts. The median tract poverty rate for PBV households is 27.8 percent (mean is 28.9 percent) compared with 23.6 percent (25.2-percent mean) for TBV households. Exhibit 16 shows census tract frequencies in five categories of poverty rate: 0 to 9 percent, 10 to 19 percent, 20 to 29 percent, 30 to 39 percent, and 40 percent and above. Of PBV households with children, 10.6 percent reside in tracts with poverty rates under 10 percent compared with 13.3 percent of TBV households with children. The share of PBV households with children living in tracts with poverty rates of at least 40 percent is 23.8 percent compared with 15.1 percent of TBV households with children.

The minority share of tract population is slightly lower for PBV households with children than for TBV households with children. The median percentage of non-White residents in a tract is 65.2 percent (mean is 61.2 percent) for PBV households with children compared with 67.8 percent (61.8-percent mean) for TBV households with children.

As measured by R/ECAPs, PBV households with children tend to live in more distressed neighborhoods than the matched sample of TBV households. The share of PBV households residing in R/ECAPs is 23.3 percent compared with 14.0 percent of TBV households.

The school proficiency index is slightly higher for PBV households with children than for TBV households with children. The median school proficiency index is 28 (mean is 33.5) for PBV households and 27 (32.1 mean) for the matched sample of TBV households.

Exhibit 16

Census Tract Poverty Rate Categories for Families With Children

Poverty Rate Category	PBV (%)	TBV: Weighted (%)
0–9%	10.6	13.3
10–19%	22.0	27.0
20–29%	21.7	25.8
30–39%	21.9	18.9
40% and above	23.8	15.1

PBV = project-based voucher. TBV = tenant-based voucher.
Sources: Public and Indian Housing Information Center, December 2015; 2009–2013 American Community Survey 5-year estimates

The jobs proximity index is notably higher for PBV households with children than for the matched sample of TBV households. The median jobs proximity index is 53 (mean is 51.6) for TBV households compared with 48 (47.7 mean) for TBV households.

Labor market engagement is similar for both groups. The median labor market engagement index is 26 (mean is 34.8) for PBV households with children and 27 (33.2 mean) for TBV households with children.

PBV households with children score lower on the environmental health index as compared with TBV households with children. The median environmental health index is 25 (mean is 33.0) for PBV households with children compared with 27 (34.1 mean) for the matched sample of TBV households with children.

Transportation opportunity is much higher for PBV households with children than for the matched sample of TBV households with children. The median low transportation cost index is 79 (mean is 70.4) for PBV households compared with 69 (65.2 mean) for TBV households. The median transit trips index is 75 (mean is 68.4) for PBV households and 71 (66.0 mean) for TBV households.

Overall, the results of the neighborhood comparisons are quite mixed. Although PBV households with children tend to live in higher-poverty neighborhoods, are more likely to reside in R/ECAPs, and have lower environmental quality, they also tend to have better proximity to jobs and better transportation opportunities. The categories of SAFMR, minority share of tract population, labor market engagement, and school proficiency are similar for both groups.

Within-PHA Comparison of Selected Outcomes for Households With Children

In this section, I compare length of stay, rent burden, and poverty rates for TBV families with children with those for PBV families with children, within the 604 PHAs with PBV programs. The comparisons are made with multivariate regression models with PHA controls, so that the comparisons of PBV and TBV households are within-PHA comparisons. To control for non-PHA-specific factors affecting outcomes, the regression models include two continuous predictors (household head age and number of children) and binary indicators for program type, married household heads, female household heads, elderly households, and nonelderly households with a disabled spouse or co-head.

Length of Stay

I modeled length of stay with a linear regression with PHA fixed effects; estimates are shown in exhibit 17 (PHA fixed effects are not shown). Model estimates indicate that the average length of stay for PBV households with children is 4.6 years shorter than that of TBV households with children, within PHAs with PBV programs, with other things equal.

To compare length-of-stay predictions between PBV and TBV households, I compared model predictions evaluated at the means of all variables except program type. Predicted length of stay is 8.7 years for TBV households and 4.2 years for PBV households.

Predicted length of stay is much longer for elderly households than for other households. For these predictions, I evaluated model predictions at the overall means for the PHA fixed effects and evaluated means according to elderly status for the remaining variables except for program type. In the TBV program, predicted length of stay is 8.6 years for nonelderly households and 12.9 years for elderly households. The corresponding predictions for the PBV program are 4.0 years for nonelderly households and 8.3 years for elderly households.

Exhibit 17

Length of Stay Regression Estimates

Variable	Coefficient	Standard Error	*t*-value	*p*-value
Intercept	– 5.847	0.265	– 22.105	< 0.0001
Project-based voucher	– 4.574	0.059	– 77.536	< 0.0001
Household head age	0.241	0.002	155.048	< 0.0001
Number of children	0.024	0.010	2.520	0.012
Married household head	0.032	0.050	0.649	0.516
Female household head	1.743	0.050	34.636	< 0.0001
Elderly household	– 2.565	0.087	– 29.320	< 0.0001
Nonelderly household with disabilities	– 0.180	0.035	– 5.188	< 0.0001

Notes: The model includes 603 public housing agency fixed effects, which are not reported. N = 714,395, R-*Squared = .261.*
Source: Public and Indian Housing Information Center, December 2015

Rent Burden

I analyzed rent burden with two regression models. First, I modeled continuous rent burden with a linear regression with PHA fixed effects; estimates are shown in exhibit 18 (PHA fixed effects are not shown). Estimates indicate rent burden is 5.1 percent lower for PBV households than for TBV households, within PHAs that have PBV programs, with other things equal.

To estimate rent predictions for PBV and TBV households, I compared model predictions evaluated at the means of all variables except program type. Predicted rent burden is 37.0 percent for TBV households and 32.0 percent for PBV households.

I also modeled the rent burden categories shown in exhibit 14 with a multinomial logistic regression with PHA random intercepts. For brevity, regression estimates are not reported but are available on request. Model predictions evaluated at the means of all variables except program type are shown in exhibit 19.

Exhibit 18

Rent Burden Regression Estimates

Variable	Coefficient	Standard Error	*t*-value	*p*-value
Intercept	36.258	0.398	90.998	< 0.0001
Project-based voucher	– 5.081	0.096	– 52.839	< 0.0001
Household head age	0.015	0.002	6.251	< 0.0001
Number of children	– 0.469	0.015	– 31.233	< 0.0001
Married household head	– 3.033	0.077	– 39.523	< 0.0001
Female household head	0.468	0.078	6.022	< 0.0001
Elderly household	– 3.081	0.133	– 23.161	< 0.0001
Nonelderly household with disabilities	– 2.751	0.053	– 52.210	< 0.0001

Notes: The model includes 603 public housing agency fixed effects, which are not reported. N = 657,755, R-Squared = .076.
Source: Public and Indian Housing Information Center, December 2015

Exhibit 19

Rent Burden Category Predictions

Rent Burden Category	PBV (%)	TBV (%)
0–30%	81.1	52.1
31–39%	2.8	24.1
40–49%	1.3	9.2
50% and above	2.5	9.5
Missing	12.3	5.1

PBV = project-based voucher. TBV = tenant-based voucher.
Source: Public and Indian Housing Information Center, December 2015

1. Rent burdens of 0 to 30 percent: The predicted share of PBV households with burdens in this category is 81.1 percent compared with 52.1 percent of TBV households.
2. Rent burdens between 31 and 39 percent: The predicted share of PBV households with burdens in this category is 2.8 percent compared with 24.1 percent of TBV households.
3. Rent burdens between 40 and 49 percent: The predicted share of PBV households with burdens in this category 1.3 percent compared with 9.2 percent of TBV households.
4. Rent burdens of 50 percent or more: The predicted share of PBV households with burdens in this category is 2.5 percent compared with 9.5 percent of TBV households.
5. Missing rent burden: Rent burden could not be computed for 12.3 percent of PBV households and 5.1 percent of TBV households.

Poverty Rates

I modeled continuous census tract poverty rates with a linear regression with PHA fixed effects; estimates are shown in exhibit 20 (PHA fixed effects are not shown). Estimates indicate poverty rates are 4.4 percent greater for PBV households than for similar TBV households within the same PHAs.

To estimate tract poverty rates for PBV and TBV households within the same PHAs, I compared model predictions evaluated at the means of all variables except program type. Mean predicted poverty rates are 25.4 percent for TBV households and 29.8 percent for PBV households.

Exhibit 20

Poverty Rate Regression Estimates

Variable	Coefficient	Standard Error	*t*-value	*p*-value
Intercept	14.382	0.310	46.452	< 0.0001
Project-based voucher	4.400	0.069	63.603	< 0.0001
Household head age	– 0.027	0.002	– 14.544	< 0.0001
Number of children	0.243	0.011	21.540	< 0.0001
Married household head	– 0.203	0.059	– 3.458	0.0005
Female household head	– 1.413	0.059	– 23.905	< 0.0001
Elderly household	1.436	0.103	13.990	< 0.0001
Nonelderly household with disabilities	0.219	0.041	5.388	< 0.0001

Notes: The model includes 603 public housing agency fixed effects, which are not reported. N = 708,297, R-*Squared = .254.*
Sources: Public and Indian Housing Information Center, December 2015; 2009–2013 American Community Survey 5-year estimates

I modeled the poverty categories shown in exhibit 14 with a multinomial logistic regression with PHA-random intercepts. For brevity, regression estimates are not reported but are available upon request. Model predictions evaluated at the means of all variables except program type are shown in exhibit 21.

1. Poverty rates of 0 to 9 percent: The predicted share of PBV households with poverty rates in this category is 7.7 percent compared with 11.6 percent of TBV households.
2. Poverty rates of 10 to 19 percent: The predicted share of PBV households with poverty rates in this category is 24.1 percent compared with 32.2 percent of TBV households.
3. Poverty rates of 20 to 29 percent: The predicted share of PBV households with poverty rates in this category is 27.6 percent compared with 30.9 percent of TBV households.
4. Poverty rates of 30 to 39 percent: The predicted share of PBV households with poverty rates in this category is 24.3 percent compared with 17.6 percent of TBV households.
5. Poverty rates of 40 percent and above: The predicted share of PBV households with poverty rates in this category is 16.3 percent compared with 7.8 percent of TBV households.

Exhibit 21

Poverty Category Predictions

Rent Burden Category	PBV (%)	TBV (%)
0–9%	7.7	11.6
10–19%	24.1	32.2
20–29%	27.6	30.9
30–39%	24.3	17.6
40% and above	16.3	7.8

PBV = project-based voucher. TBV = tenant-based voucher.
Sources: Public and Indian Housing Information Center, December 2015; 2009–2013 American Community Survey 5-year estimates

Summary

Within-PHA comparisons are consistent with the national comparisons from the previous section. PBV households have much shorter lengths of stay than TBV households within the same PHAs, and elderly households have considerably longer stays in both programs as compared with nonelderly households within the same PHAs. PBV households are much less likely to be rent burdened than similar TBV households within the same PHAs. PBV households are more likely to live in high-poverty neighborhoods than are similar TBV households within the same PHAs.

Conclusions

To summarize, key findings include—

1. PBV use is much more common among MTW PHAs. One possible explanation for greater use of PBVs in MTW agencies is that their populations are harder to house. Analyzing data for a variety of household types that may be harder to house, however, I find little support for this hypothesis.

2. PBV use is much more common in large PHAs. Possible explanations are that negotiating PBV contracts and/or administering two voucher programs are too burdensome for smaller PHAs.

3. Elderly households are much more likely to use a PBV relative to other households. Elderly households, as a share of total vouchers, are very similar in MTW and non-MTW agencies, so this is not an explanation of greater PBV use by MTW agencies.

4. Geographically, PBVs are most prevalent in the Northeast and West census regions. This finding could be in part due to the concentration of MTW agencies in the West and to local housing market factors (for example, tighter rental supply) in the Northeast.

5. Rent burdens are lower for PBV tenants than for TBV tenants. Subsidies are similar for tenants in both programs.

6. Length of stay tends to be much shorter for PBV households with children than for similar TBV households with children. As discussed in the introductory note, this finding may be due to considerations with the data and not due to actual differences in tenant experience or outcomes.

7. Comparing neighborhood outcomes for PBV and TBV households with children, results are quite mixed. PBV tenants tend to live in higher-poverty neighborhoods, are much more likely to reside in R/ECAPs, and have greater environmental risks. PBV households, however, also tend to live closer to employment opportunities, have lower transportation costs, and have better transit access. As discussed in the introductory note, a large number of PBVs are units that were converted from older project-based programs (that is, public housing and Rent Supplement/Rental Assistance Payments) and thus will reflect the earlier locational development decisions of those programs.

8. Results of within-PHA comparisons are very similar to national comparisons. Within the same PHAs, PBV households have shorter lengths of stay, lower rent burdens, and higher census tract poverty rates than TBV households.

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SpAM

SpAM (Spatial Analysis and Methods) presents short articles on the use of spatial statistical techniques for housing or urban development research. Through this department of Cityscape*, the Office of Policy Development and Research introduces readers to the use of emerging spatial data analysis methods or techniques for measuring geographic relationships in research data. Researchers increasingly use these new techniques to enhance their understanding of urban patterns but often do not have access to short demonstration articles for applied guidance. If you have an idea for an article of no more than 3,000 words presenting an applied spatial data analysis method or technique, please send a one-paragraph abstract to rwilson@umbc.edu for review.*

Measuring Distance to Resources

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Abstract

Mapping counts or rates of residents by areal geographies is useful for visualizing distributions across regions. However, this approach limits the understanding of resource proximity to visual approximations. Taking advantage of exact location information in a geographic information system (GIS), direct proximity statistics can be created by geoprocessing residence locations to population centers. In this article, we demonstrate how to geoprocess location information to create a table of the distances between resident locations and the nearest population centers to gain a more precise understanding of how far people live, as groups, from their closest resource centers.

Relationship Between Voucher Residences and Population Centers

Proximity analysis is an analytical approach used to capture the distance between neighboring locations. Measuring the proximity of a residential location to the closest population center (PC) is a common approach toward understanding general resource accessibility. Similarly, the proximity of PCs to residence locations is useful for understanding distance costs from a central location to nearby residences. Because residence locations and the center of a PC are represented as discrete spatial locations in a GIS, distance measurement techniques can succinctly capture proximity and present the results as a set of statistics. A proximity analysis also allows for the visualization of the geographic distribution of locations and their distances around a PC that can be used in conjunction with distance analysis tables that offer more comprehensive pictures of accessibility or outreach challenges.

We demonstrate the proximity analysis approach by geoprocessing two sets of locations to create a distance statistics table to gauge how proximate Housing Choice Voucher (HCV) program participant locations are to their nearest PC. Assigning residential locations to the closest, or proximate, PC allows for deriving a set of summary statistics on the distance between individuals and the likely places they frequent for resources and services. The assumption rests on a complex interaction between self-selection and economic realities that occurs in residential selection, wherein people often cluster together residentially due on similarities in social, demographic, and economic characteristics (Tittle and Rotolo, 2010). HCV recipients, as an example, typically cluster where housing is affordable.

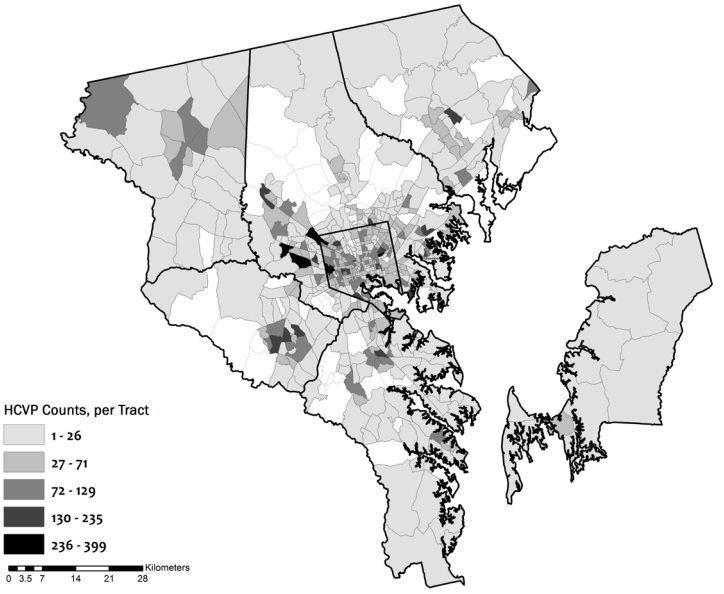
Data

The data we used in this example are the counts of 2016 HCV program participants by census tract in the Baltimore-Columbia-Towson, MD Core Based Statistical Area (CBSA)—Baltimore CBSA hereafter. We downloaded the data from the U.S. Department Housing and Urban Development (HUD) enterprise GIS storefront. Exhibit 1 shows the geographic distribution of program participants across the CBSA.

Because HUD does not provide program participant locations, we simulated the locations in a two-stage process to create residential locations based on where people actually live. First, we proportionally divided the counts of program participants according to the proportion of residents within each block group contained in each census tract. Second, we created a set of randomly distributed locations within each block group to simulate the locations based on known residential patterns. This two-stage process allows for a reasonable approximation of where HCV program participants live and reduces the risk of placing them in areas where populations do not reside (for example, forested portions, lakes, parks areas, and industrial sites).

Exhibit 1

Thematic Map of Housing Choice Voucher Program Participant Counts in the Census Tracts



HCVP = Housing Choice Voucher participant.

Proximity Analysis

A proximity analysis of this type rests on the geographic theory of spatial interaction, in which individuals interact with places by traveling to nearby locations to obtain amenities, services, or resources. With HCV program participants, the interaction results from traveling to the closest PC where daily needs resources (for example, jobs, groceries, goods, and doctors) are concentrated. Interaction for outreach involves centralizing resources to deliver in a PC and venturing into surrounding neighborhoods to reach the intended constituents. In each of these cases, the "least cost principle" is applied to the geographic theory of spatial interaction to assume that people—particularly those with limited abilities to travel—will travel to the closest place for any needs.

Method

We use ArcGIS software to develop this method, but any GIS software program can be used to replicate our method. The GIS software programs available contain the tools required to prepare the data, calculate proximity distances, and visualize the results. The method demonstrated in this article follows a series of six stages to create a table of summary distance statistics between HCV program participant residences and their closest PCs, and also output for visualizing the distances. We provide a script in the appendix to automate the following method.

Stage 1: Identifying Initial Population Centers

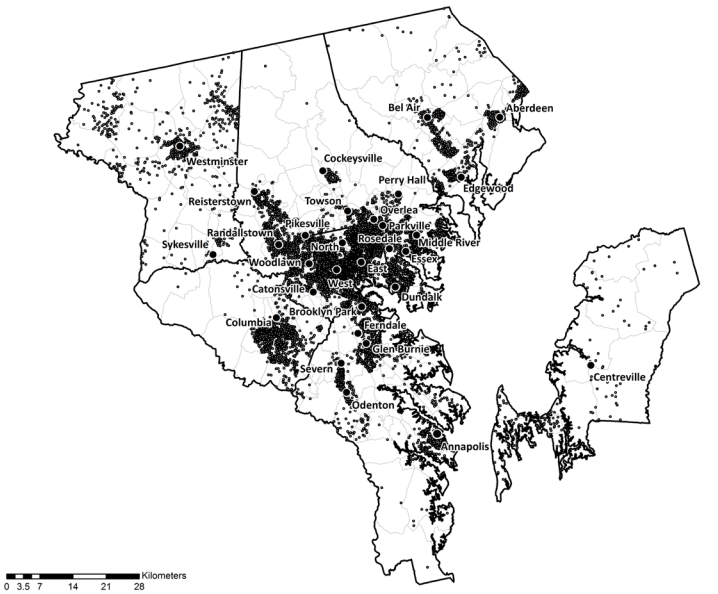
In the first stage, we selected a set of locations (point geometries) to represent the PCs that the HCV participant residence locations will be assigned. Our method gives analysts the quantitative and qualitative flexibility to identify PCs that serve as resource centers. The initial PCs can be selected objectively based on a population threshold, for example, that will ensure that PCs likely have a concentration of amenities, services, or resources. Alternatively, the initial selection of PCs can be determined subjectively by choosing sites that have importance or fill coverage gaps between places.

Any given coverage area, such as the Baltimore CBSA, likely has too many PCs for residential assignment. The initial centers should be places with a certain number of residents but recognizable by name to residents. Selecting too many PCs leads to an oversaturation with too many centers too close to each other, creating a large summary table with too few distances to each PC. Too large a table makes the statistics unreliable and unreasonable to communicate the likely centers to which residences travel for resources. Selecting too few PCs would aggregate residential locations to PCs that are unlikely to be places to which residences travel for resources. Both situations provide unrealistic pictures of people and the PCs with which they interact. The selection of PCs, therefore, must be well thought out.

Our first selection reduced the 72 PCs in the Baltimore CBSA to 30 by removing nearly all centers with fewer than 10,000 residents, making our initial analysis primarily quantitatively selective. We subjectively included additional PCs to cover large gaps between centers (see exhibit 2).

Exhibit 2

Initial Population Centers With Randomized Housing Choice Voucher Program Participant Locations



For example, we kept Cockeysville (northern Baltimore County) and Centreville (Eastern Shore in Queen Anne's County) to reduce gaps in coverage, even though their populations are less than 10,000. Additionally, because the city of Baltimore is a single PC in the geometric center of the city jurisdiction boundary, we added three PCs (North, East, and West Baltimore) within the administrative sections of the city. The initial selection of 30 PCs provided a comprehensive coverage across the Baltimore CBSA in relation to residential distributions of HCV program participants.

Stage 2: Assigning HCV Recipient Locations to the Nearest Population Centers

Before conducting a proximity analysis, we updated the HCV data to contain X and Y coordinates, to create and draw proximity links between HCV recipient locations and the nearest PCs. These proximity links are known as *spider diagrams*, which aid in the visualization of the geographic distribution of locations around a central location.

We identified the nearest PC to each participant location based on the direct (Euclidean) distance using the Near technique in the ArcToolbox. This technique identifies the closest PC to each participant location and records the following three geographic characteristics of the nearest PC to each participant location in the resident location attribute table.

- *Unique identifier* of the nearest PC location.
- *Distance* from the HCV program participant location to the nearest PC.
- *X and Y coordinates* of the nearest PC location.

These three characteristics allow for a summarization of the linkage distances into a set of summary statistics of residences and the closest PCs. They also provide the data that creates the spider diagrams for visualization.

Stage 3: Calculating the Proximity Link Between Locations

In this stage, we calculated the distances between HCV recipient locations and PCs and created proximity links for the spider diagram. Using the X and Y coordinates of the closest PC recorded for each program participant location, we produced a proximity layer of lines between the residences and PCs showing those linkages.

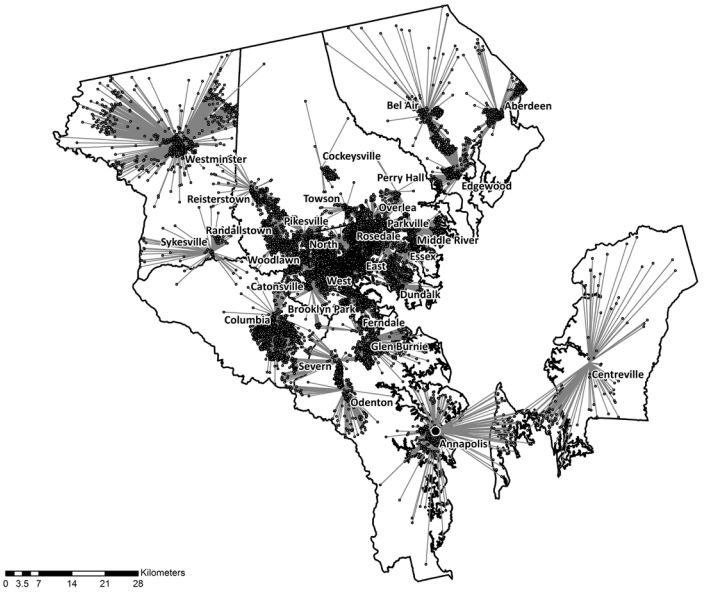
We first had to generate an additional set of X and Y coordinates for the participant locations to create the proximity links. Creating a layer of proximity links requires start and end coordinates that allow for the lines to be drawn between locations. With the Add Geometry Attributes tool in the ArcToolbox, we added the centroid coordinates for the HCV resident locations. Doing so gave the program participant layer the coordinate pairs needed to create proximity link lines between the residences and the population centers.

Using the XY to Line technique in the ArcToolbox, we created a new geographic layer of lines between participant locations and PCs and loaded the links into ArcGIS to visualize (see exhibit 3). The links allow for a visual depiction of the proximity assignment to ensure that coverage is adequate.

The PCs can now be visually inspected in conjunction with the distance summary statistics table to begin evaluating whether the results are reasonable to meet the objectives of the analysis.

Exhibit 3

Initial Population Center Selection Links Between Housing Choice Voucher Program Participants and Nearest Population Centers



Stage 4: Summarizing the HCV Counts by Population Centers

In this stage, we summarized the distances between the HCV recipient locations and PCs into a table of proximity distance statistics. We used these statistics to evaluate the proximity assignment results and determine if PCs should be removed from, or added to the analysis.

We summarized the distances associated by the unique identifier for each PC, recorded from the near analysis of each resident location in stage 2. We then used the Summary Statistics tool in the ArcToolbox to create several statistical point estimates for each PC and specified Count, Sum, Mean, Standard Deviation, Minimum, and Maximum to be calculated using the NEAR_FID unique identifier as the Case field. The Case field enables ArcGIS to summarize distances by each individual PC and create a table of summary statistics.

Stage 5: Assessing Proximity Results by Population Center

At the final stage, we imported the summary distances into an Excel spreadsheet to create a distance statistics table (exhibit 4) corresponding with the thematic map in exhibit 3 to visualize the frequencies of each PC. This visualization allows for an examination of the distance summary statistics. In this stage, we generated a set of links that show which HCV recipient locations are proximately associated with the PCs and inspected the attribute table of the PCs layer to ensure that we achieved a reasonable set of statistics.

Exhibit 4

Distance Statistics (in Kilometers) of Initial Housing Choice Voucher Program Participation Assignment to Nearest Population Centers

Pop Center	Count	Sum	Mean	Std. Dev.	Minium	Maximum	Coeff. Var.
East Baltimore	4,002	8,452	2.1	0.9	0.1	4.7	0.43
North Baltimore	1,437	4,099	2.9	0.7	0.7	4.5	0.24
West Baltimore	3,514	7,590	2.2	0.9	0.0	5.0	0.44
Aberdeen	322	1,376	4.3	3.5	0.1	16.6	0.81
Annapolis	407	2,024	5.0	5.0	0.1	28.2	1.01
Bel Air	366	1,378	3.8	3.8	0.1	25.8	1.02
Brooklyn Park	845	2,177	2.6	1.1	0.2	5.6	0.44
Catonsville	458	1,432	3.1	1.4	0.2	8.2	0.44
Centreville	92	1,275	13.9	5.9	0.8	28.3	0.43
Cockeysville	96	232	2.4	2.0	0.0	14.6	0.81
Columbia	1,329	6,654	5.0	2.2	0.0	14.6	0.43
Dundalk	780	1,618	2.1	1.2	0.1	8.7	0.58
Edgewood	438	1,457	3.3	2.0	0.0	8.0	0.60
Essex	430	1,008	2.3	0.8	0.3	6.7	0.33
Ferndale	154	352	2.3	1.0	0.2	8.0	0.44
Glen Burnie	755	2,707	3.6	2.0	0.2	14.0	0.55
Middle River	624	1,409	2.3	1.4	0.2	7.3	0.61
Odenton	205	839	4.1	3.3	0.2	12.5	0.80
Overlea	412	981	2.4	1.0	0.2	4.6	0.41
Parkville	773	2,019	2.6	0.7	0.1	4.8	0.25
Perry Hall	168	409	2.4	1.6	0.2	9.8	0.64
Pikesville	1,090	2,804	2.6	0.9	0.4	6.5	0.36
Randallstown	746	1,732	2.3	1.6	0.2	7.5	0.68
Reisterstown	360	1,306	3.6	2.1	0.2	9.4	0.58
Rosedale	753	2,051	2.7	0.8	0.1	4.5	0.31
Severn	227	915	4.0	3.4	0.2	12.9	0.85
Sykesville	85	460	5.4	4.7	0.0	15.5	0.87
Towson	227	388	1.7	1.3	0.1	5.8	0.77
Westminster	708	5,194	7.3	6.3	0.1	25.2	0.86
Woodlawn	1,278	3,324	2.6	1.0	0.1	6.4	0.38

We added the coefficient of variation (CV) to the table to compare the spread of HCV program participant locations around the average from the PCs. The CV is particularly important in spatial analysis when comparing groups of locations or distances around a central point, because less space exists in which the locations closer to the center can be distributed. That is, locations toward the center are likely to be closer together and have naturally smaller distances, because less space exists for the locations to be distributed–, making their variation from the mean appear less varied. The converse is true for locations farthest aware from the center; that is, they appear more dispersed and have larger distances. Thus, using the standard deviation distances alone to compare the summarized distances around each PC location is untenable, because the differences in space restrictions will make PCs with HCV participants closer to the PC to appear less dispersed than those farther away. Therefore, to determine if HCV residences are more dispersed around the different PCs, the distances around the average distance for each group are contextualized by dividing the standard deviation of the distances, the mean distance to create a CV of distances to make comparisons.

The results of our first analysis show that using 30 PCs created a large distance analysis table, including a number of PCs with few HCV program participants. Centreville, Cockeysville, Ferndale, Odenton, Perry Hall, Severn, Sykesville, and Towson are centers with a relatively few HCV

program participants in proximity. Reducing the size of the table is not a simple matter of removing these small number of residences. First, removing each location will impact the counts of nearby PCs, because the program participants associated with one of the removed centers will get assigned to the next nearest PC. Second, removing a center because it does not meet a certain threshold may lead an unreasonable distance to be considered proximate. For example, removing Centreville would show many more HCV program participants on the Eastern Shore traveling to Annapolis for services, which is an unreasonable and unlikely assumption. As such, we subjectively determined whether to keep or discard a PC for the next analysis.

Stage 6: Adjustment Recalculations To Refine the Results

To refine the analysis, we removed five of the eight PCs with fewer than 300 associated HCV resident locations—Cockeysville, Ferndale, Odenton, Perry Hall, and Sykesville. We eliminated two additional PCs, Essex and Rosedale, because they are in close proximity to each other and other centers. We removed Sykesville in the west and Cockeysville in the north; although doing so left gaps in the coverage area, the HCV program participant locations were close enough to be assigned to a nearby PC on a regional scale.

Most participants near Cockeysville were reassigned to Towson, thus increasing Towson's numbers. Towson is reasonable reassignment choice because amenities, services, and other resources are more clustered in that center than in Cockeysville. We also removed Parkville and Overlea because of their proximity to Towson, which has greater name recognition and is more meaningful to residents. We replaced North Baltimore with Northeast Baltimore to provide coverage in the city's northeast. Few to no HCV program participant locations actually lived close to the North Baltimore location, even though it was the most proximate PC for about 1,400 participants. Further, given the economic status of North Baltimore, resources for HCV participants are not in that section of the city. These two reasons made North Baltimore less than an ideal choice to represent a central location for participants to travel to for resources.

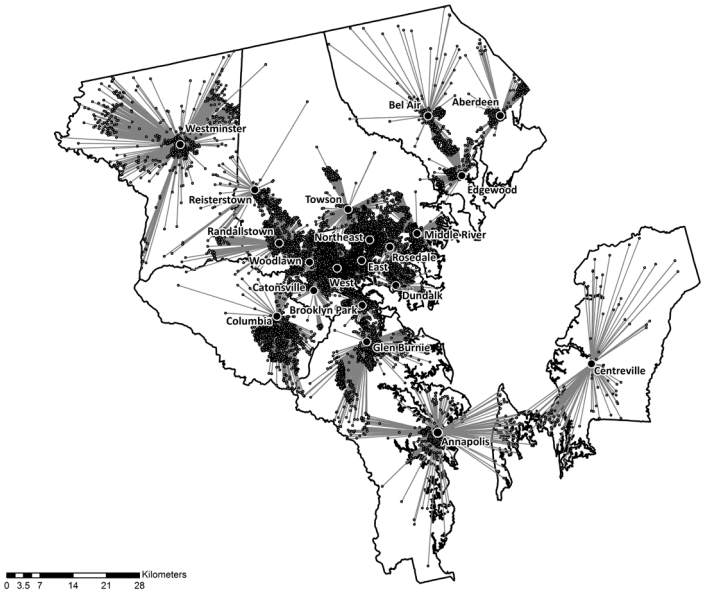
We removed Ferndale and Odenton, because they are in close proximity to Glen Burnie and Odenton to Annapolis, respectively. HCV participant locations around Parkville and Perry Hall, slightly northeast of the city of Baltimore, were reassigned to several PCs in the vicinity, which also increased the count of HCV program participants around Towson (see exhibit 5).

The removal of the aforementioned five centers left Centreville, Severn, and Towson remaining in the second analysis.

In the second analysis, all PCs had resident counts at least above a reasonable threshold to create estimates that represent large enough groups, with no two PCs too close to each other. We repeated stages 2 to 4 and reexamined the results, as in stage 5.

Exhibit 5

Final Population Center Selection Links Between Housing Choice Voucher Program Participants and Nearest Population Centers



Graphing the Final Proximity Analysis Results

Once we summarized the voucher holder distances, we assessed the resulting table to determine if we needed to adjust the number and inclusion of PCs. We imported the summary table into a Microsoft Excel spreadsheet with the distance statistics and calculated the corresponding CVs to evaluate the results (exhibit 6).

Exhibit 6 offers several statistics for reporting on approximately how far HCV program participants travel for services or other resources. These statistics provide the number of participants in proximity to each PC, how far on average they would have to travel to a particular PC, and how dispersed they are within the area. The minimum and maximum figures give the distance ranges of the closest and farthest HCV program participant residences from a PC. Finally, we calculated the CV so that the dispersion of the distances for each PC can be compared.

Exhibits 7 and 8 show graphs of the average distances and CVs, respectively, to visually gauge the similarities and differences for each PC.

The summary table displayed in exhibit 6 can also be joined to the PC layer to thematically map HCV program participant volumes of those proximate to that PC or any of the summarized distance statistics. The final map to accompany exhibit 6 contains only the PCs with corresponding HCV program participant counts (exhibit 9).

Exhibit 6

Distance Statistics (in Kilometers) of Final Housing Choice Voucher Program Participation Assignment to Nearest Population Centers

Pop Center	Count	Sum	Mean	Std. Dev.	Minium	Maximum	Coeff. Var.
East Baltimore	4,005	6,587	1.9	0.9	0.1	4.7	0.44
Northeast Baltimore	1,611	6,612	2.8	1.1	0.1	8.3	0.39
West Baltimore	3,514	9,861	2.5	1.3	0.0	6.5	0.51
Aberdeen	322	1,376	4.3	3.5	0.1	16.6	0.81
Annapolis	439	2,539	5.8	5.6	0.1	28.2	0.98
Bel Air	367	1,394	3.8	3.9	0.1	25.8	1.02
Brooklyn Park	926	2,464	2.7	1.1	0.2	5.7	0.42
Catonsville	461	1,456	3.2	1.4	0.2	8.3	0.45
Centreville	92	1,275	13.9	5.9	0.8	28.3	0.43
Columbia	1,400	7,527	5.4	2.7	0.0	21.8	0.51
Dundalk	805	1,732	2.2	1.3	0.1	8.7	0.59
Edgewood	439	1,466	3.3	2.0	0.0	8.9	0.60
Glen Burnie	1,157	6,149	5.3	3.6	0.2	19.4	0.67
Middle River	1,142	3,988	3.5	2.1	0.2	9.7	0.60
Randallstown	961	3,174	3.3	3.0	0.2	20.9	0.91
Reistertown	376	1,540	4.1	3.2	0.2	23.7	0.77
Rosedale	1,263	1,712	2.8	1.1	0.1	6.0	0.38
Towson	986	2,869	4.0	2.4	0.1	14.7	0.61
Westminster	722	5,516	7.6	6.6	0.1	27.3	0.87
Woodlawn	2,093	8,284	3.5	1.3	0.1	7.0	0.37

Exhibit 7

Average Distances of Housing Choice Voucher Program Participant Residences to Nearest Population Centers

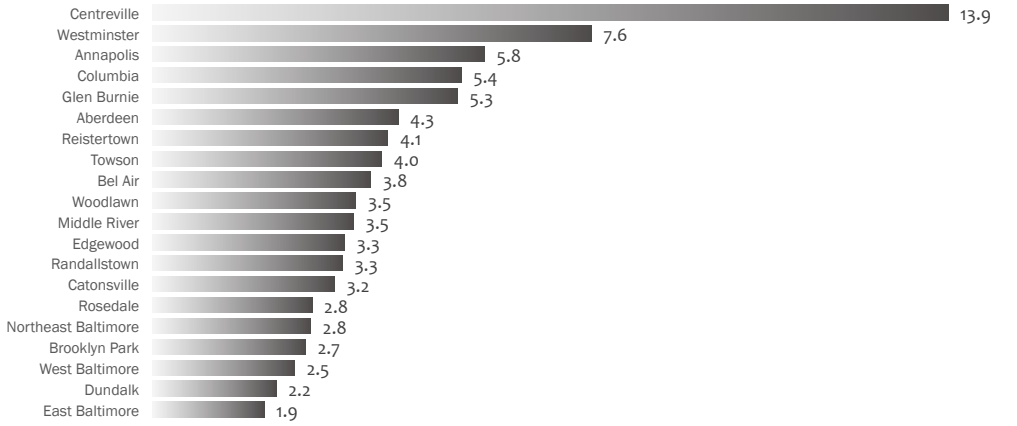


Exhibit 8

Distance Coefficients of Variation of Housing Choice Voucher Program Participant Residences to Nearest Population Centers

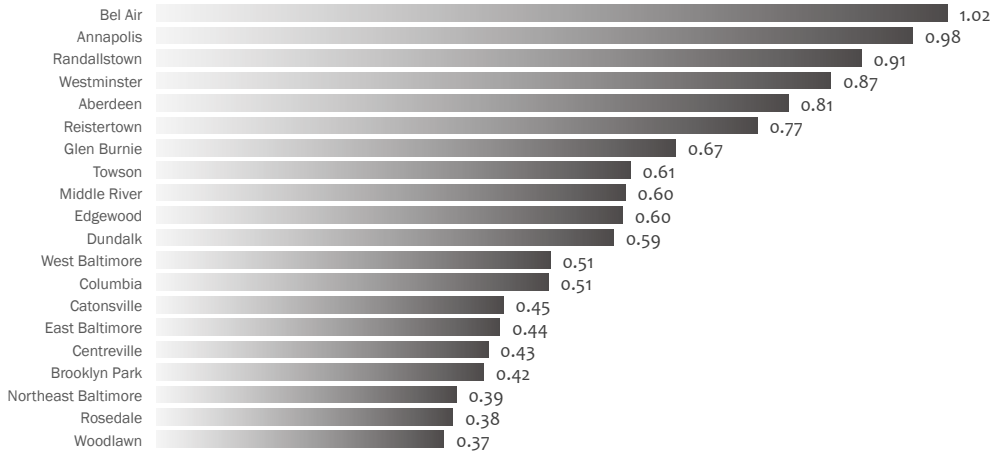
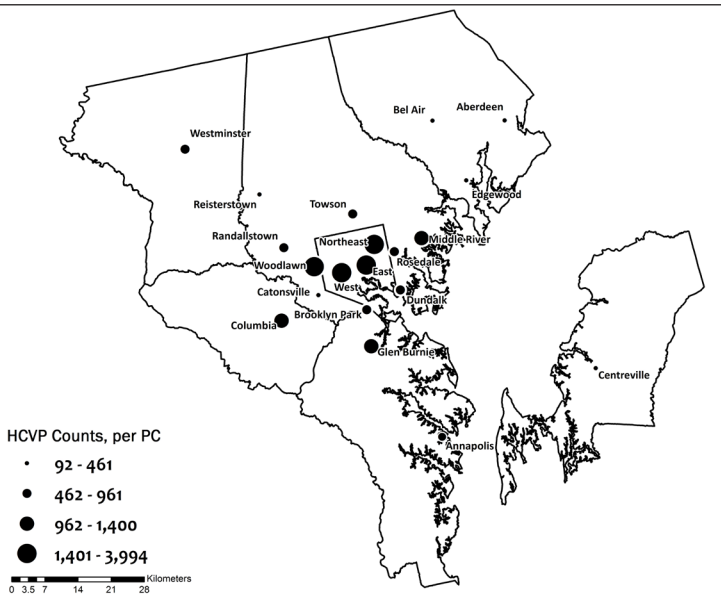


Exhibit 9

Final Population Center Selection With Counts of Housing Choice Voucher Program Participants



HCVP = Housing Choice Voucher participant. PC = population center.

Summary

The proximity method is an approach that enables analysts, researchers, and others to transform location data into a set of a descriptive statistics for stakeholders, planners, and other officials to make informed decisions based on how proximate residents are to resources or how far outreach must be to reach specific populations. Information compiled as a set of statistics allows for that information to be better understood than by the visual display of numerous data points or color-shaded areas that show concentrations of locations. The use of GIS enables analysts to implement this technique quickly, which gets information to users faster than before. If too many locations are assigned to a PC, many of those locations are likely not really proximate, which undermines the objective of providing local-level counts so that outreach or services can be centered in places that serve the maximum population and minimize travel distance. The advantage of the method presented in this article is that the analyst has control over data selection to make the results as generalized as needed but more accurate that other methods.

Appendix: Python Script of Proximity

```
import arcpy
## set the workspace environment
arcpy.env.workspace       = "C:\my\workspace\and\geodatabase.gdb"
arcpy.env.overwriteOutput = True
## set variables:
## these variables you may need to change as the analysis changes
points     = “randomized_voucher_locations” ## HCV program locations
popCenters = “population_centers”           ## population centers
nearTable  = “Near_Table”                   ## the near distances table
## these variables always stay the same, no change required
## the below is the summarized table of the near table and the accompanying statistics
myFields = [
                          [ “NEAR_DIST”, ”COUNT”],
                          [ “NEAR_DIST”, ”MIN”  ],
                          [ “NEAR_DIST”, ”MAX”  ],
                          [ “NEAR_DIST”, ”MEAN” ],
                          [ “NEAR_DIST”, ”STD”  ]
        ]
## sumTable is the summary statistics of the near distances table
sumTable = "%s_SUMMARY" %(nearTable)
## generate near table
arcpy.GenerateNearTable_analysis(points,popCenters,nearTable,””,”LOCATION”,””,”CLOSEST”)
## summarize the near table
arcpy.Statistics_analysis(nearTable,sumTable,myFields,”NEAR_FID”)
## add coefficient of variation and name fields
arcpy.AddField_management(sumTable,”NEAR_DIST_CV”,”DOUBLE”)
arcpy.AddField_management(sumTable,”NAME”,”TEXT”)
## join in the population centers to get their names, it makes reading the table easier
arcpy.AddJoin_management(sumTable,”NEAR_FID”,popCenters,”OBJECTID”)
## calculate coefficient of variation and bring in the name of the population center
arcpy.CalculateField_management(sumTable,”NEAR_DIST_CV”, “!STD_NEAR_DIST! / !MEAN_NEAR_DIST!”,
”PYTHON_9.3”)
expression   = “!%s.NAME!” %(popCenters)
sumTableName = “%s.NAME”   %(sumTable)
arcpy.CalculateField_management(sumTable,sumTableName,expression,”PYTHON”)
## remove the join
arcpy.RemoveJoin_management(sumTable,popCenters)
```

Acknowledgments

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Evaluation Tradecraft

Evaluation Tradecraft presents short articles about the art of evaluation in housing and urban research. Through this department of Cityscape*, the Office of Policy Development and Research presents developments in the art of evaluation that might not be described in detail in published evaluations. Researchers often describe what they did and what their results were, but they might not give readers a step-by-step guide for implementing their methods. This department pulls back the curtain and shows readers exactly how program evaluation is done. If you have an idea for an article of about 3,000 words on a particular evaluation method or an interesting development in the art of evaluation, please send a one-paragraph abstract to marina.l.myhre@hud.gov.*

Use of Genetic Matching in Program Evaluation: The Case of RAD

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In this article, we describe the use of genetic matching in program evaluation, define cases in which this approach would be appropriate, and detail the value that this approach can provide. In particular, we focus on how the researchers used genetic matching in the ongoing evaluation of the Rental Assistance Demonstration (RAD) program, the results they obtained, and how they assessed its success. Clinical researchers and social scientists have developed genetic matching as a sampling technique for conducting nonrandomized observational studies in a quasi-experimental fashion. The method matches each member of the treatment group with one or more members of the control group. The match uses a set of key covariates, which the analyst selects based on prior expectations about possible treatment group participation factors. In the RAD evaluation, the research staff used stratified random sampling to select the RAD project sample (treatment group) from the participating RAD population. For the non-RAD sample (control group), researchers used a genetic matching algorithm to select a matched group of non-RAD public housing projects from the nonparticipating public housing population. Postsampling analysis confirmed that, on covariates likely to impact participation in RAD, the control group and the treatment group were similarly distributed. This matching technique can be a useful tool in program evaluation when membership in the treatment or control group is not random; for instance, if participation is voluntary, as is the case in the RAD program.

Overview of RAD

RAD was authorized in 2012[1] as a pilot program for converting public housing projects that are subsidized through public housing programs to assisted housing projects that are subsidized through project-based Section 8 Housing Assistance Payment (HAP) contracts. Participation in the program is voluntary for public housing authorities (PHAs). For a PHA to participate, RAD requires that it submit a project application with supporting documentation and analysis. Over a period of several months, the U.S. Department of Housing and Urban Development (HUD) reviews and approves the RAD application, grants a Comprehensive Housing Assistance Plan (CHAP), and issues a RAD Conditional Commitment (RCC). During this process, a project can be withdrawn by the PHA or have its CHAP revoked by HUD. At the end of this approval process, the PHA and HUD agree to convert the project to a project-based Section 8 HAP contract. After conversion, the former public housing project will receive its program funding from the project-based Section 8 program instead of from public housing programs. The primary intent of the RAD program is to preserve and improve the quality of subsidized housing by enabling PHAs to use their long-term Section 8 HAP contracts to leverage external capital for rehabilitation or new construction and financial stabilization.

Congress requires HUD to assess how the RAD program has been implemented and its impact on the physical and financial condition of converted housing and tenants. The core research questions revolve around whether RAD has produced better-quality housing and put that housing on a firmer financial foundation while continuing to serve low-income tenants. The evaluation began in 2014 and will continue through 2018. An interim report on the evaluation was released in September 2016.

Genetic Matching in Observational Studies

Few program evaluations can replicate the research design used in typical clinical experiments to test the efficacy of drugs and other medical treatments. In such experiments, the treatment group is administered the test drug, while the control group is given a placebo. Such studies are *double blind* in the sense that the assignment of each participant to the treatment or control group is random, and neither the research scientists nor the subjects of the experiment know to which group each subject has been assigned.

Random selection is the preferred approach for clinical research because any variation between the two groups after such assignment is random, rather than systematic. This allows researchers to more accurately attribute any difference in impact to the treatment alone (that is, receiving the drug as opposed to a placebo), rather than to potentially confounding variables.

Studies that use observational data rather than experimental data—as is the case with most program evaluations, including the evaluation of the RAD program—are more likely to produce biased results because assignment into the treatment and control groups has not been randomized. However, observational studies can be conducted in a quasi-experimental fashion by matching each member of the treatment group with one or more controls based on a set of key covariates that are postulated to have some effect on the propensity of a given individual to participate in the treatment. Using this method,

[1] Consolidated and Further Continuing Appropriations Act of 2012, Pub. L. 112–55.

the researcher selects a matched group of controls with a similar distribution of covariates to that of the treatment group. A high-quality match will minimize all observed sources of bias.[2] The quality of the match is measured by calculating the bias for each variable, as follows.

$$Bias = \frac{\bar{X}_T - \bar{X}_C}{\sqrt{\frac{(\sigma_T^2 + \sigma_C^2)}{2}}}, \quad (1)$$

where $\bar{X}_T$ and $\bar{X}_C$ are the means of a covariate X for the treatment and control groups, respectively, and σ_T^2 and σ_C^2 are their variances.[3] This bias should not be statistically different from 0.

There are many ways to match treatment and control samples. No consensus has emerged in the research literature on which matching method is best, and empirical matching is as much art as science (Stuart, 2010). For the evaluation of the RAD program, research staff opted for a flexible matching method—the genetic matching algorithm GenMatch (GM) written in R (Sekhon and Mebane, 1998).[4] GM is "a multivariate matching method that uses an evolving search algorithm developed to maximize the balance of covariates across matched treated and control units" (Diamond and Sekhon, 2013: 2).[5] "Balance" means that the treatment and control groups have the same joint distribution of the covariates. GM minimizes a loss function[6] that combines two statistical tests: (1) a parametric *t*-test for the difference in means of each covariate and (2) a nonparametric Kolmogorov–Smirnov test (KS test) that minimizes the difference between the empirical cumulative distribution functions of each covariate (Diamond and Sekhon, 2013). It is helpful to think of genetic matching as a generalized matching algorithm that can incorporate both nonparametric (for example, Mahalanobis distance) and parametric (for example, propensity score matching [PSM]) matching algorithms, if appropriate.[7] GM, through its iterations, allows us to identify the most relevant characteristics to match treatment and comparison entities. GM outperforms PSM and other, more simplistic nonparametric methods because it returns an optimal set of matches even if such optimal balance is best achieved by a differential combination of weights across characteristics on which the treatment and comparison groups are matched.[8]

[2] It does not, of course, control for unobserved sources of bias.

[3] The bias is also known as the "standardized difference," because the difference in means is "standardized" by dividing it by the pooled standard deviation.

[4] R is a programming language and development environment for statistical computing and data visualization; see https://www.r-project.org/about.html for more information.

[5] Genetic algorithms (including but not limited to genetic matching) are tools that can be used in machine learning. These algorithms have their roots in and borrow concepts from evolutionary biology (for example, mutation, crossover, and selection).

[6] The loss function that is minimized is the maximum *p*-value from either the Kolmogorov–Smirnov (KS) test or the paired *t*-test over all variables that are matched over. One can write the loss function as—
$L = max\,[pt\text{-}test(var_1), pKS\text{-}test(var_1), pt\text{-}test(var_2), pKS\text{-}test(var_2), \ldots pt\text{-}test(var_k), pKS\text{-}test(var_k))]$.
The best match is the one that minimizes this loss function. Rather than relying on the *t*-test alone, the GM algorithm combines the *t*-test with the KS test to get results that are as well-balanced as possible with respect to both tests. Using *p*-values enables one to compare results from both tests on the same (probability) scale.

[7] Mahalanobis matching, for example, minimizes a distance measure that does not rely on an econometric model or distributional assumptions—and the lack of distributional assumptions enables us to find matches among smaller sample sizes.

[8] As a practical example, if propensity score methods were indeed the best method for identifying comparison entities that were statistically similar, the genetic matching algorithm would place a weight of 1 on the propensity score "characteristic" and a weight of 0 on all other characteristics.

The *t*-test for the difference in means is familiar but subject to two crucial limitations. First, the *t*-test is based on a single parameter, the mean, even though distributions with identical means might have widely different underlying distributions. Second, the *t*-test depends on the assumption that both underlying distributions are normal, which may be untrue. The KS test, on the other hand, is nonparametric in that it does not depend on any assumptions about the underlying distributions. It compares the empirical distribution of each variable for a given RAD project with its potential matches in the non-RAD population and calculates the maximum difference between the two cumulative distribution functions. The GM algorithm minimizes the largest discrepancy based on *p*-values from KS tests and *t*-tests for all covariates.[9] For example, if one is trying to achieve balance on *A*, *B*, and *C* characteristics, the algorithm begins with the assumption that *A*, *B*, and *C* all matter equally in achieving balance. It assesses this by minimizing the *p*-values of the *t*-test and the KS test between the treatment and control groups. GM checks multiple weighting schemes—across *A*, *B*, and *C*—to identify which weighting scheme minimizes *p*-values, thereby identifying which variables are most important to minimize statistical bias.

Research Design for Evaluation of the RAD Program

The research design for the evaluation of the RAD program called for analyzing data for a small sample of RAD projects (the treatment group) and a small sample of non-RAD projects (the control group) to identify how RAD might impact the physical and financial condition of converted properties. The analysis focused on changes in the RAD cohort, before and after conversion, compared with changes in the non-RAD cohort over a comparable period of time for a range of variables, such as short- and long-term capital needs, reserves, and cashflow. Small sample sizes were a necessity, given the need to manage the high cost and burden on PHAs of collecting primary data. Data included a project's physical and financial condition, collected by professional engineers on site through a Physical Condition Assessment or similar format, and the PHA's views and experiences of the program, collected by online surveys and telephone interviews. The data collection burden on PHAs was managed by limiting the number of PHAs participating in the study to small sample groups. The research team decided on a minimum of 24 RAD projects in the treatment group and 48 non-RAD projects in the control group. The ratio of 2 non-RAD projects for every RAD project in the sample reflected the expectation that the control group would exhibit greater data variability and that PHAs with non-RAD projects would be less inclined to participate in the study, requiring substitutes.

The sample frame for the treatment group consisted of the universe of 132 RAD properties that had an approved CHAP as of December 31, 2013, and had either closed or reached the RCC stage by December 31, 2014. This sample frame meant that the resulting sample would be representative of

[9] The *p*-value represents the probability of getting a value of the test statistic greater than the one obtained, given that the null hypothesis is actually true. As applied in the RAD study, the null hypothesis would be that no difference exists between RAD and non-RAD developments. A low *p*-value (less than 5 percent) would result in rejection of the null hypothesis (with 95 percent confidence). A high *p*-value, however, would mean that the null hypothesis could not be rejected. Using *p*-values enables results for different test statistics to be compared on the same scale. That is, the GM algorithm can directly compare the *p*-value from a *t*-test with the *p*-value from a KS test because both are measured in terms of probabilities.

RAD projects that had applied earlier and had moved from CHAP to RCC or had closed in a timely manner.[10] To select the RAD sample, researchers used a stratified random selection methodology along two dimensions: (1) PHA size and (2) project performance rating. Each dimension was split into three subcategories, yielding nine (3 × 3 = 9) potential buckets. However, only eight of these buckets contained actual housing projects. Exhibit 1 shows the number and percentage of projects in each bucket for the RAD treatment group sample. The bucket of substandard-performing projects managed by small PHAs is empty, because no projects in the population of 132 RAD projects from which the RAD project sample was drawn were in that bucket.

The sample frame for the control group consisted of 5,993 public housing projects that had not applied to the RAD program based on the HUD's inventory of all public housing projects and RAD program data on applications. To select non-RAD projects to serve as the control group from the non-RAD population, the genetic matching algorithm was used to select without replacement the two non-RAD properties that were the best matches for each participating RAD property. Because the sample included 24 RAD properties, the result was 48 matching, non-RAD comparison projects from the HUD inventory of non-RAD projects.

Exhibit 2 shows the number and percentage of projects in each bucket for the non-RAD control group. The bucket of substandard-performing projects managed by small PHAs is empty again because it is empty for the RAD sample, and the non-RAD control group is intended to match the RAD sample. The distribution of projects across the other buckets for both samples is broadly similar. Although not identical in all buckets, the distribution is the same for the PHA size subcategories. The slight differences reflect the use of other variables during the iterative genetic matching process.

Exhibit 1

Distribution of Projects in RAD Treatment Group Sample by PHA Size and Project Performance Rating

PHA Size	Substandard		Standard		High-Standard		Total RAD Projects in Sample by PHA Size	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Small	0	0	2	8	3	13	5	21
Medium	1	4	8	33	6	25	15	63
Large	1	4	2	8	1	4	4	17
Total RAD projects in sample by performance rating	2	8	12	50	10	42	24	100

PHA = public housing authority. RAD = Rental Assistance Demonstration.
Source: Public and Indian Housing Information Center and RAD program data as summarized by Econometrica, Inc.

[10] The RAD program was expanded at about the time of our sampling. Due to the time limitations of our study, we did not sample from the entire universe of 1,074 public housing projects that eventually applied to RAD. Projects that applied later, were progressing slowly, or dropped out were not in our sample frame because they would have offered little information on the impact of RAD. Researchers selected a supplemental sample of projects that withdrew from RAD or had their CHAPs revoked by HUD to analyze the factors contributing to that outcome.

Exhibit 2

Distribution of Projects in Non-RAD Control Group by PHA Size and Project Performance Rating

PHA Size	Substandard		Standard		High-Standard		Total Non-RAD Projects in Control Group by PHA Size	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Small	0	0	2	4	8	17	10	21
Medium	2	4	17	35	11	23	30	63
Large	3	6	3	6	2	4	8	17
Total non-RAD projects in control group by performance rating	5	10	22	46	21	44	48	100

PHA = public housing authority. RAD = Rental Assistance Demonstration.
Source: Public and Indian Housing Information Center and RAD program data as summarized by Econometrica, Inc.

Accounting for Bias

Drawing a simple random sample of 48 projects from the population of 6,664 non-RAD public housing projects would introduce *self-selection bias*, because PHAs *choose* to participate (or not participate) in RAD; they are not randomly assigned to RAD. Failing to account for this choice could result in biased estimates that would reduce the accuracy and reliability of the findings. However, at the start of the study, the research team expected that RAD projects could differ systematically from non-RAD projects due to self-selection bias. For instance, PHAs might prefer to submit a well-managed project to the RAD program because such a project would be less risky.[11] In addition, the goal of RAD is to generate capital for rehabilitation, and PHAs might therefore select projects that need more capital improvements than other public housing developments to take advantage of that feature of the program. The size of a PHA could also affect its participation in RAD; if smaller PHAs have less mixed-finance experience and therefore less familiarity with the financing tools that RAD makes available, they may not understand the advantages of RAD or they may feel they cannot make RAD work for them.

To eliminate potential self-selection biases, such as those described above, and to give more confidence to the findings, statisticians matched the 24 projects in our RAD sample with non-RAD public housing projects based on observable characteristics that could account for differences in the likelihood that a given project would participate in RAD. Using RAD program data, HUD administrative data from the Public and Indian Housing Information Center, and data from the 2008–2012 American Community Survey 5-year estimates, the research team created a data set of non-RAD properties with usable information for 13 matching variables, or covariates. These variables were selected to capture key characteristics of PHAs, public housing projects, and the neighborhoods in which the projects are located. The covariates used for this matching are listed in exhibit 3, along with the rationale for each covariate and the source of the data. The only PHA-level variable was the size of the PHA based on the number of public housing units under

[11] Because RAD projects can assume project debt, which is repaid out of project cashflows, PHAs may consider better-managed projects to be less likely to default under RAD.

management. Property-related variables included information on the property's size (number of Annual Contributions Contract units), age (Date of Full Availability, construction date, or date of last modernization), structural type (building and development type), bedroom mix (percentage of zero-, one-, or two-bedroom units), physical condition (Real Estate Assessment Center inspection score), and vacancy rate. Neighborhood-level variables capture information on the strength or weakness of local affordable housing market conditions, such as rents that are high relative to average household income (cost-burden rate), overcrowded living conditions (overcrowding rate), degree of poverty in the community (poverty rate), extent to which households in the area rent rather than own their homes (percentage of renters), and the prevalence of vacant housing (vacancy rate) in the area.

Exhibit 3

Covariates Used To Match RAD Properties With Non-RAD Properties (1 of 3)

Variable	Description	Rationale	Data Source
ACC_Unit_Cnt	Number of Annual Contributions Contract units in a property	Indicator of the size of the development. Property maintenance and replacement costs are expected to be commensurate with the number of units in a property.	PIC database
Bldg_Type_Code	Building type of project = 1, 2, 3, 4, 5, where: 1 = ES, elevator structure 2 = RW, rowhouse or townhouse style 3 = SD, semidetached 4 = SF, single-family detached 5 = WU, walkup/multifamily apartment	Property maintenance and replacement costs are driven in part by building type, in that the cost of maintaining or replacing a physical asset such as an elevator will impact the level of capital needs.	PIC database
Dev_Type_Code	Development type of the project = 1, 2, 3, where: 1 = elderly 2 = mixed 3 = family	According to *Capital Needs in the Public Housing Program* (Abt Associates, 2010), average capital needs vary by type of housing. For example, the average amount of capital needs for an elderly unit is lower than that of a family unit.	PIC database
DOFA	Date of Full Availability for the project	Indicates the age of the building, which is important for determining replacement needs. DOFA establishes when a development can access the operating subsidy from a PHA's Operating Fund. In most cases, this date is the same as the construction date. We also considered the last modernization date, if available.	PIC database

Exhibit 3

Covariates Used To Match RAD Properties With Non-RAD Properties (2 of 3)

Variable	Description	Rationale	Data Source
Percent_1_2_Bed	Percentage of units in the project that have either zero, one, or two bedrooms	Indicator of the size of the unit. Costs associated with the unit size of individual units are not equally distributed.	PIC database
PHA_Size_Code	PHA size = 1, 2, 3, where: 1 = small, ≤ 250 units 2 = medium, 251–1,250 units 3 = large, > 1,250 units	Large PHAs differ from small PHAs. A PHA's planning process is unique to the PHA but related to the size of the PHA. The PHA plan includes policies, programs, operations, and strategies for meeting local housing needs and goals. Factors must be consistent with the housing and community development plans of the jurisdiction (as described in the Consolidated Plan); thus, PHA size matters.	PIC database
Rounded_ Inspection_ Score	Physical inspection score (rounded) for the project	REAC conducts approximately 20,000 physical inspections on housing properties annually to ensure that families living in public housing have decent, safe, and sanitary housing that is in good repair. Scores range from 0 to 100. Properties that receive a Public Housing Assessment System score greater than 90 are considered high performers; properties that score between 70 and 89 are standard; properties that score lower than 70 are substandard or troubled. High-scoring properties are inspected every 3 years, standard performers are inspected every 2 years, and troubled properties are inspected every year. The inspection score served as a proxy for estimating capital needs; properties with high scores are likely to have fewer capital needs than those with lower scores.	REAC file
Vacancy_Rate	Vacancy rate in the project	Calculated as the percentage of units occupied. Indicator of both the condition of the development and the quality of PHA management. One would expect that a well-managed development in good physical condition would be 100% occupied.	PIC database

Exhibit 3

Covariates Used To Match RAD Properties With Non-RAD Properties (3 of 3)

Variable	Description	Rationale	Data Source
Cost_Burden_Rate	Cost-burden rate in the census tract	Measures the percentage of renters with gross rent greater than or equal to 35 percent of their income. Indicator of both the cost of housing in the local market and of poverty in the neighborhood in which the development is located.	ACS data—U.S. Census Bureau; by census tract
Overcrowd_Rate	Overcrowding rate in the census tract	Calculated as number of persons/number of rooms. A ratio greater than 1 is defined as overcrowded. Indicator of local housing market conditions and poverty in the neighborhood in which the development is located.	ACS data—U.S. Census Bureau; by census tract
Poverty_Rate	Poverty rate in the census tract	Percentage of neighborhood residents below the poverty level.	ACS data—U.S. Census Bureau; by census tract
Renter_Rate	Renter rate in the census tract	Percentage of neighborhood housing stock occupied by renters. Indicator of the type of housing available in the neighborhood in which the development is located.	ACS data—U.S. Census Bureau; by census tract
Vacant_Rate	Vacancy rate in the census tract	Percentage of vacant homes in the neighborhood in which the development is located. Indicator of demand and supply conditions in the local housing market. The vacancy rate determines the choices open to consumers in a market. As housing supply expands, housing vacancies rise, and demand will either remain the same or decrease as more residents find available units; as vacancies decrease, the housing supply either remains the same or contracts while demand grows.	ACS data—U.S. Census Bureau; by census tract

ACS = American Community Survey. PHA = public housing authority. PIC = Public and Indian Housing Information Center. RAD = Rental Assistance Demonstration. REAC = Real Estate Assessment Center.

One can see the amount of bias in the RAD sample directly by comparing the group of 24 RAD projects with the entire set of 6,644 non-RAD (NR) public housing projects. Exhibit 4 compares the number of projects in each group, the mean value for each variable for the RAD ($Mean_{RAD}$) and non-RAD ($Mean_{NR}$) groups, the standard deviation (StdDev) and standard error (StdErr) for difference in means, the *t*-value, and the bias. The bias is similar to a *t*-test for the difference in two means.[12] A high bias will often result in a *t*-test that rejects the null hypothesis that the two means are equal. For example, Vacant_Rate has a bias of -41.9 percent and a *t*-value of -2.05 (which would lead to a rejection of the null hypothesis that the two means are the same at the 95-percent confidence level). Exhibit 4 shows that the RAD sample and the population of non-RAD projects are fairly dissimilar. Even though the average bias of 4.2 percent is fairly low, the disaggregated results for each of the covariates show much higher levels of bias: Vacancy_Rate (within the project) has a 39.5-percent bias, and Poverty_Rate and Renter_Rate both have biases greater than 20 percent.

Due to the dissimilarity between RAD projects and the population of non-RAD projects, the research team gathered a matched sample of non-RAD projects for our control group. The goal was to establish a control group that has a lower overall bias and lower bias for individual covariates. The means to achieve this goal was the GM algorithm. The target was a control group of 48 non-RAD projects matched to the randomly selected sample of 24 RAD projects. However, to reach this target, statisticians implemented the GM algorithm using a 4-to-1 match (that is, 4 matches were selected for each of the 24 projects in the sample of RAD projects). This approach resulted in the selection of 96 unique non-RAD projects, which was twice the size of the desired sample of non-RAD projects in case some matches had to be rejected. Matches were selected without replacement, so each non-RAD project could be selected as a control only once. When possible, the two best matches were selected for the study. However, in several cases, matched non-RAD projects

Exhibit 4

Comparison of Means by Covariates for RAD Sample and Non-RAD Population

Variable	$Mean_{RAD}$	$Mean_{NR}$	StdDev	StdErr	*t*-Value	Bias (%)
ACC_Unit_Cnt	159.6	154.8	208.3	42.6037	0.11	2.3
Bldg_Type_Code	2.5833	2.4104	1.1134	0.2277	0.76	15.5
Dev_Type_Code	2.9167	2.8639	0.4234	0.0866	0.61	12.5
DOFA	1974.5	1976.6	16.9795	3.4722	– 0.60	– 12.4
Percent_1_2_Bed	0.6204	0.6610	0.3103	0.0635	– 0.64	– 13.1
PHA_Size_Code	1.9583	1.9738	0.8351	0.1708	– 0.09	– 1.9
Rounded_Inspection_Score	84.5417	84.8222	12.9316	2.6444	– 0.11	– 2.2
Vacancy_Rate	0.1658	0.0919	0.1868	0.0382	1.93	39.5
Cost_Burden_Rate	44.5833	42.1859	13.1244	2.6838	0.89	18.3
Overcrowd_Rate	0.0344	0.0375	0.0472	0.0097	– 0.32	– 6.4
Poverty_Rate	31.4750	27.8604	15.1196	3.0918	1.17	23.9
Renter_Rate	55.6292	51.0282	22.1308	4.5256	1.02	20.8
Vacant_Rate	10.9125	14.5284	8.6328	1.7653	– 2.05	– 41.9
Average bias						**4.2**

RAD = Rental Assistance Demonstration.
Source: Public and Indian Housing Information Center and American Community Survey data as analyzed by Econometrica, Inc.

[12] The *t*-value is calculated by dividing the difference in means by the standard error instead of the standard deviation. Loosely speaking, standard error = (standard deviation) × sqrt(1/n). The square root term causes the standard error to approach 0 as the sample size increases. The precise mathematical relationship between the bias and the *t*-value is Bias = tValue * $sqrt(1/n_1 + 1/n_2)$.

had to be rejected for various reasons. For instance, one project was no longer a public housing project and was eliminated. Several projects turned out to be RAD projects (they had applied to the program after the cap was lifted) and thus were not appropriate as controls. One project was rejected because it was a single highrise building that had been matched against a project of scattered townhouse units. In other cases, the PHAs declined to participate and were dropped from the study. When a potential control was rejected, staff selected the next best match in the list. In a few cases, the controls ran out. Consequently, for some of the projects in the RAD sample, staff reran the genetic matching program to select 4 more controls to complete the final sample of 48 projects.

Assessing Genetic Matching Results

Using genetic matching reduced bias in the samples. The results of the GM algorithm are given in exhibit 5. On one variable, PHA_Size_Code, the samples were a perfect match under both the *t*-test for difference in means and the KS test. This means that the RAD sample and the non-RAD sample could be sorted into equal numbers of projects of the exact same size class. On Poverty_Rate, the samples were a near-perfect match—perfect in terms of the difference in means but not with respect to the KS test. The worst match in terms of *p*-values was on Bldg_Type_Code, at 29.6 percent under the KS test and 48.8 percent under the difference in means test. Another way of describing this result is to say that one can reject the null hypothesis that the distribution of building types in the two samples is the same with 70-percent confidence. Typically, analysts demand a higher degree of confidence—in the 90- or 95-percent range. Bias might still be present with respect to the Bldg_Type_Code and Vacant_Rate variables. For the latter, one can accept the null hypothesis that the means are the same with only 45-percent confidence.

Exhibit 6 compares the bias of the unmatched set of all non-RAD public housing projects against the final set of 48 matched non-RAD projects in the sample of comparison projects. For all but three covariates, bias decreased after the match. For two covariates—ACC_Unit_Cnt and

Exhibit 5

Results of the Genetic Matching Algorithm

Variable	*p*-Values (%)	
	t-Test for Difference in Means	KS Test
ACC_Unit_Cnt	72.8	55.2
Bldg_Type_Code	48.8	29.6
Dev_Type_Code	81.2	92.2
DOFA	67.0	76.3
Percent_1_2_Bed	77.3	98.4
PHA_Size_Code	100.0	100.0
Rounded_Inspection_Score	76.6	79.0
Vacancy_Rate	84.3	98.8
Cost_Burden_Rate	87.4	81.6
Overcrowd_Rate	88.9	72.6
Poverty_Rate	100.0	99.8
Renter_Rate	77.3	82.4
Vacant_Rate	53.3	56.3

KS Test = Kolmogorov–Smirnov test.
Source: Based on analysis by Econometrica, Inc.

Exhibit 6

Comparison of the Degree of Bias Before and After Match

Variable	$Mean_{RAD}$	$Mean_{NR}$	Unmatched			Matched		
			N_{NR}	$Mean_{NR}$	Bias (%)	N_{NR}	$Mean_{NR}$	Bias (%)
ACC_Unit_Cnt	24	159.6	6,644	154.8	2.3	48	149.4	8.8
Bldg_Type_Code	24	2.5833	6,644	2.4104	15.5	48	2.3958	17.4
Dev_Type_Code	24	2.9167	6,644	2.8639	12.5	48	2.9375	– 5.9
DOFA	24	1974.5	6,644	1976.6	– 12.4	48	1976.1	– 10.8
Percent_1_2_Bed	24	0.6204	6,644	0.6610	– 13.1	48	0.6378	– 7.3
PHA_Size_Code	24	1.9583	6,644	1.9738	– 1.9	48	1.9583	0.0
Rounded_ Inspection_Score	24	84.5417	6,644	84.8222	– 2.2	48	85.5208	– 7.4
Vacancy_Rate	24	0.1658	6,644	0.0919	39.5	48	0.1518	5.0
Cost_Burden_Rate	24	44.5833	6,644	42.1859	18.3	48	44.1458	3.9
Overcrowd_Rate	24	0.0344	6,644	0.0375	– 6.4	48	0.0332	3.6
Poverty_Rate	24	31.4750	6,644	27.8604	23.9	48	31.4583	0.1
Renter_Rate	24	55.6292	6,644	51.0282	20.8	48	56.8750	– 7.2
Vacant_Rate	24	10.9125	6,644	14.5284	– 41.9	48	11.7083	– 15.7
Averages					**4.2**			**– 1.2**

Source: Based on analysis by Econometrica, Inc.

Rounded_Inspection_Score—the bias was higher after the match (in absolute value) but still less than 10 percent. Given the results in exhibits 5 and 6, some further caution might be due with respect to three covariates: Bldg_Type_Code, DOFA, and Vacant_Rate. Our overall conclusion is that the genetic matching reduced bias. After-match average bias is less than one-third its original size, falling from 4.2 to -1.2 percent.

Concluding Remarks

As evidenced by the results outlined in this article, genetic matching is a powerful tool. It can help researchers mitigate systemic bias in quasi-experimental situations in which assignment to the treatment group is nonrandom and a specific set of covariates is believed to influence the propensity to participate. Within the public policy space, genetic matching is particularly well-suited for program evaluation in which participation in the treatment or exposure to the policy reform has not been randomized (that is, it may be voluntary or the result of participation in previous reforms) and the researchers seek to draw conclusions about the impacts of the policy in question (Sekhon and Grieve, 2008).

In such instances, genetic matching is used to control for imbalances that are expected to impact the propensity of selection to, or participation in, the treatment group and *not* imbalances related to each group's values for the dependent variables of interest. Of course, in some situations, genetic matching would not be an appropriate methodological choice. These situations include research questions that do not involve the identification or selection of a comparison group (for example, longitudinal analysis using data for a single population) and research designs that employ random selection to choose the units that will receive treatment.

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