Evaluating the Minneapolis Neighborhood Revitalization Program's Effect on Neighborhoods

by

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A Thesis Presented to the
Faculty of the USC Graduate School
University of Southern California
In Partial Fulfillment of the
Requirements for the Degree
Master of Science
(Geographic Information Science and Technology)

May 2017

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To my parents

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Acknowledgements

I am grateful to my mentor, Professor Kemp, for the direction I needed, Professor Ruddell for acting as my committee chair, my committee members Professor Vos and Professor Loyola, and Professor Sedano and my other faculty who gave me assistance when I needed it. I am grateful for the data provided to me by the Minnesota Population Center and the proofreading done by my sister, Lorna.

List of Abbreviations

ACS	American Community Survey
AHS	American Housing Survey
DiD	Differences-in-Differences
GIS	Geographic Information System
GISci	Geographic Information Science
MPO	Metropolitan Planning Organization
NAP	Neighborhood Action Plan
NRP	Minneapolis Neighborhood Revitalization Program
SSI	Spatial Sciences Institute
USC	University of Southern California

Abstract

How can cities improve neighborhood quality after years of decline? One prominent attempt is the Minneapolis Neighborhood Revitalization Program (NRP) established in 1991 that earmarked $400 million over 20 years for neighborhoods to engage residents and create plans to improve the community. Previous studies evaluated the NRP program, but were completed too soon for the program to have a noticeable impact. Additionally, reviews of the first decade of implementation completed by 35 of the 67 neighborhoods assessed the success of the program, but these documents mainly served marketing and accountability purposes. This study adds to the critical appraisal of the NRP program by using census data and indicators for neighborhood income, home value, rent, and vacancy rate to examine whether or not the City of Minneapolis increased neighborhood quality. Propensity score matching paired Minneapolis study site neighborhoods with similar neighborhoods in St. Paul and difference-in-differences and hot spot analysis determined any significant changes in Minneapolis and its neighborhoods from 1990-2014. Regression models explored the relationship between each indicator and variables for NRP participation, amount of NRP funding, number of days participated in the NRP, and neighbor funding levels, and spatial analysis explained why some neighborhoods were more successful than others. Results show that Minneapolis performed better than St. Paul during the study period, and that some neighborhoods in the city experienced statistically significantly greater improvements, most notably the neighborhoods in downtown. Based on this analysis, the study recommends solutions to improve future iterations of this program in other locales.

Chapter 1 Introduction

Due to years of urban decline, the City of Minneapolis, Minnesota implemented the Neighborhood Revitalization Program (NRP) as a means to improve residential neighborhood quality and increase citizen participation. Although the concept of a resident-driven community development program was not new in 1990, the NRP was viewed as one of the most progressive programs of its time (Filner 2006).

This study expands upon previous analysis of the NRP and aims to examine the neighborhood level impacts of the NRP to see if the program was successful in revitalizing neighborhoods. By using difference-in-differences, spatial analysis, and regression techniques and pairing the neighborhoods in the city of St. Paul, Minnesota with equivalent Minneapolis neighborhoods using propensity score matching to create a control group, the research investigates the relationship of the NRP with four indicators of neighborhood quality: median household income, vacancy rate, average monthly gross rent, and average home value. Demonstrating that Minneapolis neighborhoods improved at a rate greater than St. Paul neighborhoods during the same time period provides evidence that the NRP was successful in achieving the program's main goal. Knowing that the NRP was successful can allow other municipalities and government agencies to use it as a model.

1.1 The Minneapolis Neighborhood Revitalization Program

1.1.1. Inception

After years of suburban flight and a reduction in funding for community development programs, Minneapolis neighborhoods were in decline with housing stock deteriorating, crime increasing, schools failing, and blight becoming apparent (Fagotto and Fung 2006). During the 1970s, Minneapolis lost 14 percent of its population to suburban areas, and the number and

population of high poverty census tracts tripled during the 1980s (Filner 2006). A survey of Minneapolis homeowners conducted in 1986 showed a fear of deteriorating residential environments and an increase in people wanting to leave the city due to the rise in urban poverty (Filner 2006).

Major decreases in funding to alleviate the problems of urban decay and poverty worsened the situation. In the 1980s, spending on urban neighborhood development in Minneapolis decreased almost 40 percent. The U.S. Department of Housing and Urban Development also experienced a decrease in the housing budget of almost 70 percent, and for the first time, a greater amount of Community Development Block Grant funding was given to suburbs rather than cities. (Filner 2006). To fight some of these causes and their effects of decline, the City heavily invested in the downtown central business district in the 1980s to reverse the loss of businesses to suburban communities, leading to backlash from the residents of surrounding residential neighborhoods that believed funding should also benefit their neighborhoods (Elwood and Leitner 2003).

As a result of these conditions, in 1987 the Minneapolis City Council assembled the Housing and Economic Development Task Force to search for a solution, and in 1988 it asserted that a physical revitalization effort would cost over $3.2 billion. It recommended that the City undertake a citywide planning effort using guidance from neighborhood residents to increase efficiency and reduce costs. The idea of a formal participatory system for community development was not a new idea – by the early 1990s, over 60 percent of U.S. cities had programs involving citizen participation and neighborhood development (Filner 2006). Citizen participation programs were attractive because they used the opinions of city residents voiced through surveys, public workshops, or representative organizations to develop strategies to

address urban problems. These programs also had a wider acceptance rate than a strategy completely developed by the local government.

1.1.2. Implementation

The program resulting from the Task Force's recommendations to the City Council became the NRP. This program originally devoted$400 million over 20 years using tax-increment financing (Fagotto and Fung 2006), a funding mechanism that invested future property tax growth from development and improvements in the downtown area into the NRP (Elwood 2002), to help mitigate poverty and empower citizens (Elwood and Leitner 2003). The program was divided into two ten-year phases, Phase 1 from 1991 to 2001 and Phase 2 from 2001 to 2011, and included all 81 neighborhoods in the city as previously defined by the Minneapolis City Council.

The City required each neighborhood to incorporate a nonprofit neighborhood association to act as the representative body for the neighborhood, organize residents to draft strategies and a budget to address community problems, and manage funding from the City and other sources. The neighborhood associations sought the input of residents to write the main document governing the actions and revitalization strategies, establishing a budget, and identifying funding sources for each phase of the NRP, referred to as the Neighborhood Action Plan (NAP).Neighborhood associations were autonomous organizations with control over their strategies and use of funds, while the City acted as an advisor, approving each NAP and providing technical assistance. Although the City had a goal that 52 percent of the total NRP funding went to housing related activities, it was ultimately the decision of each neighborhood association; as such, only 49 percent of the total amount of NRP funding went to housing. On average it took 3.2 years from NAP inception to final approval (Fagotto and Fung 2006), with

the first NAPs for Phase 1 approved in 1992 and the last approved in 2007 (City of Minneapolis n.d.). Citizens were members of the neighborhood association, and the City mandated that neighborhood associations surveyed residents as a part of the NAP process. Residents also contributed to the implementation of NAP strategies by volunteering and donating money and resources.

Phase 2 experienced a reduction in funding of approximately $25 million per year due to changes in the property tax system made by the Minnesota State Legislature in 2001 (Minneapolis, Neighborhood Revitalization Program Chronology of Key Events n.d.). As with Phase 1, there was a wide range of NAP completion dates for Phase 2, with the first completed in 2004 and the last completed in 2015 (City of Minneapolis n.d.). Currently, two neighborhoods still have not completed a Phase 2 NAP. Though funding for the program ended in 2011, the City reserved the remaining amount for neighborhoods that still have active NAPs.

Each neighborhood association self-designated into one of three categories to define the apparent need in the community: protection, revitalization, and redirection. Protection neighborhoods were strong neighborhoods and were generally upper middle class areas, revitalization neighborhoods were neighborhoods at risk for decline and were generally well-balanced and middle class, and redirection neighborhoods were the most impoverished areas that had experienced significant decline. Self-designation allowed residents to express how they viewed their neighborhood and did not affect funding levels – however, neighborhoods may have been cautious to label themselves as redirection or revitalization neighborhoods due to the connotation that those are "bad" neighborhoods. The City allocated funds using a formula based on neighborhood size, poverty level, and housing condition that favored disadvantaged and declining neighborhoods (Fagotto and Fung 2006). The correlation between income,

classification, and funding allocation can be seen in Figure 2 below; generally redirection and revitalization neighborhoods received a greater amount of funding because they had experienced the most decline, though this was not always the case due to the subjectivity in self-selecting a category.

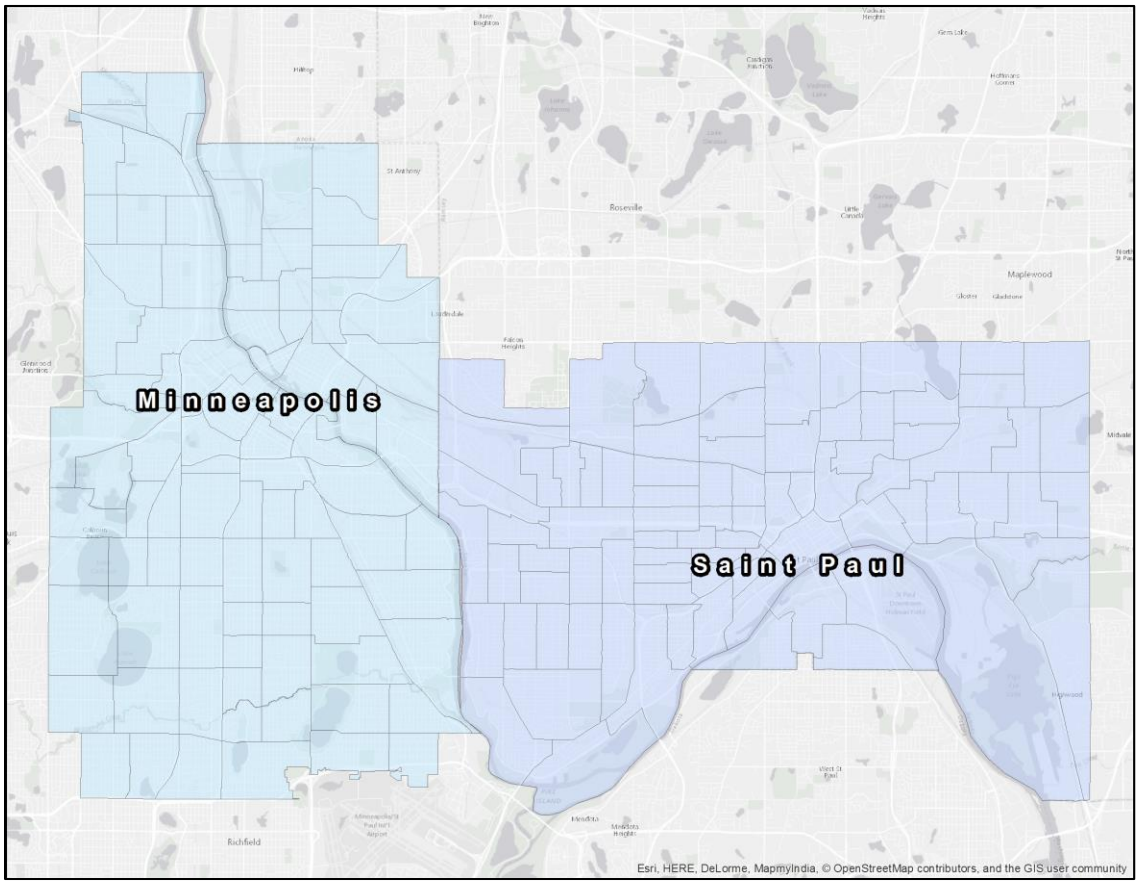

Figure 1: Minneapolis and Saint Paul, Minnesota with Neighborhood Boundaries *Source:* (City of Minneapolis n.d.; Minnesota Population Center 2011)

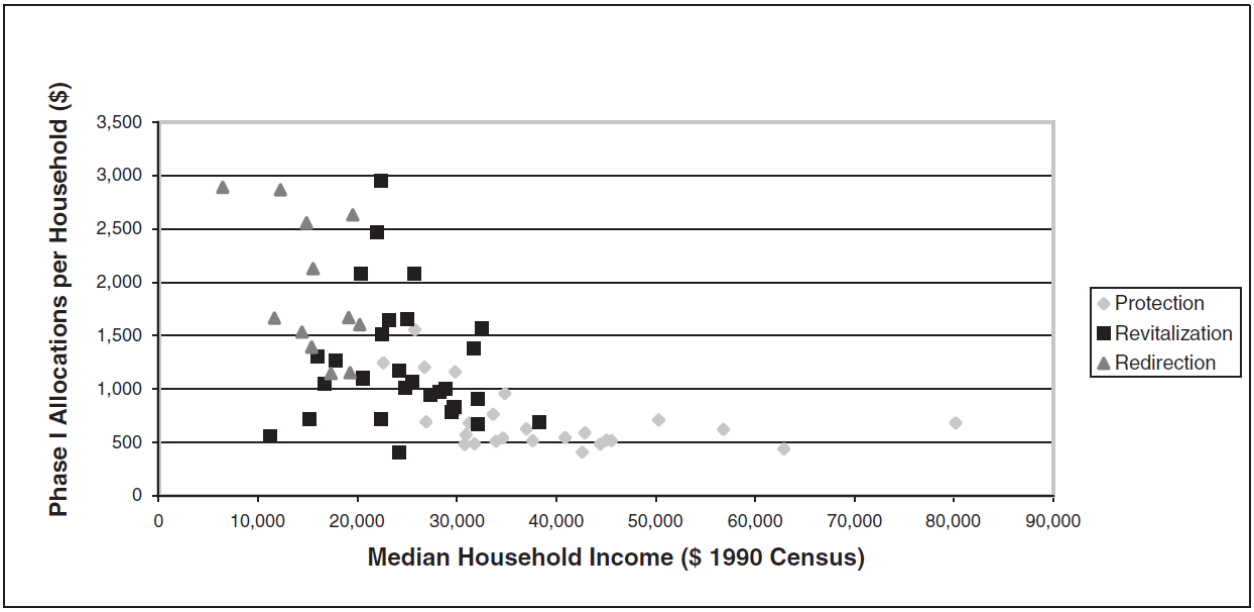

Figure 2: Phase 1 Funding Allocations by Neighborhood Median Household Income and Type. *Source:* (Fagotto and Fung 2006)

1.2 Motivation

A fact sheet published by the City of Minneapolis lists nine different studies that evaluated the NRP with publication dates ranging from 1992 to 2005 (Minneapolis, Neighborhood Revitalization Program Chronology of Key Events n.d.). Given that some neighborhoods are still implementing their NAPs, any lasting impacts of the NRP would not have been apparent in these studies. Furthermore, six of the nine studies on the list were published by 1996, but by that time, nearly half of the neighborhoods had not received final plan approval for Phase I and thus could not expend any money nor implement their strategies (City of Minneapolis n.d.). The City of Minneapolis commissioned a review to assess the first phase of the NRP, and the report found that homeownership rates increased and repairs and improvements as shown by building permit data significantly increased; however, the research methodology did not control for regional-level trends and other factors that may have caused the increases (Berger, et al. 2000). The study only covers the first phase of the program, but the

publication date of 2000 means that not every neighborhood had expended Phase 1 funds since the latest Phase 1 NAP approval occurred in 2007. The two most recent studies do not discuss how well the NRP achieved neighborhood revitalization, but rather focus on the successes and failures of the program in encouraging citizen participation (Filner 2006; Fagotto and Fung 2006). A deeper analysis of each of these studies can be found in Chapter Two.

In addition to the academic and professional studies mentioned above, 35 neighborhoods published reviews of their Phase I activities that are available through the City's NRP website, PlanNet. The majority of these reviews were either accountability documents or served a marketing purpose, displaying how the neighborhood spent its NRP funding and advertising how the neighborhood association was able to respond to the needs of the residents. Neighborhood associations wanted to show their constituents that efforts were successful and to show the City that investments were worthwhile. Additionally, since fewer than half of the neighborhoods completed reviews and that the reviews only cover the first half of the NRP's length, more research is necessary to objectively assess both the neighborhood-level and citywide impacts of the program.

The purported success of the NRP in citizen participation (Fagotto and Fung 2006) suggests that the NRP is a viable community development program for use in other metropolitan areas. Studies have linked neighborhood quality with educational attainment (Ceballo, McLoyd and Toyokawa 2004), physical activity levels (Kamphuis, et al. 2010), residential mobility (Rabe and Taylor 2010), and adult health(Weden, Carpiano, and Robert 2008; Wen, Hawkley, and Cacioppo 2006). As such, cities are motivated to improve poor neighborhood conditions to diminish the negative effects on the population.

1.3 Research Goals

Problems of urban decline experienced in Minneapolis neighborhoods caused the City to enact the NRP, hoping to increase the quality of residential neighborhoods while increasing citizen participation. The research aims to answer the questiondid the NRP increase neighborhood quality in Minneapolis and by how much, hypothesizing that the NRP did indeed revitalize neighborhoods and had an overall positive effect on the city. Other predictions are that neighborhoods that received greater funding experienced greater improvement and that neighborhoods adjacent to higher funded neighborhoods also experienced greater improvement. In addition to assessing overall effects, the study hopes to gain insights into which neighborhoods were especially successful and exploring possible explanations.

1.4 Study Organization

This study contains four additional chapters. Chapter Two begins with an overview of past research about the NRP and continues with an exploration of related literature to help select indicators for neighborhood quality and a procedure to test the effect of the NRP. Using this knowledge, Chapter Three presents a methodology that employs the neighboring city of St. Paul as a control group through the technique known as propensity score matching, and then uses difference-in-differences and regression analysis to demonstrate whether or not there is a correlation between receiving NRP funding and an increase in neighborhood quality. Chapter Four presents the results, and Chapter Five discusses the implications of these results, the limitations of the study, and concludes with future research suggestions.

Chapter 2 Background

This section starts by discussing existing studies that evaluated the NRP and then summarizes related literature about assessing neighborhood quality and evaluating community development programs. The literature further explains how this study expands existing research and informs the methodology outlined in Chapter 3.

2.1 Evaluation of the Minneapolis Neighborhood Revitalization Program

Several studies have evaluated the NRP, but all of them were published before the end of the program – the most recently completed studies are from 2006. The most thorough study was the City commissioned Neighborhood Revitalization Program Evaluation Reports, Phase One: 1990-1999 (Berger, et al. 2000) which assessed the use of NRP funds, the structure of the program, impacts on local government, and neighborhood impacts. As stated in the study, the average date of Phase 1 plan adoption was March 1997, so the study only included an average of two years of NRP funded activities per neighborhood. This small amount of time is insufficient to draw conclusions about the widespread effects of the NRP. In assessing neighborhood impacts, the study investigated five measures: homeownership rates, numbers of permits for home repairs and improvements, dollar value of permits for home repairs and improvements, share of properties sold in a year, and sales price of single family homes. One flaw in these measures is that they do not directly assess the effect on renters as a result of the NRP, although renters may experience an increase in rent due to increased repairs and home sales prices. Because renters accounted for 26 percent of households in the Minneapolis – St. Paul metropolitan area in 1998 as evidenced by the American Housing Survey (see Table 1 on page 29), omitting the effects on renters is a significant flaw.

Berger et al. (2000) used regression to attempt to isolate the effects of the NRP on the previously mentioned measures. One of the report's major claims is that homeownership rates increased due to NRP expenditures, but their methodology, which uses a regression with homeownership rate as the dependent variable and NRP expenditure amounts, crime per capita, median income, and percent white as explanatory variables, does not account for the regional trend because it does not include data from areas that did not receive NRP funding, nor does it establish a control group for comparison. As evidenced by American Housing Survey Data from 1989-1998, there was a regional increase in homeownership rates during that time period (see Table 1 on page 29), so the failure to account for the region-wide trends limits the conclusion.

Another major claim was that building permit data shows an increase in the number of renovation and repair projects but not the dollar value of projects during 1992-1997 due to the NRP. Although the authors did include an explanatory variable for the amount of time since NAP approval in each neighborhood, using data from 1992-1997 means only half of the neighborhoods would have spent NRP funds because the average date of Phase 1 NAP approval was March 1997. Therefore it is difficult to generalize that the NRP had an effect on building permits. Similar to the previous criticism of the measure of the NRP's impact on homeownership rates, the methodology investigating building permits does not account for regional trends. Any future study of the NRP needs to account for region-wide effects and to address neighborhood changes after completion of the NRP.

The two most recent studies focused on how well the NRP engaged the community. Fagotto and Fung (2006) lauded the program, stating that the NRP is a strong example of how government funds can increase citizen engagement. The study also found that homeownership rates increased in the city, especially in neighborhoods labeled as redirection. This is probably

due to one of the main criticisms of the program, that it is highly biased towards homeowners (Filner 2006). In particular, Filner (2006) found that 90 percent of money spent on housing was devoted to home improvement and homebuyer assistance programs. Other issues with the program include an inability to accomplish citywide goals such as affordable housing (Fagotto and Fung 2006), developers being the greatest beneficiaries of the program, difficulty including minorities and non-English speakers, reinforcing existing power structures where the privileged and well-off have the greatest control, and major tension between homeowners and renters (Filner 2006). Although the structural analysis of the program is beneficial to estimate how the program may have impacted neighborhoods, neither of these studies directly addressed the success of each neighborhood in achieving its goals or improving the quality of the neighborhood.

A total of 35 out of 67 neighborhoods completed Phase 1 reviews to evaluate the activities completed and inform the creation of a Phase 2 NAP. These reviews vary greatly in scope and content, although their main purpose seems to be accountability to residents and marketing of NRP activities. For example, the Kenny neighborhood's review is a seven page document that reads like a community newsletter and lists all of the NAP activities from Phase 1 and describes the progress made on each (City of Minneapolis n.d.). The Whittier neighborhood's review is a good example of how some neighborhoods used the review as a marketing tool; the document titled "A Decade of Change" used a graphic design template and many images to illustrate the improvements occurring in the neighborhood. The Linden Hills neighborhood had one of the most extensive reviews at 41 pages long, including a focus group assessment and resident survey. The overarching questions in this review were "How well is the neighborhood association performing?" and "How can the neighborhood association improve?"

which were useful for the neighborhood association to plan for Phase 2 but do not offer any broader conclusions about how neighborhood quality may have been changing.

Much like the academic and professional studies of the NRP, these Phase 1 reviews are limited in that they only cover half of the NRP and cannot assess any long term impacts. Even the most thorough reviews did not analyze the larger picture and overall neighborhood impacts – the reviews focused on each NAP activity. However, reviews like the one by Linden Hills can serve as an example of how to evaluate the perception of projects and short term impacts to the neighborhood to improve strategies in the future. Additionally, the use of resident surveys is an excellent method to gather qualitative data and better understand the perceptions of residents.

2.2 Related Work

2.2.1. Research about Neighborhood Quality

Due to the subjectivity inherent in defining neighborhood quality and resource intensive methods for collecting this data, researchers often use income or housing value taken from census data as an indicator for neighborhood quality. In one example, Bayer et al (2007) used hedonic regression – a regression technique where several explanatory variables account for the change in price over time – to develop a framework for estimating household preferences for schools and neighborhoods, combining variables for race, age, educational attainment, income, homeownership, cost of housing, crime rates, and others to observe whether or not households pay for better (i.e. more expensive) neighborhoods and higher performing schools. In another study linking neighborhood quality with academic performance, Ceballo et al. (2004) chose household income as their indicator for neighborhood quality and compared it with survey data about educational achievement and attitudes. Another study by Demelle et al. (2016) develops a more complicated "Quality of Life Index" comprised of social, physical, economic, and crime

characteristics of a neighborhood, discovering that the quality of surrounding neighborhoods contributes to a neighborhood's improvement or decline.

The choice to use a variety of objective indicators can be problematic, but alternatives exist. Greenberg and Crossney (2007) worked to verify the theory that crime, blight, and other outdoor characteristics influence neighborhood quality by analyzing American Housing Survey data; they concluded that there is a strong negative correlation between neighborhood quality and detrimental outdoor conditions, housing quality, socioeconomic status, and age. One of their main arguments is that although much existing research about neighborhood quality uses census data, the results are limited because the census does not explicitly rate neighborhood quality and researchers must instead use proxies such as more expensive housing, more educated people, new market rate housing, and population growth to indicate a high quality neighborhood. They offer American Housing Survey (AHS) data as a solution because it includes survey questions about three scales – housing unit, neighborhood, and metropolitan area – and most importantly includes questions directly addressing neighborhood and housing quality. Unfortunately, the AHS is limited because it only offers nationwide and metropolitan level summaries and does not provide more granular geographic data. The regional level insights about neighborhood perceptions and housing characteristics make the AHS a beneficial source for this study to establish a baseline before attempting more localized analysis. Census data investigation is still necessary to obtain a fine-grained, neighborhood level perspective, and many of the previously mentioned studies were successful in finding conclusive results with census data.

2.2.2. Assessing the Effects of Community Development Projects

Other cities have attempted to address the problems of urban decline through programs similar to the NRP, and the literature evaluates some of these programs. Donnelly and Majka

(1998) used survey, census, and crime data to track the changes from 1970 to 1990 in the Five Oaks neighborhood of Dayton, Ohio, where residents organized the Five Oaks Neighborhood Improvement Association to respondto a sudden increase in crime and drugs. Their simple analysis of raw data found that crime dropped 24 percent and home sales improved at a rate higher than the rest of the city and the region.

With a more complicated methodology involving the use of Geographic Information Systems (GIS), Perkins et al. (2009) evaluated the success of an urban revitalization project in Salt Lake City, testing if the neighborhoods around a brownfield redevelopment project improved over time. The authors compared blocks adjacent to the project with demographically similar blocks farther from the project with propensity score matching, a regression-based technique that pairs "treatment" neighborhoods with nearby neighborhoods that did not receive treatment based on the similarity of several input variables. Then, the authors utilized hot spot analysis – the Getis Ord Gi statistic – to find whether or not there was significant clustering of home repairs, building permits issued, and independently issued home conditions in the neighborhoods adjacent to the project; this GIS tool identifies areas where indicator values are statistically significantly higher or lower than expected based on the surrounding areas. In another study, Funderberg and MacDonald (2010) employed propensity score matching combined with a hedonic regression model to analyze the effects on neighborhoods adjacent to Low Income Housing Tax Credit properties in Polk County, Iowa. The authors found that housing that concentrated low-income residents was correlated with a slower rate of nearby housing valuation, though they concluded that the evidence is suggestive rather than conclusive. Propensity score matching is an attractive methodological component for this study because it creates a control group for comparison with the treatment group – i.e. the neighborhoods in

Minneapolis that participated in the NRP – in a scenario where the creation of a control group is unethical, infeasible, or impossible.

Hedonic regression models and difference-in-differences design are two viable techniques for this study. As mentioned previously, hedonic regression uses ordinary least squares regression with an indicator as the dependent variable. All of the explanatory variables are potential factors that may affect the value of the indicator. Difference-in-differences (DiD) involves tracking the change of a treatment and control group over time, then subtracting the change in control group from the change in the treatment group. The resulting value provides an estimate of how the treatment may have affected an indicator, either increasing or decreasing the indicator value.

Several studies have demonstrated the feasibility of difference-in-differences and regression. Deng (2011) evaluated the effects of Low Income Housing Tax Credit projects on property values in Santa Clara County, California with hedonic regression and difference-in-differences analysis. Bayer et al (2007) also used hedonic regression to develop a framework to observewhether or not households are willing to pay for better neighborhoods and higher performing schools. Similarly, Brown and Geoghegan (2011) applied hedonic regression and difference-in-differences to assess the effects of a new high-performing school in Worcester, Massachusetts on the neighborhoods. By comparing the change over time between areas within the new school's attendance boundaries and areas outside of the boundaries, the authors found that housing prices within the new school's attendance boundaries increased at a greater rate. Using difference-in-differences and hedonic regression modeling in tandem is important to better isolate the effects of a project on a neighborhood by including a treatment variable in the regression equation and account for the change over time within a similar geographic area. Both

methods must show a significant effect in the same direction, e.g. positive or negative, to draw conclusions about the effects of a project on a neighborhood.

2.3 Summary

The previous evaluation of Phase 1 of the NRP (Berger, et al. 2000) examined the neighborhood level impacts of the program, but the methodology did not account for regional trends or the effects on the actions of renters and the study was completed before many neighborhood associations had spent all of their Phase 1 funding. The studies by Fagotto and Fung (2006) and Filner (2006) evaluated the NRP in terms of its success in engaging residents and strengths and weaknesses of the program structure. Additionally, 35 neighborhoods completed reviews of efforts funded during Phase 1 of the NRP, although these studies were not comprehensive and mostly served as marketing materials for neighborhood associations. This study expands on this prior work and performs an evaluation of the NRP based on its outcomes for housing related expenditures in an attempt to show the success of the program in increasing the quality of housing. Literature about defining neighborhood quality has provided a list of potential indicators and variables to use in this study, including housing cost, poverty levels, vacancy rates, crime, household income, homeownership rates, and educational attainment, while research that evaluated other community development programs has demonstrated different techniques, including propensity score matching, hot spot analysis, difference-in-differences analysis, and hedonic regression, to inform the methodology of this study.

Chapter 3 Methodology

The purpose of this study is to assess the NRP's effectiveness in improving neighborhood quality. First, this chapter describes the research design, establishing the indicators of median household income, median home value, median gross rent, and vacancy rate and continuing with a baseline analysis of AHS data over time to describe the regional level characteristics of housing and neighborhoods. After establishing trends at the regional level, the study explores the data for Minneapolis and St. Paul and compares the two cities, justifying the use of St. Paul as a control. The study then employs propensity score matching to create matched pairs of neighborhoods – one in Minneapolis and one in St. Paul – and uses hot spot, difference-in-differences, and regression analysis to determine whether or not the observed trends are correlated with neighborhood participation in the NRP.

3.1 Research Design

3.1.1. Data Sources

The U.S. Census Bureau provided the main sources of data for this study: AHS data for the Minneapolis-St. Paul metropolitan area from the available years 1989, 1993, 1998, 2007, and 2013; decennial census data for the cities of Minneapolis and St. Paul from 1990; and ACS data for the cities of Minneapolis and St. Paul from 2014. The AHS was chosen as a source because it explicitly details opinions about neighborhoods, among other advantages discussed in Greenberg and Crossney (2007), to depict regional-level trends. Because the AHS does not include data at scales smaller than the metropolitan area, it is necessary to examine decennial census and ACS data to extract trends at the city and neighborhood level

Decennial census and ACS data is frequently used and well-documented in similar studies. This study used decennial census and ACS data summarized at the block group level

because the smaller geographic areas align better with the officially designated Minneapolis neighborhoods from the City of Minneapolis. ACS 5-year estimates for 2014 were selected because the data is more accurate than 1-year or 3-year estimates. All census data and accompanying shapefiles were downloaded from the Minnesota Population Center (Minnesota Population Center 2011).

The City of Minneapolis hosts an online database about the NRP called PlanNet (City of Minneapolis n.d.), allowing users to download NAPs and view summaries about funding amounts, budgets, and expenditures. The City of Minneapolis' website also provided a shapefile of the official neighborhood boundaries (City of Minneapolis 2015). The study combined PlanNet data with the geographic data to enable further analysis. The City of St. Paul does not have a comparable neighborhood structure to Minneapolis, so 1990 census tracts were used because they closely match with Minneapolis neighborhoods in both size and number (71 neighborhoods in Minneapolis versus 82 in St. Paul).

Due to the change in block group boundaries over time, areal interpolation estimated the indicator values for each neighborhood in Minneapolis and St. Paul in both 1990 and 2014. Although this technique introduces uncertainty to the data, maintaining constant geographic boundaries is essential to performing neighborhood level analysis.

3.1.2. Indicators

Because of the lack of survey data about perceived neighborhood quality at a fine-grained geography, it is necessary to use other neighborhood characteristics as a proxy for quality. Previous literature has used a variety of indicators and combinations of indicators to determine neighborhood quality. Ultimately, the researcher chose median household income, median home

value, median gross rent, and vacancy rate to investigate neighborhood quality; throughout this study, these indicators are referred to as income, home value, rent, and vacancy rate.

Household income and housing cost are two frequently used indicators from the literature. Median household income is one of the most commonly used indicators, and Ceballo et al. (2004) used income as the only indicator for neighborhood quality. Households with a higher than average income have more mobility and are able to select the most attractive neighborhoods whereas low-income households must search for the most affordable neighborhoods and sacrifice quality for price.

The studies by Filner (2006) and Fagotto and Fung (2006) that evaluated the NRP identified a major split between homeowners and renters; to capture the differences between the two groups, it is essential to include both median gross rent and median house value. Home value provides a better estimate of neighborhood quality than monthly housing cost because mortgage payments reflect the value of the home at the date of purchase and do not respond as quickly to neighborhood change. Similar to the relationship between income and neighborhood quality, areas where housing prices are higher than average implies that there is a greater demand while low prices indicate lower demand.

Housing vacancy is another indicator used in this study because it can show both the demand and the health of the neighborhood. In this study, vacancy rate was calculated by dividing the number of vacant units by the total number of housing units. A low vacancy rate suggests a neighborhood is popular and in high demand. High vacancy rates can indicate a glut of housing supply and inadequate demand and the presence of dilapidated, empty, and condemned housing. For example, the NAP for the Jordan neighborhood mentioned that the number of boarded and vacant houses was a problem and offered strategies to counter the issue.

All monetary values were adjusted for inflation using the average annual Consumer Price Index (CPI) (Bureau of Labor Statistics, U.S. Department of Labor 2016), and all dollar figures are displayed in 2015 dollars unless specified otherwise. Because the four indicators chosen are reflective of the region as a whole, it was necessary to normalize each indicator by calculating the difference between the neighborhood value and the regional average. The regional averages were taken from 1990 and 2014 census data for the Minneapolis – St. Paul, MN-WI Metropolitan Statistical Area, using median household income, median home value, and vacancy rate calculated as the number of vacant units divided by the number of housing units – defined as any dwelling unit, either owned or rented regardless of whether or not the unit is occupied. Normalization also adjusts the values to regional trends; for example, if home values diminished during a recession, the normalized value would show which neighborhoods retained home value despite the un-normalized values showing a loss. This calculation also makes neighborhoods easily comparable, which is essential for analysis of the difference between Minneapolis and St. Paul.

Some other indicators commonly used in the literature were crime, average square footage, and average lot size. The main reason for omitting these indicators is data availability – while neighborhood level data is available for these attributes for recent years, data for the baseline and earlier years either does not exist or is inaccessible. The Minneapolis Police Department does have crime data available from the past; however, it does not show crime rates at the neighborhood level and provides only a citywide summary. Data for building square footage and lot size are maintained by the County Assessor for Hennepin and Ramsey Counties, but data is not readily available. Given the position of Minneapolis as a developed central city in the region, most new development would be infill and lot sizes and building square footage are

unlikely to change significantly. As such, including these indicators would not add depth to the analysis.

3.1.3. Propensity Score Matching

One of the difficulties in assessing the success of a citywide program is that there is not a naturally occurring control group for comparison. There are two solutions to this problem: attempt to isolate the effects of the program on an indicator by accounting for other variables that affect that indicator; or somehow create an artificial control group. As suggested by previous literature review, numerous variables affect neighborhood quality, so trying to isolate the NRP's impacts on such a complex phenomenon is especially difficult. Because this study uses a difference-in-differences design (where the fundamental assumption is that the control and treatment groups would have experienced the same outcomes if treatment did not occur), it is essential that the control groups are nearly identical. One study (Funderburg and MacDonald 2010) had success using propensity score matching to develop a control group.

Propensity score matching is a method used to select control neighborhoods that match the treatment neighborhoods based on the propensity score taken from a regression equation. Minneapolis is unique in that it abuts a city, St. Paul, that is nearly the same population, racial and ethnic composition, size, and urban form – St. Paul has a defined downtown and urban neighborhoods. In addition, the median values for each of the four indicators are similar for each city, as evidenced in the previous section. As such, this is a perfect situation for using propensity score matching to create a control group.

This study employed the MatchIt package in R using 1990 values for the study's main indicators as input variables: income, home value, rent, and vacancy rate. The package outputs a list of neighborhood pairs, with one neighborhood in Minneapolis and its similar counterpart in

St. Paul. Figure 3 below shows lines connecting each neighborhood pair; there were no discernable geographic patterns in the matches.

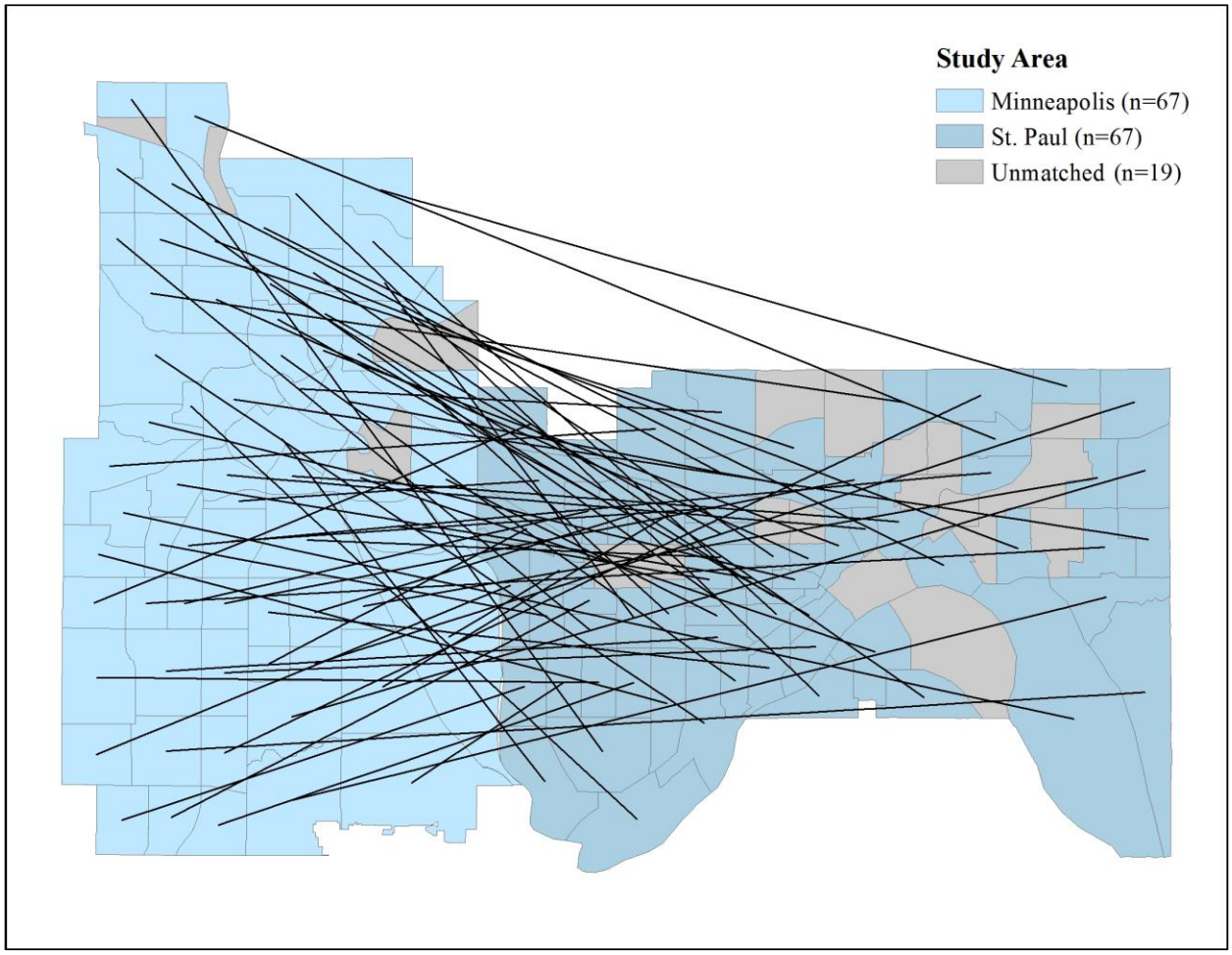

Figure 3: Matched neighborhood pairs resulting from propensity score matching

3.1.4. Difference-in-differences Analysis

Difference-in-differences (DiD) is a popular technique used to assess the effect of treatment over time in comparison to the control group. The equation used is below, where $\Delta Indicator$ represents the difference between the indicator value in the base year 1990 and the horizon year 2014.

$$DiD = \Delta Indicator_{Minneapolis} - \Delta Indicator_{St.Paul}$$

The main strength of this design is that it can isolate the effects of the NRP and control for external factors that would otherwise affect the indicators – for example, new construction and vacancy rates can affect average monthly housing cost. Subtracting the same indicator from the control neighborhood enables this isolation of treatment effects, given the assumption that the matched treatment and control neighborhoods would have experienced the same outcomes in the horizon year in the absence of intervention.

A positive DiD value when using the indicators for income, home value, and rent, and a negative value for the indicator for vacancy rate imply that neighborhood quality in Minneapolis increased at a rate greater than in St. Paul. By understanding whether or not there was a difference in neighborhood quality change between the two cities, this may suggest that the NRP may have affected the neighborhoods.

Following the calculation of DiD values, the study used statistics and spatial analysis to find patterns and clusters. First, a t-test checked if the control group was significantly different from the treatment group. Next,hot spot analysis (Getis Ord Gi statistic) located any statistically significant hot or cold spots. Then, cluster-outlier analysis (Anselin Local Moran's I) checked for significant clusters of high and low values and outliers where a high value was surrounded by low values or a low value was surrounded by high values. Finally, the study checked for spatial

autocorrelation using Moran's I, determining whether or not statistically significant clustering occurred. All of this spatial statistic testing employed a spatial weights matrix to define the relationships between neighborhoods; the researcher employed highways, railroads, industrial areas and water bodies as barriers and verified using aerial imagery to check whether or not the residential portion(s) of each neighborhood were connected.

3.1.5. Regression Analysis

Next, Ordinary Least Squares (OLS) regression analysis tested whether the change was related to the NRP or to other external factors. The equation is below:

$$\Delta Indicator = \alpha + \beta Indicator_0 + \gamma Test + \varepsilon$$

This equation examines the correlation between the change in an indicator value from 1990 to 2014 based on that indicator's value in 1990 ($Indicator_0$) and a *Test* variable that represents one of many different relationships tested by swapping the *Test* variable; no combinations of test variables were used because the purpose of this analysis was not to predict the change but rather to find statistically significant relationships. As such, coefficient γ is the main indicator for the effect of each *Test* variable. If this coefficient has a statistically significant p-value, then this indicates there is a relationship between the *Test* variable and the change in indicator value. The sign of the coefficient – either positive or negative – indicates if the test variable caused an increase or decrease in the dependent variable. When the dependent variable represents the change in income, home value, or rent, a positive coefficient is interpreted as a positive result and when the dependent variable represents the change in vacancy rate, a negative coefficient is interpreted as a positive result.

In addition, the other coefficients must be significant to conclusively indicate a relationship between the change in indicator and coefficient γ. Coefficient α represents the y-

intercept of the equation, the value when the other terms in the equation are zero. Coefficient β is a magnitude of the base value of the indicator – this value should be close to one because the change in indicator value should equal the base year indicator plus some number equivalent to the effect of the *Test* variable. The term ε represents the error or the difference between actual observed values and the predicted value based on this equation.

This study is not trying to develop a predictive model that shows exactly how the NRP may have contributed to the change in neighborhood quality, so the tests are mainly looking at coefficient significance to conclude whether or not there is a relationship with the NRP and the change in an indicator. The R-squared values are not as important, though a high R-squared value would certainly bolster the findings. However, it is unlikely that such simple equations could possibly explain the complex systems that change each of the indicator values. Examples in the literature justify the method of evaluation in this study. Gurley-Calvez et al. (2009) that used regression to evaluate the New Markets Tax Credit Program, and the different models used did not produce an R^2 above 0.20; the authors mainly evaluated the coefficients, identifying statistically significant coefficients using p-values lower than 0.05. Another study by Baum-Snow and Marion (2009) also yielded low R^2 values, but they relied heavily on charts plotting the data with regression lines to strengthen their argument, showing an apparent trend despite a poorly-fitted model. Although a higher R^2 value implies more precise results, a statistically significant coefficient γ is more important to assess the success of the NRP because the goal of this study was to test if treatment has a significant effect on an indicator.

The test variables used in this study were neighborhood participation in the NRP, amount of NRP funding received, amount of NRP funding spent on housing related activities, the effects of a neighbor's funding level, and the number of days since the approval of a neighborhood's

Phase I NAP. The first test evaluated the relationship with the participation of a neighborhood in the NRP by using neighborhoods from both Minneapolis and St. Paul. The equation was tested twice, first using every neighborhood in Minneapolis and St. Paul, and then only using the neighborhoods from the two cities that were matched with propensity score matching to see how matching affected the results. The test variable used was a dummy variable where a value of one represents that a neighborhood that received NRP funding and a value of zero represents that a neighborhood did not or was located in St. Paul. This design shows if there is a significant difference between NRP neighborhoods and the neighborhoods that did not receive funding because neighborhoods with a test variable value of zero have no effect on the coefficient. Thus when evaluating the results, a positive coefficient γ demonstrates that NRP neighborhoods generally experienced an increase greater than other neighborhoods equal to the value of coefficient γ, and a negative value means there was a decrease of γ. Note that the p-value for this coefficient must also be statistically significant for this value to be meaningful.

The next test evaluated the relationship of the total amount of NRP funding and the amount of NRP funding spent on housing related activities in each neighborhood. Only neighborhoods in Minneapolis that received funding were included in this test. Both of the variables were normalized by dividing by the total number of households in a neighborhood to account for any differences in funding levels attributed to the number of households. After that, another test used a variable representing the number of days between Phase I NAP approval and January 1, 2014 and only included neighborhoods in Minneapolis that received funding to account for the great variation in "start dates" for each neighborhood, i.e. when that neighborhood received Phase I NAP approval and could receive funding.

Lastly, a test evaluated the relationship between a neighbor's funding level and the change in indicator value, again only using neighborhoods in Minneapolis that received NRP funding. The first step in this test used the spatial weights matrix used in the spatial statistics of DiD analysis to determine neighborhood relationships. For each neighborhood, the highest funded adjacent neighbor was selected and was input as a variable in the regression. Using those same values, a dummy variable was created where a value of one represented that the neighborhood received less funding than at least one neighbor and a value of zero represented that the neighborhood received the same or more funding than all of its neighbors. Then, this dummy variable was input in the regression equation.

Geographically weighted regression (GWR) was ultimately deemed inappropriate based on the equations and the structure of the underlying test variables. Because the equations only tested one variable at a time, the coefficient of each test variable would function as a magnitude of the $Indicator_0$ value, so any geographic variation would not be as meaningful. Additionally, the use of a dummy variable for NRP participation requires using St. Paul neighborhoods since only four neighborhoods in Minneapolis did not participate; as such, any local variation where the value is zero is meaningless. Similarly, the variables for the amount of time in NRP and NRP funding amounts are only relevant in Minneapolis neighborhoods and there are not enough zero values to make this analysis meaningful. Combining any of the test variables in a multivariate equation is not necessary because this study is not trying to predict the change in indicator values – too many external factors that affect neighborhood quality are omitted.

3.2 Regional Level Analysis

This section attempts to understand the general conditions of housing and the neighborhoods in the Minneapolis-St. Paul metropolitan area using American Housing Survey (AHS) data from 1989-2013. Analyzing the condition and opinion of housing and neighborhoods within the metropolitan area establishes a baseline for local level analysis. The AHS was chosen to provide insights about neighborhood quality that are not apparent in census data. This study later compares the results of AHS analysis to census data for the City of Minneapolis during the same time period to account for any differences. It is expected that trends in the AHS metropolitan dataset would match trends in the census for Minneapolis. This data illustrates the demographics and neighborhood perception within the metropolitan area, allowing for a baseline understanding of the regional level changes occurring during the time period for later thesis study. It is important to understand regional trends before drawing conclusions at a more localized scale.

3.2.1. Demographic and Housing Stock Characteristics

Table 1 below shows the AHS results for the four indicators used in this study. Income, home value, rent all increased and vacancy rate decreased from 1989 to 2013. Comparing 2007 to 2013, the effects of the recession are apparent in the major decrease in income, home value, and rent.

Table 2 below portrays a division in income between renters and owners. While it appears that the regional median household income has increased over time, income actually decreased for renters and increased for owners. Exacerbating renters' shrinking income is the increase in rent cost over time as shown in Table 1.

Table 1: American Housing Survey (AHS) Indicator Values for the Minneapolis-St. Paul Metropolitan Area 1989-2013

	1989	1993	1998	2007	2013
Income	$66,498.56	$65,916.97	$67,772.32	$75,288.63	$70,202.54
Home Value	$168,612.75	$153,770.72	$178,306.58	$305,190.54	$203,485.62
Rent	$917.49	$1,202.31	$1,142.92	$1,562.96	$1,283.99
Vacancy Rate	6.5%	5.7%	3.1%	7.2%	4.8%

Source: (U.S. Census Bureau 1992; U.S. Census Bureau 1995; U.S. Census Bureau 2000; U.S. Census Bureau 2009; U.S. Census Bureau 2015)

Table 2: Median Household Income for Renters and Owners in Minneapolis-St. Paul Metropolitan Area 1989-2013

	1989	1993	1998	2007	2013
All	$66,498.56	$65,916.97	$67,772.32	$75,288.63	$70,202.54
Owners	$80,253.19	$79,053.78	$84,607.80	$91,210.96	$85,463.96
Renters	$41,348.00	$37,827.59	$34,288.94	$36,597.57	$34,594.59

Source: (U.S. Census Bureau 1992; U.S. Census Bureau 1995; U.S. Census Bureau 2000; U.S. Census Bureau 2009; U.S. Census Bureau 2015)

3.2.2. Neighborhood Opinion

The most valuable part of AHS data for this study is the neighborhood opinion score, where respondents rate their neighborhood on a scale from 1 (worst) to 10 (best).

Figure 4 below illustrates the change in average score over time for all residents, owners, and renters. Overall, residents in the region have a relatively high opinion of where they live, and the opinion has only fluctuated slightly over time. Renters have a noticeably lower opinion than homeowners, but the opinion of renters has risen over time by approximately half a point. Because there are more homeowners than renters, the overall curve is more similar to the trend in homeowner opinion. Looking back to the analysis of the indicator values, it is interesting to see

that neighborhood opinion is not related to home value or rent. Despite a major loss in median house value from 2007 to 2013, homeowner opinions continued to rise, and changes in rent and income do not affect the opinions of renters.

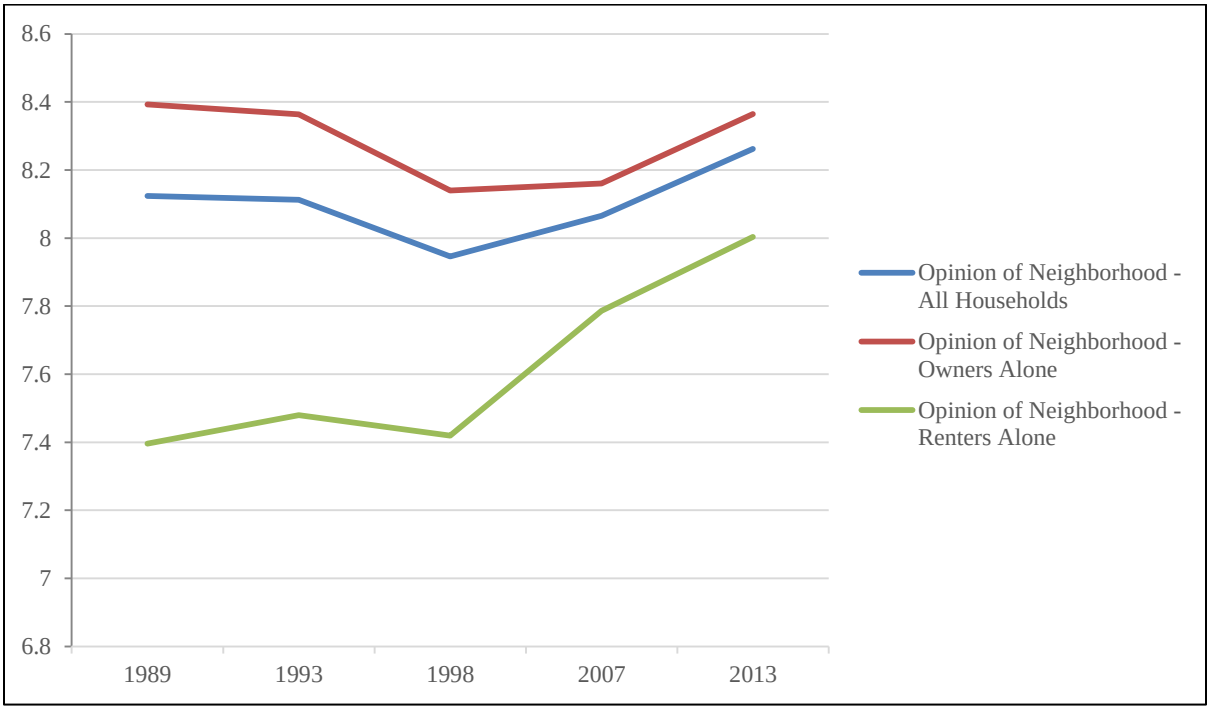

Figure 4: Neighborhood Opinion from 1 (worst) to 10 (best) using data from the American Housing Survey *Source:* (U.S. Census Bureau 1992; U.S. Census Bureau 1995; U.S. Census Bureau 2000; U.S. Census Bureau 2009; U.S. Census Bureau 2015)

3.3 City and Neighborhood Level Data Analysis

This section compares Minneapolis to St. Paul to demonstrate the similarity between the two cities and justify the use of St. Paul as a control, then uses summary statistics to extract trends. After analyzing census data, this section examines neighborhood level data about the NRP and detects priorities based on funding amounts and categories. Data comes from the City of Minneapolis's online database about the NRP, PlanNet, and includes information about each neighborhood, the amount of funding allocated in the program, categories in which

neighborhoods spent funding, and the specific activities funded in the program. Note that this section uses indicator values normalized with the regional average – negative numbers represent a median below the regional average.

3.3.1. Comparing Minneapolis and St. Paul

First, the median neighborhood value for was calculated using values normalized with the regional average – negative numbers represent a median below the regional average. On the surface, the two cities are very similar. As shown in Table 3 below, both cities were founded in the mid-nineteenth century and have a similar area. Minneapolis has a greater population and higher population density.

Table 3: Population and Area of Minneapolis and St. Paul in 1990

	Minneapolis	**St. Paul**
Established	1867	1854
Area (sq. mi)	58.4	56.2
Population	368,383	272,235
Density (pop./sq. mi)	6,308	4,844
White, Non-Hispanic	77.5%	80.4%
Black or African American	13%	7.4%
Hispanic or Latino	2.1%	4.2%
Asian	4.3%	7.1%

Source: (Minnesota Population Center 2011)

The critical assumption of difference-in-differences analysis is that the treatment and control groups are similar in the base year and would be expected to perform the same over time without any treatment occurring. Table 4 below shows the similarity in median indicator values for both cities. St. Paul has a higher median neighborhood income while Minneapolis has a higher home value, rent, and vacancy rate. However, these values are similar enough to justify the use of St. Paul as a control group.

Table 4: Comparison of Median Neighborhood Normalized Indicator Values in 1990

n=153	Minneapolis, n=71	St. Paul, n=82
Income	-$15,431.23	-$18,047.93
Home Value	-$38,229.91	-$35,148.76
Rent	-$39.90	-$85.86
Vacancy Rate	1%	0%

Source: (Minnesota Population Center 2011)

When looking at the mean neighborhood change from 1990-2014 (Table 5), the average Minneapolis neighborhood experienced an increase in income, home value, rent, and vacancy rate while the average St. Paul neighborhood experienced the opposite. Except for vacancy rate, these values suggest that Minneapolis neighborhoods improved during the time period while St. Paul neighborhoods declined. Difference-in-differences analysis performed later will determine if the increase suggested in the table still occurs when comparing similar neighborhoods.

Table 5: Change of Mean Neighborhood Normalized Indicator Values from 1990-2014

n=153	Minneapolis, n=71	St. Paul, n=82
Income	$3,978.15	-$454.18
Home Value	$38,360.64	-$46,412.02
Rent	$146.32	-$30.90
Vacancy Rate	2%	-1%

Source: (Minnesota Population Center 2011)

3.3.2. Neighborhood Analysis

This portion examines data from the NRP database to find trends in funding allocations by category. One important note is that the City set a goal for 52 percent of NRP dollars to fund housing related projects, and this priority is reflected in the allocation data.

The funding allocations for each neighborhood by category are available in Appendix A. As expected, housing received the highest proportion of funding at 52 percent, followed by economic development at 13 percent and parks/recreation and human services both at 7 percent. Nearly 90 percent of the neighborhoods of the 73 neighborhoods invested funding in housing, and over 60 percent of the neighborhoods spent more than half of their funding on housing.

Comparing Figures 5 and 6, neighborhood funding is loosely correlated with the type of neighborhood. The "redirection" neighborhoods near the center and northwest portion of the city are some of the worst areas, and the amount of funding reflects the degree of need as shown by the average values in Table 6 below. Each neighborhood self-selected its type while funding was allocated based on a formula using poverty level and other characteristics, explaining why there is not a perfect match between funding amounts and neighborhood type.

Table 6: Average Indicator Values by Neighborhood Type

	Protection	**Redirection**	**Revitalization**
N	27	12	28
Funding per Household	$3,358.49	$16,274.02	$8,594.55
Days Eligible for Funding	5981	6431	5798
1990 Income	$5,577.86	-$36,987.12	-$20,963.22
1990 Home Value	$41,104.31	-$40,990.85	-$43,029.59
1990 Rent	$93.02	-$219.41	-$69.95
1990 Vacancy Rate	-0.5%	8.3%	1.1%
Δ Income	$10,061.37	$1,928.09	$2,532.48
Δ Home Value	$82,283.55	-$1,669.35	$15,188.52
Δ Rent	$171.49	$67.79	$146.62
Δ Vacancy Rate	1.9%	-4.2%	3.8%

Source: (Minnesota Population Center 2011; Minneapolis, PlanNet n.d.)

As shown in Appendix A, there is a large difference in the amount of funding received, ranging from $400,000 to $18 million. Figure 6 displays the Phase 1 funding allocation per household, illustrating where the city concentrated funds and demonstrating the wide range in

per household funding amounts – ranging from $193 to over $18,000. Because of the major difference between each neighborhood's allocation, neighborhood funding amounts are an important variable for analysis.

Neighborhood Action Plans were approved during a wide range of dates, with Phase I plans approved for Whittier as the earliest in July 1992 and Cedar-Riverside as the latest in December 2007. Phase II plans were approved between December 2004 and December 2015. This wide range of dates means that it will be crucial to use the most recently available dataset for analysis and to compare multiple years rather than one starting and one ending year, similar to the analysis of AHS data in the earlier section.

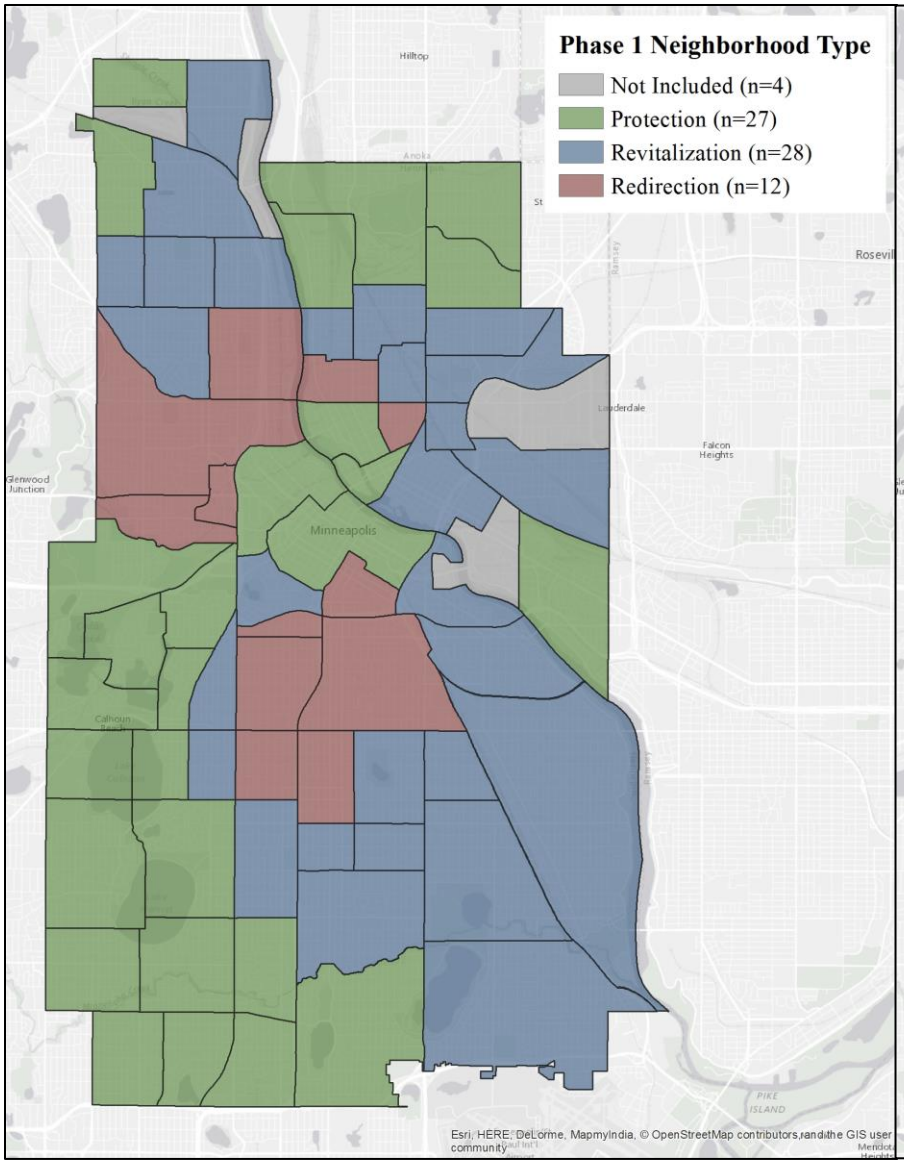

Figure 5: Phase 1 Neighborhood Types *Source:* (City of Minneapolis n.d.)

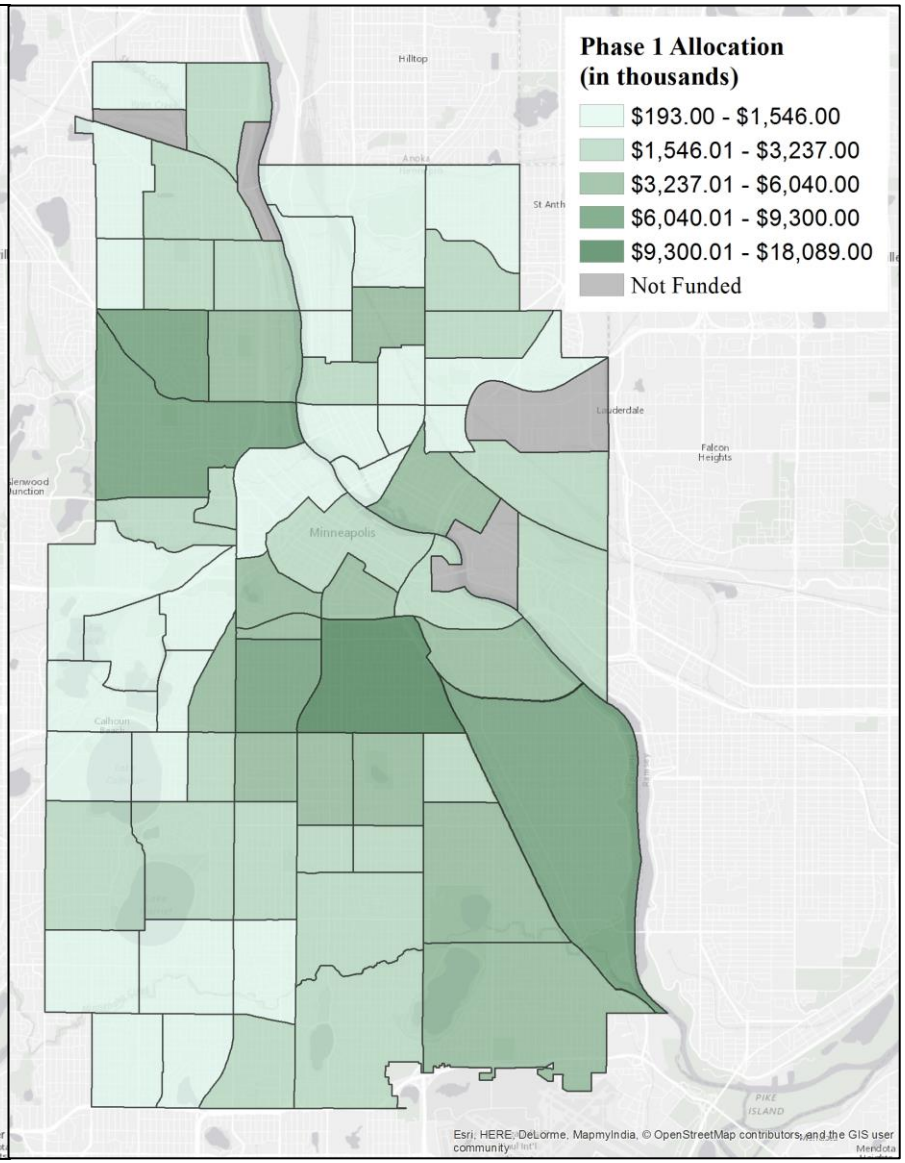

Figure 6: Phase 1 Neighborhood Allocations in Dollars per Household *Source:* (City of Minneapolis n.d.)

Spatial statistics – Moran's I and Getis-Ord Gi – assessed if the changes in each indicator value from 1990-2014 in Minneapolis were spatially autocorrelated and if there were any statistically significant hot or cold spots. Table 7 below displays the results of the spatial autocorrelation test. Using a confidence level of 95%, a p-value less than 0.05 and a z-score higher than 1.96 suggest that the spatial distribution of values is not due to random chance. As such, the change in income, home value, and vacancy rate are all spatially autocorrelated.

Table 7: Moran's I Spatial Autocorrelation Results for Change in Indicator Value

	Index	Z-score	p-value
Δ Income	0.3161	3.3893	0.0007
Δ Home Value	0.4426	4.7546	0.0000
Δ Rent	-0.0707	-0.5701	0.5686
Δ Vacancy Rate	0.3946	4.2868	0.0000

The figures on the following pages illustrate the results of hot spot analysis for each of the four indicators. This hot spot analysis checks for areas where indicator values are significantly higher or lower than neighboring values and allows for comparison with later analysis of difference-in-differences values. When looking at income, the entire downtown area (in the center) is identified as a hot spot for income change, and neighborhoods to the northwest of downtown the city is a cold spot. The lone cold spot is the Kenwood neighborhood – one of the wealthiest in the city. Similarly, displaying hot spots for home value change shows downtown as a hot spot and the northwest as a cold spot, with the addition of the southwest portion of the city – another wealthy area – as a hot spot. Hot spot analysis for rent change in returned many of the same hot spots as with home value. Finally, hot spot analysis for vacancy rate change in also depicts the northwest as a hot spot (which means vacancy rate increased) and south central Minneapolis as a cold spot.

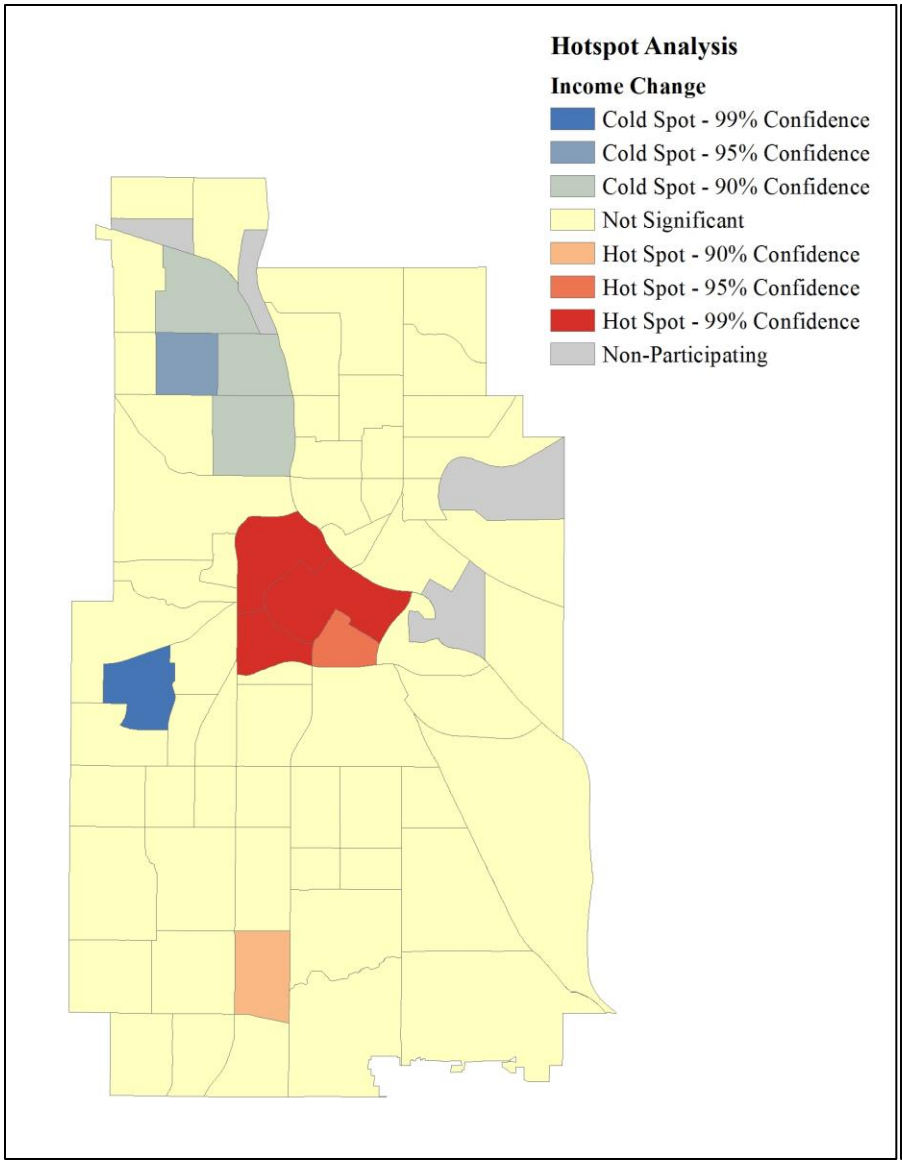

Figure 7: Hot spot Analysis of Income Change from 1990-2014

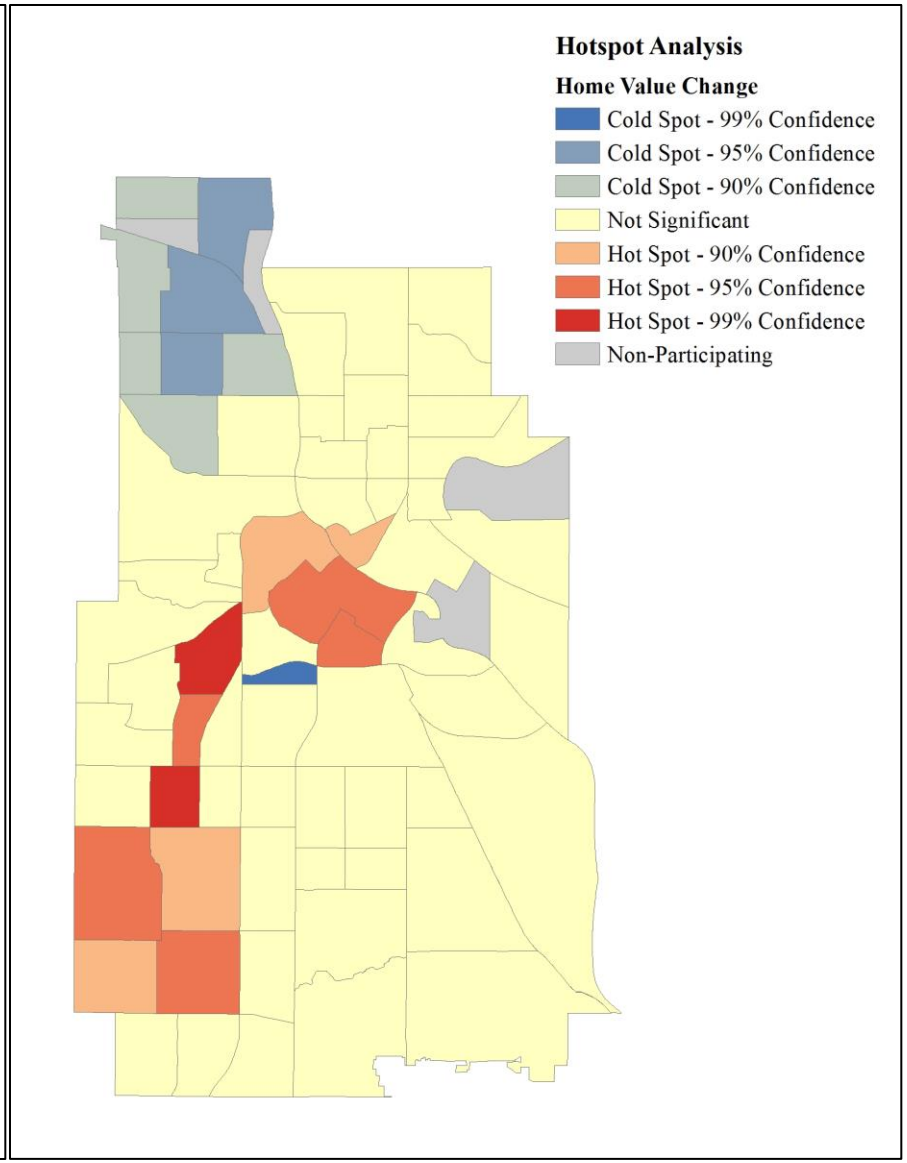

Figure 8: Hot spot Analysis of Home Value Change from 1990-2014

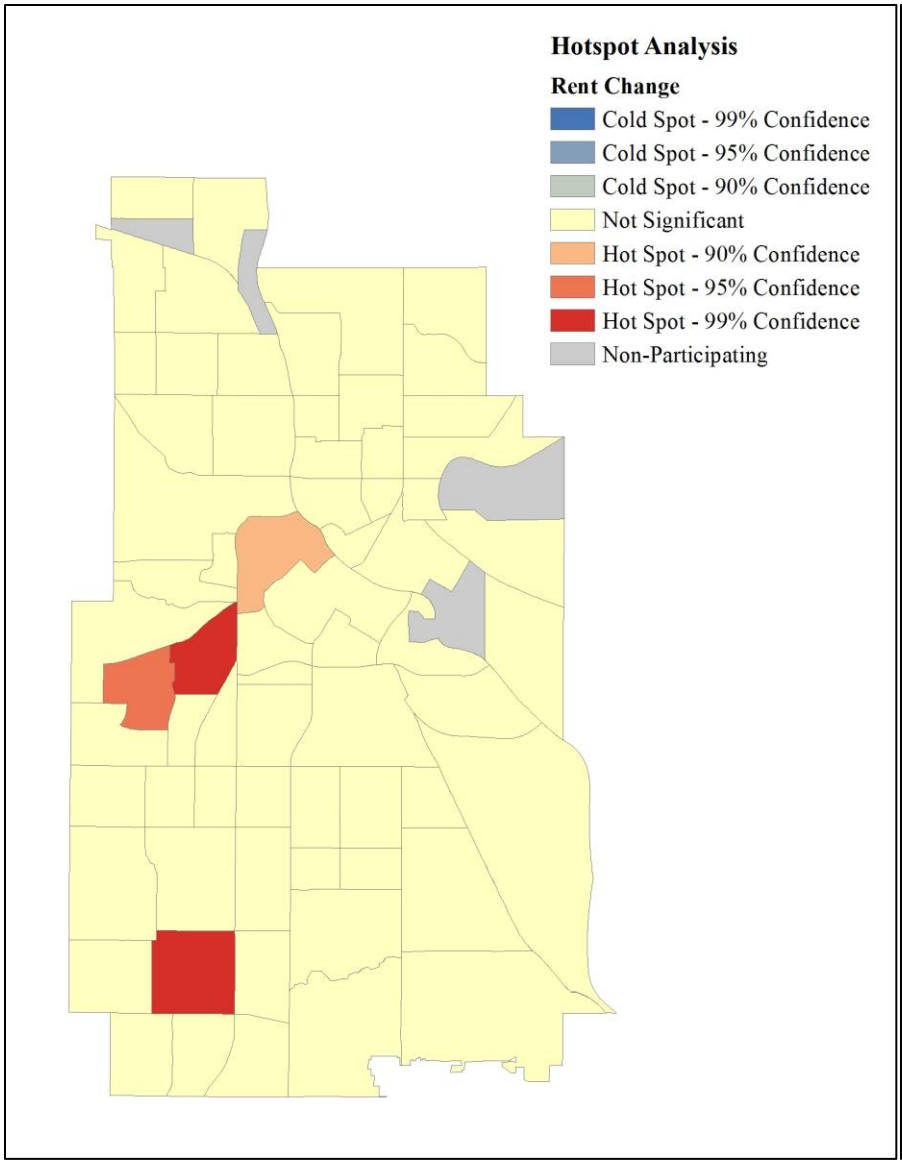

Figure 9: Hot spot Analysis of Rent Change from 1990-2014

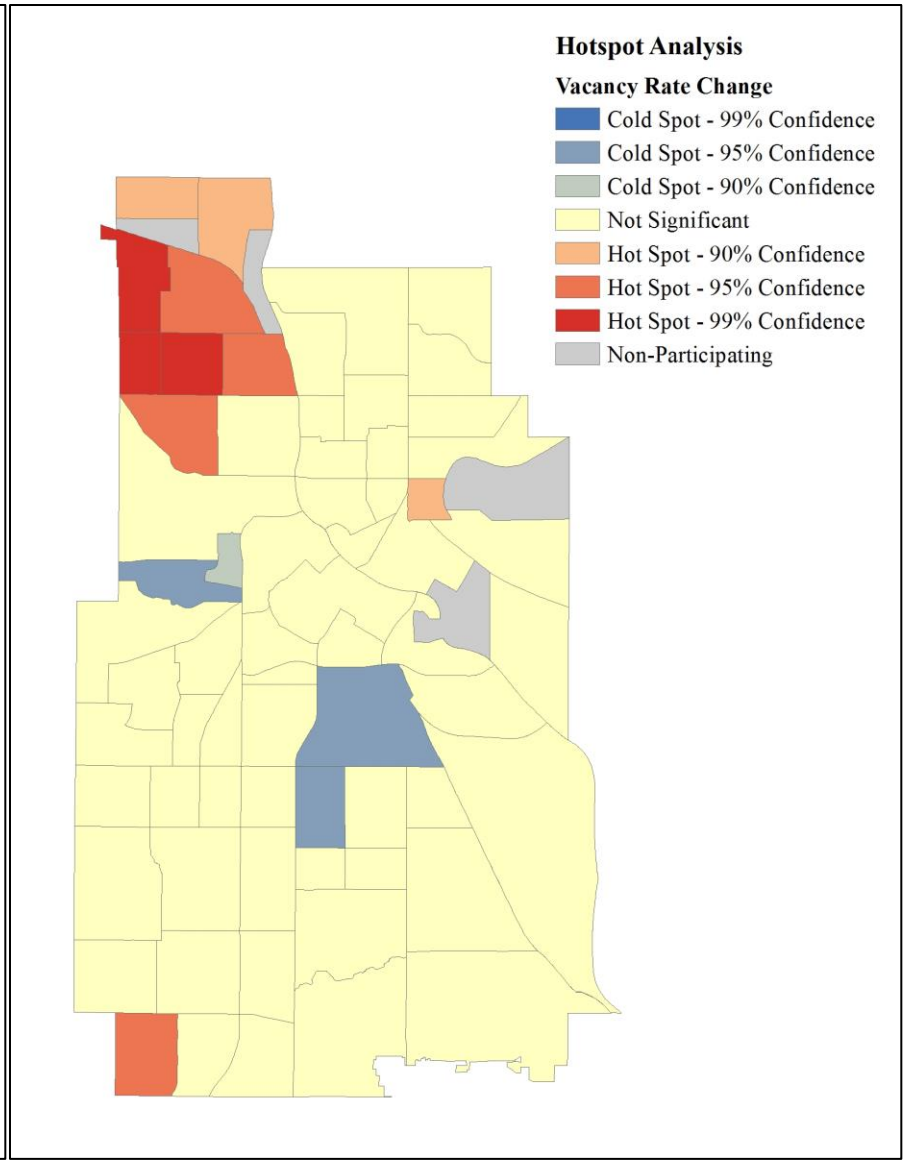

Figure 10: Hot spot Analysis of Vacancy Rate Change from 1990-2014

Chapter 4 Results

This chapter presents the results of the analysis presented in the previous chapter to test the hypothesis that the neighborhoods that participated in the NRP experienced an increase in neighborhood quality. DiD results indicate that Minneapolis generally performed better than St. Paul during the study period, and hot spot analysis found several hot and cold spots for each indicator. Regression results were inconclusive for variables for funding amounts, number of days participating in the NRP, and neighbor funding levels, though there is a relationship between NRP participation and the indicators for home value and rent. Chapter 5 will discuss these results further and offer explanations for the performance of Minneapolis and its neighborhoods.

4.1 Difference-in-differences

The results of the difference-in-differences test are in Table 8. Both the mean and the median DiD value suggest significant improvement for income, home value, and rent in Minneapolis neighborhoods; however, the median and mean DiD for vacancy rate increase in Minneapolis neighborhoods. The final column in the table represents the percentage of Minneapolis neighborhoods where the DiD value is positive for income, home value, and rent or negative for vacancy rate. Both home value and rent increased for a large majority of Minneapolis neighborhoods, while only around half of the neighborhoods improved when looking at income and vacancy rate.

Table 8: Difference-in-Differences Summary Statistics

n=134	Median	Mean	St Dev	Min	Max	% Improved
Income	$3,338.14	$4,317.56	$20,827.88	-$85,192.50	$46,420.47	56.7%
Home Value	$73,528.37	$78,966.44	$88,071.31	-$190,910.00	$328,783.30	86.6%
Rent	$142.92	$176.10	$296.45	-$552.67	$1,762.10	76.1%
Vac. Rate	1%	2%	9%	-18%	35%	46.3%

Following the calculation of DiD values, a t-test was used to determine whether the group of Minneapolis neighborhoods was significantly different from the group of St. Paul neighborhoods. Table 9 below displays the results of the t-test. Both home value and rent were found to be significantly different at the 0.01 alpha level while income and vacancy rate were only different at the 0.10 alpha level. This means that the finding from the DiD analysis that home value and rent increased for a majority of neighborhoods is significant.

Table 9: T-Test Comparing Minneapolis and St. Paul by Indicator Value

	T-value*	0.01	0.05	0.1
Income	1.925	False	False	True
Home Value	7.145	True	True	True
Rent	5.330	True	True	True
Vacancy Rate	1.915	False	False	True

*The critical t-values using 132 degrees of freedom were 2.613 for 0.01, 1.978 for 0.05, and 1.656 for 0.10

Figure below displays the DiD results on a map, shading each neighborhood based on the number of indicators that showed improvement over St. Paul from 1990-2014. Notably, every single neighborhood that received NRP funding had at least one indicator show improvement. The neighborhoods in downtown Minneapolis (located in the center of the map)

showed improvements in all four indicators; this is unsurprising because the City invested heavily in revitalizing downtown during the 1980s, giving this area a head-start.

Similarly, Figures 12-15 below illustrate the spatial distribution of DiD values for all four indicators. Again, the maps show the area around downtown Minneapolis experienced an increase in both indicators. A large majority of neighborhoods experienced an increase in home value greater than $50,000 with the highest increases concentrated in the center and southwest portions of the city. The areas showing an increase in rent do not necessarily coincide with areas that experienced an increase in home value and vice versa.

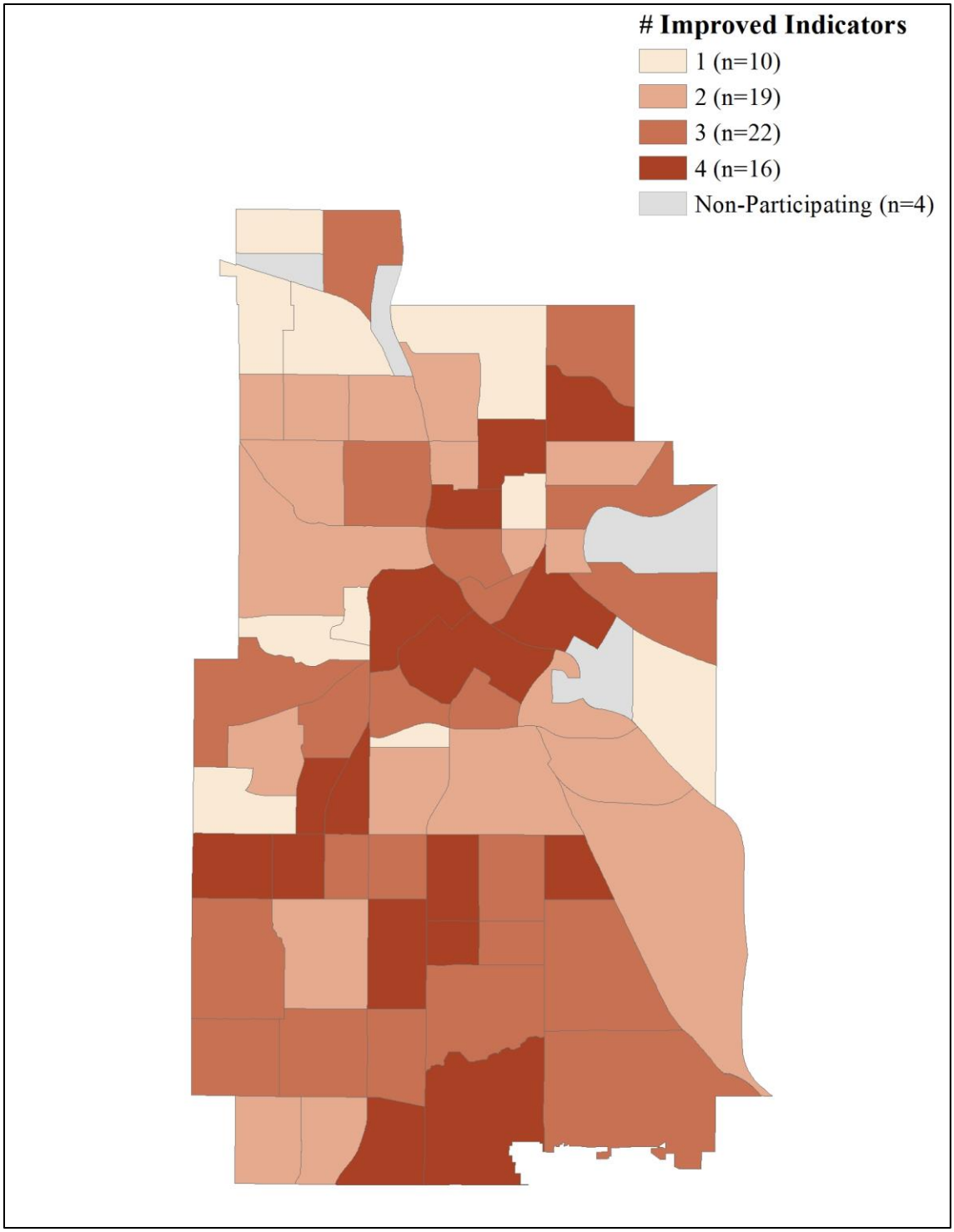

Figure 11: Number of indicators in which each neighborhood showed improvement compared to St. Paul

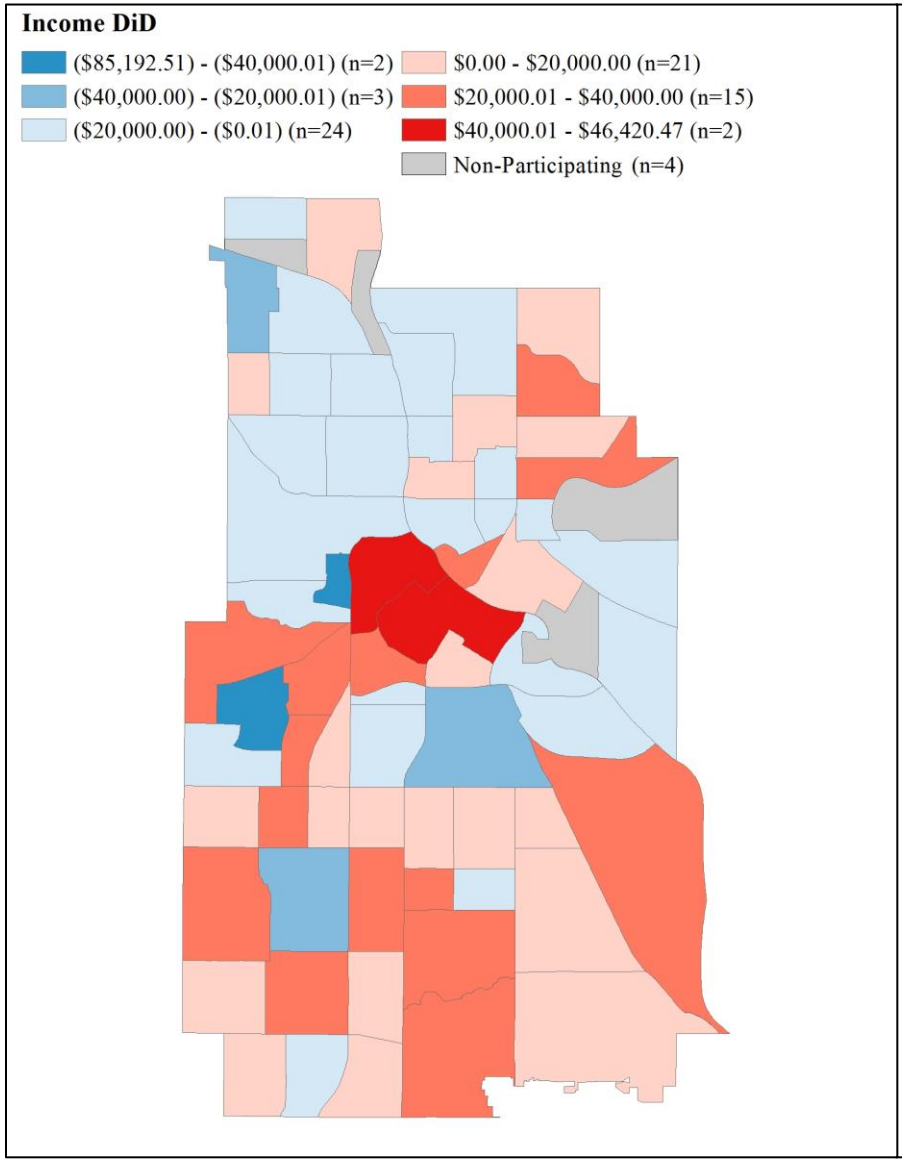

Figure 12: Income Difference–in-Differences Value by Neighborhood

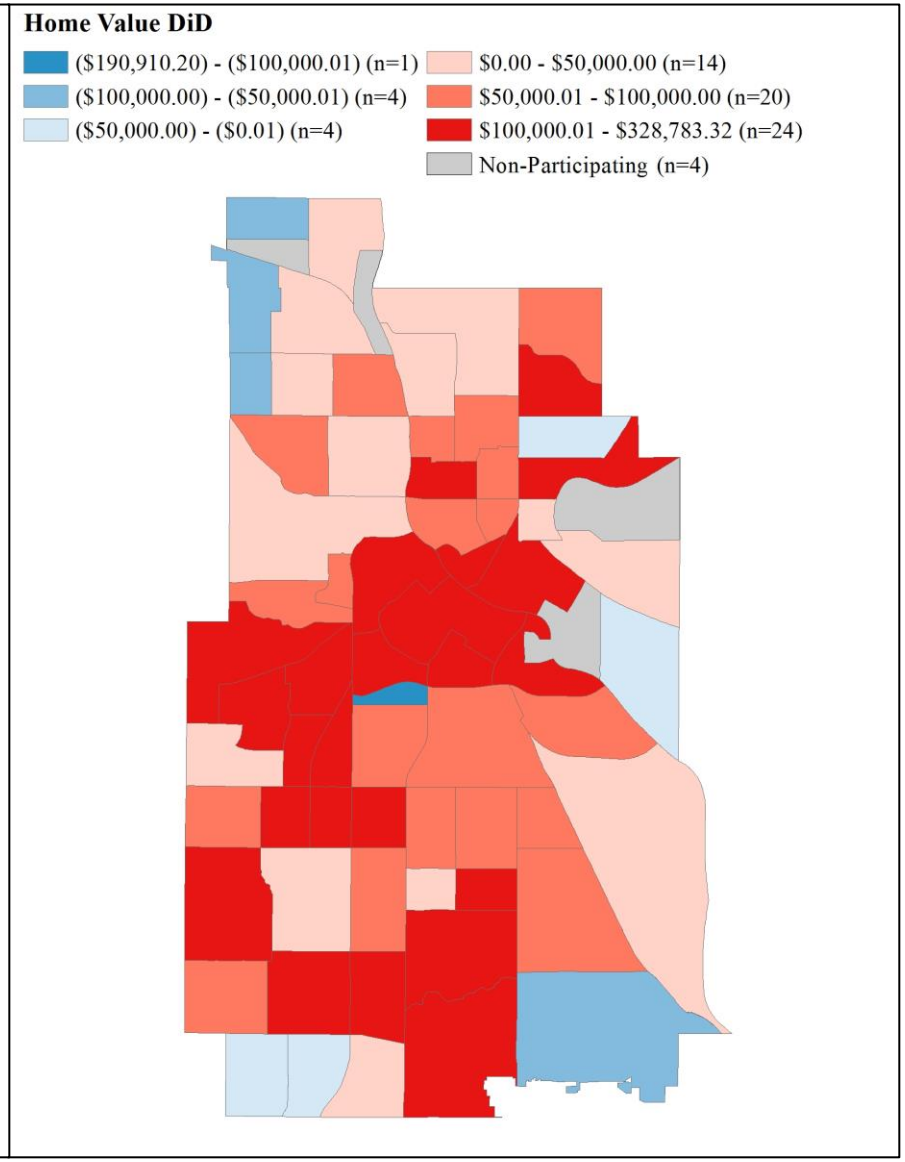

Figure 13: Home Value Difference-in-differences Value by Neighborhood

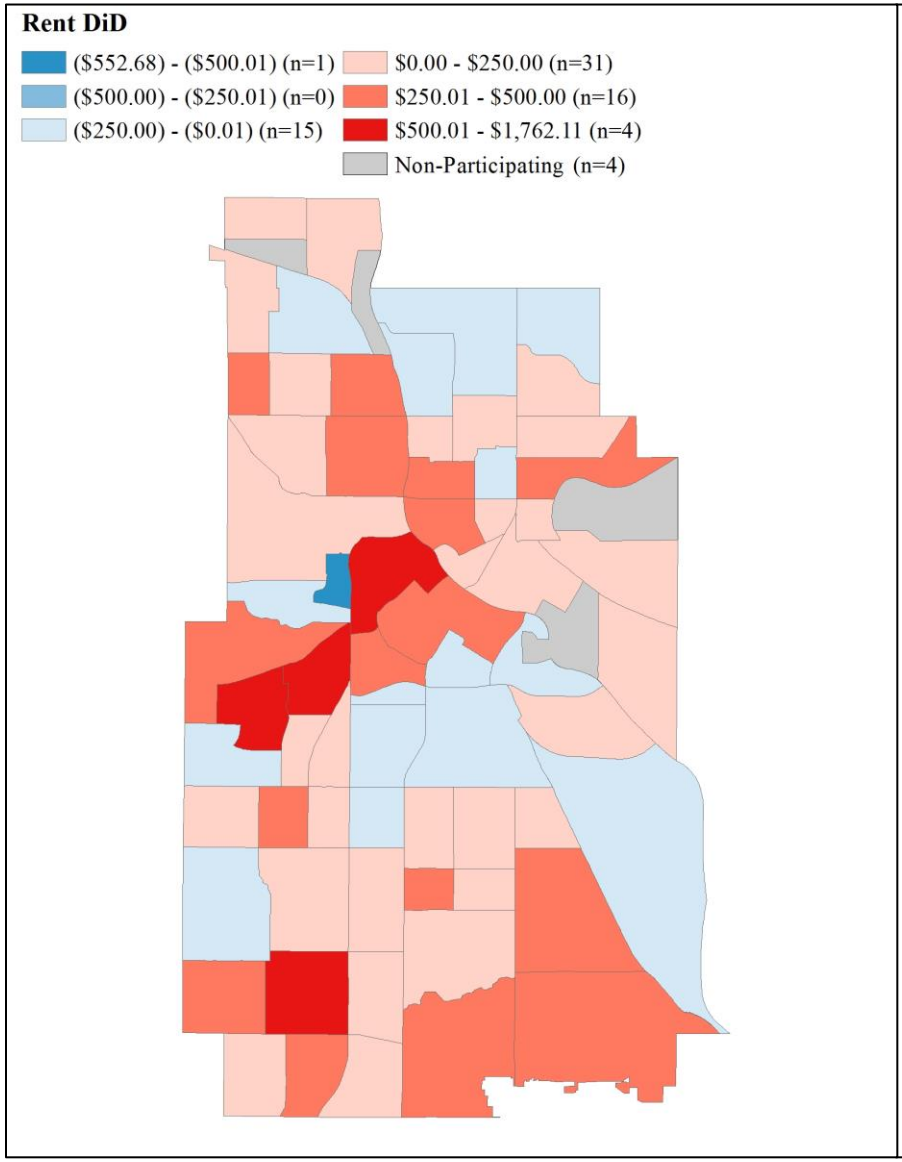

Figure 14: Rent Difference in Differences Value by Neighborhood

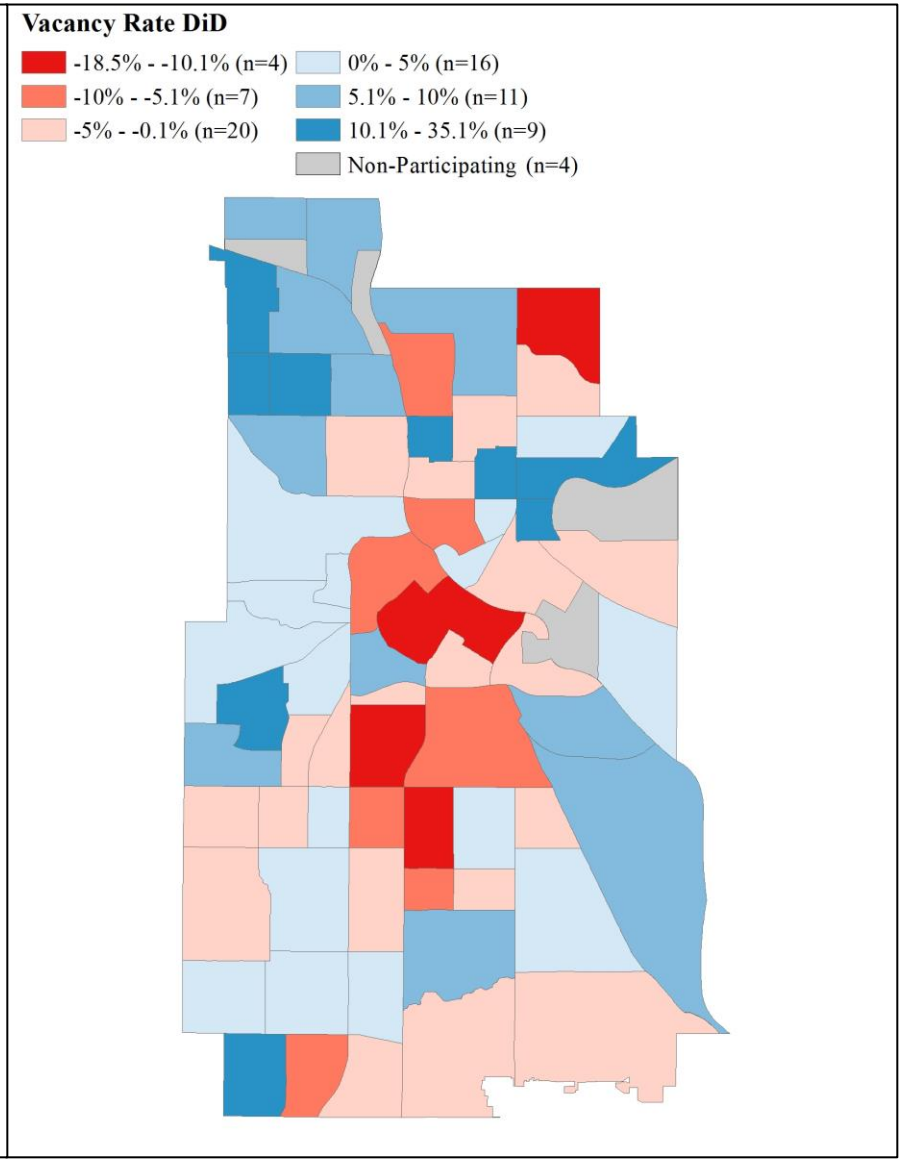

Figure 15: Vacancy Rate Difference in Differences Value by Neighborhood

Following the mapping of DiD values, hot spot analysis searched for any areas that had a statistically significant clustering of high or low DiD values. Figures 16-19 below map the results of this analysis. The Lowry Hill neighborhood is a hot spot for both home value and rent, and the neighborhoods surrounding downtown are hot spots for home value and income. The Victory and Cleveland neighborhoods in the northwest portion of the city are both cold spots for home value and hot spots for vacancy rate. South central Minneapolis is a cold spot for vacancy rate. Next, the study used Moran's I to test for spatial autocorrelation in DiD values for home value and rent. The results (see Table 10) revealed there is not statistically significant clustering occurring with income, home value, or rent although there is significant clustering in vacancy rate.

Table 10: Moran's I Spatial Autocorrelation by Indicator Difference-in-Differences Value

	Index	Z-score	p-value
Income	0.091418	1.117415	0.263817
Home Value	0.118302	1.367595	0.171439
Rent	0.066308	0.91133	0.362121
Vacancy Rate	0.3444	3.71219	0.000205

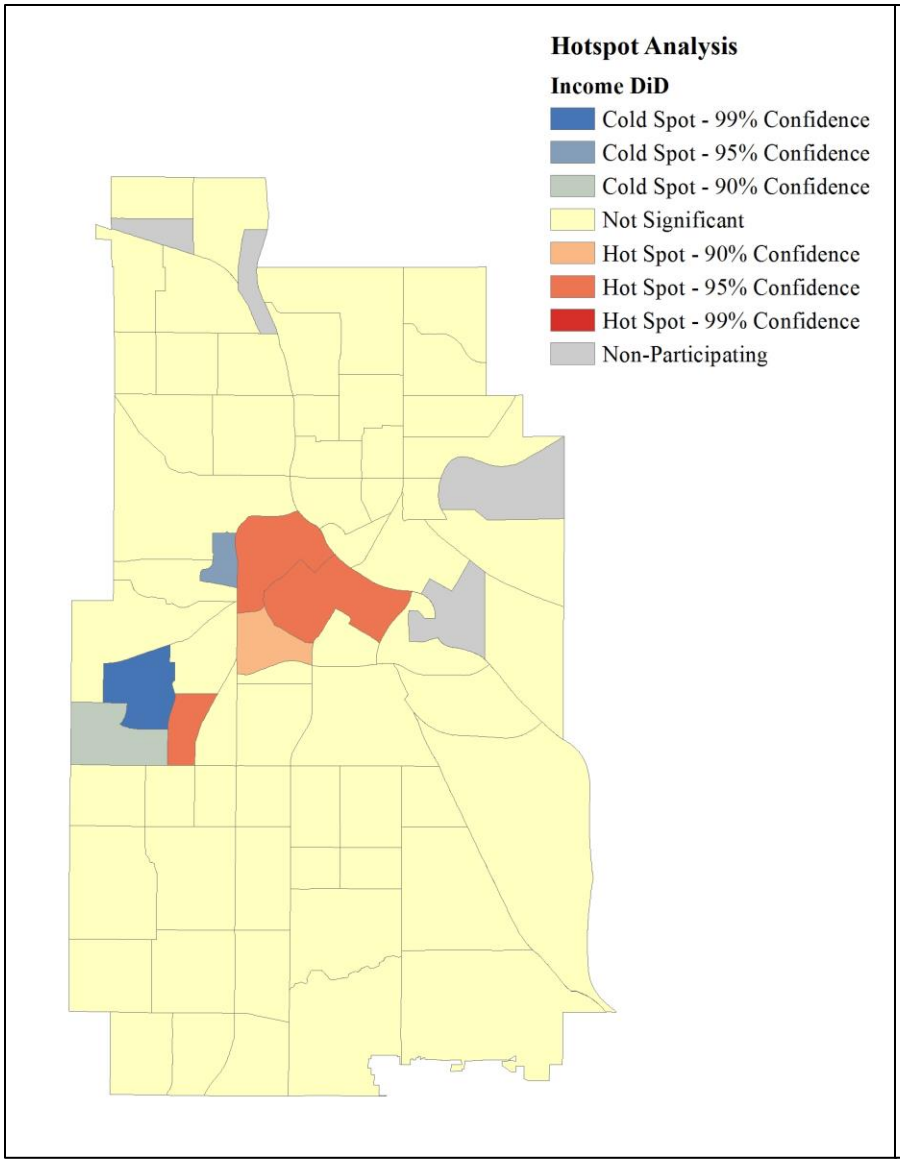

Figure 16: Hot spot Analysis of Difference in Differences Values for Income

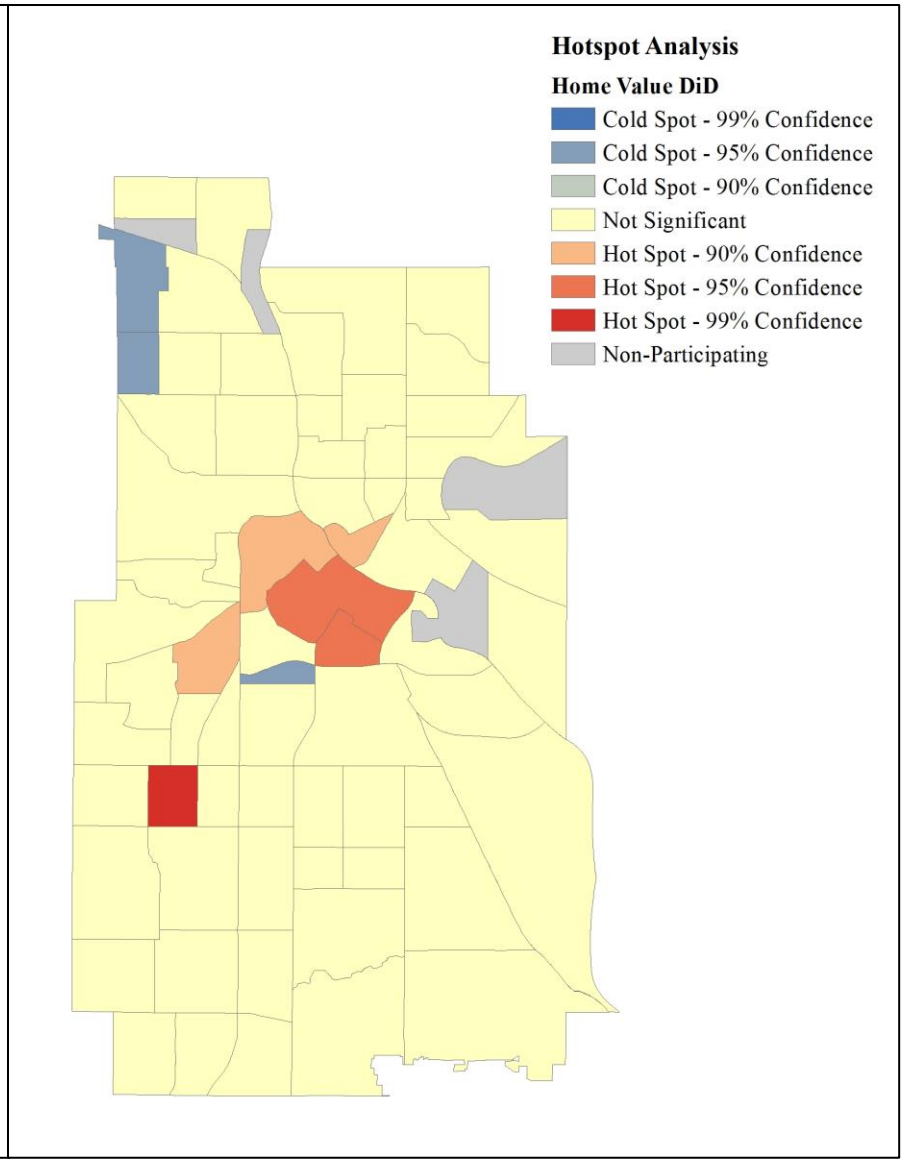

Figure 17: Hot spot Analysis of Difference in Differences Values for Home Value

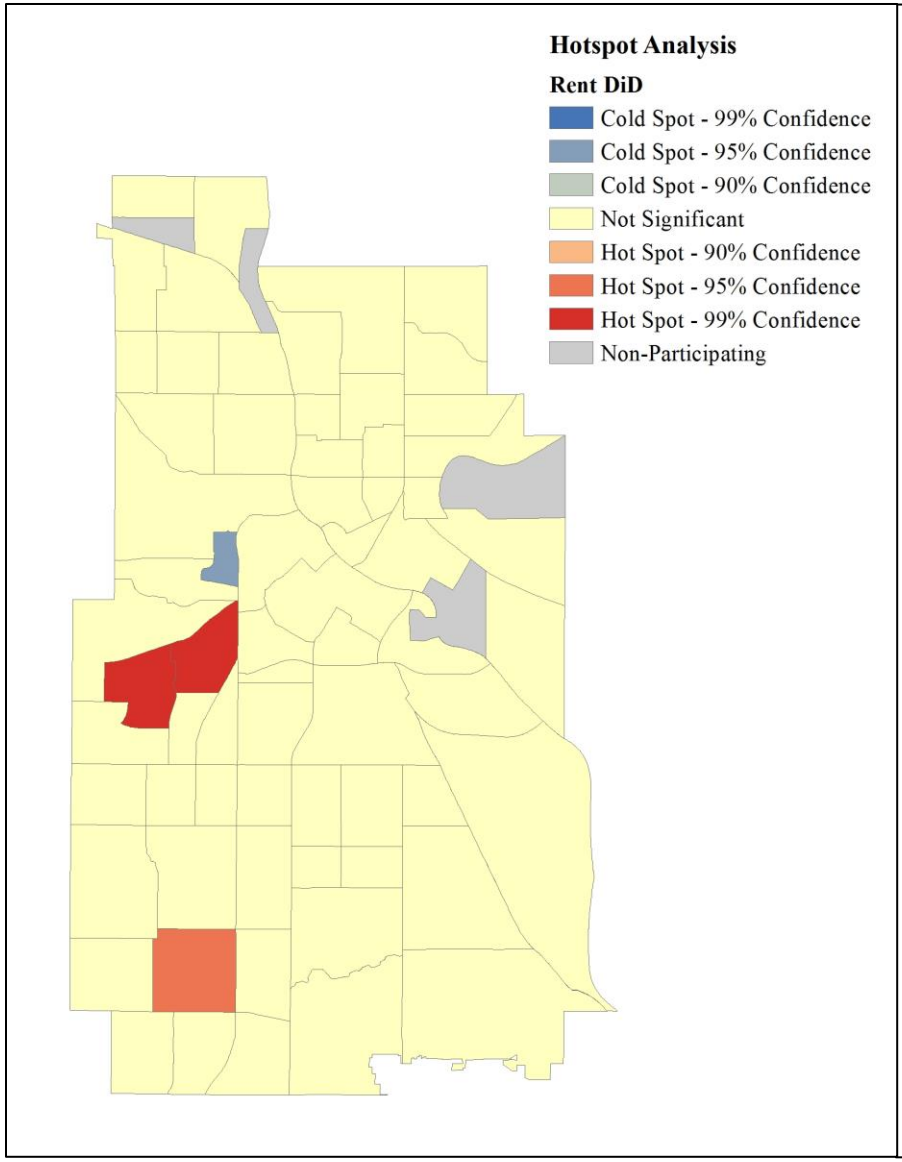

Figure 18: Hot spot Analysis of Difference in Differences Values for Rent

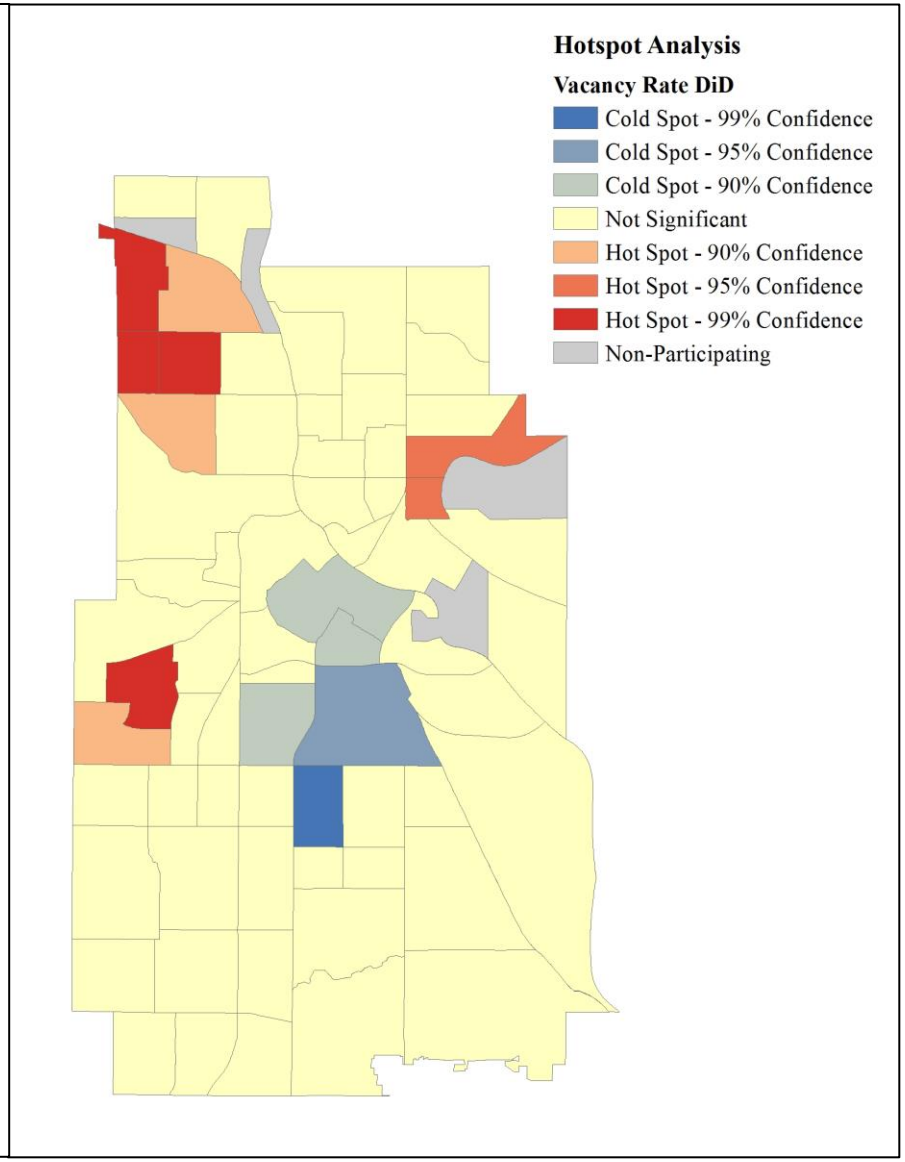

Figure 19: Hot spot Analysis of Difference in Differences Values for Vacancy Rate

Further analysis compared the DiD results to the neighborhood type (Table 11) and amount of funding (Table 12). Table 11 displays the average DiD value by neighborhood type for each indicator and the overall number of indicators, redirection neighborhoods on average had fewer DiD values that showed improvement compared to St. Paul and the income and rent in an average redirection neighborhood actually declined while the same indicators for revitalization and protection neighborhoods increased. Home values increased significantly more in protection neighborhoods.

Table 11: Mean Difference-in-differences Value by Neighborhood Type

	Protection N=27	**Redirection N=12**	**Revitalization N=28**
Improved Indicators	2.74	2.33	2.71
Income	$5,964.69	-$4,336.40	$6,438.16
Home Value	$102,029.19	$55,186.63	$66,918.71
Rent	$270.53	-$14.54	$166.77
Vacancy Rate	1%	-4%	5%

Table 12 shows the calculation of average DiD value divided by the average amount of NRP per household for each neighborhood type; this calculation shows the amount of change in each indicator contributed by one dollar of NRP funding – the value per dollar of funding. Like in the previous table, it is apparent that the average redirection neighborhood declined so much that funding could not prevent the decrease in income, home value, and rent. In contrast, funding in protection neighborhoods had a high value per dollar, with an especially high increase in income and home value.

Table 12: Mean Difference-in-differences Value per Dollar of Funding per Household by Neighborhood Type

	Protection N=27	Redirection N=12	Revitalization N=28
Income	$5.07	-$0.31	$1.37
Home Value	$61.94	-$0.51	$11.29
Rent	$0.15	-$0.01	$0.03
Vacancy Rate	0.0007%	-0.0003%	0.0013%

Because neighborhood types were selected by the neighborhood associations and are not objective definitions, this study also analyzed the performance of neighborhoods based on their income in 1990.

Table 13 below shows the mean DiD value for each indicator classified by 1990 income quartile. Note that the mean 1990 income is a normalized value, so a negative value implies that the income is lower than the regional average. As suggested by the previous tables classified by type, the most affluent neighborhoods experienced the greatest increases in income, home value, and rent. Surprisingly, the bottom 25 percent experienced a large increase in home value; even when looking at the median ($78,425.11) instead of the mean, home value for the bottom 25 percent is still higher than the upper and lower middle 25 percent groups. When subdividing each income quartile by neighborhood type, redirection neighborhoods within the bottom 25 percent did not experience as large of an increase in home value at $49,526.95, but this number is still larger than the increase shown in the upper middle 25 percent. Nevertheless, it is still apparent that the best-off neighborhoods experienced the greatest improvement in neighborhood quality while the lowest-income neighborhoods actually experienced a greater improvement than suggested by Table 11.

Table 13 Mean Difference-in-differences Value Classified by Neighborhood Income in 1990

	Top 25% N=16	Upper Middle 25% N=17	Lower Middle 25% N=17	Bottom 25% N=17
Mean 1990 Income	$21,729.87	-$11,219.12	-$23,035.65	-$37,974.11
Improved Indicators	2.81	2.41	2.82	2.58
Income DiD	$6,213.50	$3,721.67	$6,083.04	$1,363.66
Home Value DiD	$122,448.20	$31,393.22	$81,345.36	$83,236.75
Rent DiD	$346.81	$126.23	$197.62	$43.82
Vacancy Rate DiD	3%	5%	3%	-2%

4.2 Regression Testing

The first regression model tested the significance of the NRP dummy variable via coefficient γ, as shown in Table 14 below. Both datasets – one containing all 153 neighborhoods in Minneapolis and St. Paul and another only containing the 134 neighborhoods representing the 67 matched pairs – were compared to test the effect of propensity score matching on the results. Coefficient γ was found to be significant for all four indicators when using the matched neighborhoods dataset and significant for only income, home value, and rent when using the dataset containing all neighborhoods. All three coefficients (α, β, and γ) were found to be significant in the regression equations for home value and rent with both datasets. Interestingly, the values for coefficient γ in the matched neighborhoods dataset are similar to the mean DiD value for each indicator: income $4,588 (γ) vs. $4,317 (DiD mean), home value $76,860 vs. $78,966; rent $194 vs. $176, and vacancy rate 2.4 percent vs. 2 percent. Adjusted R^2 values were higher when using the matched neighborhoods dataset, though none of the regression equations using only the NRP dummy variable had a good fit for any of the indicators, suggesting that there are factors other than being located in an NRP neighborhood that contributed to the change in the indicator over time.

Table 14: Regression Results with Neighborhood Revitalization Program Participation as Explanatory Variable

		All Neighborhoods, n=153				Matched Neighborhoods, n=134			
Indicator	Coeff.	Adj R^2	Estimate	Std. Error	Sig	Adj R^2	Estimate	Std. Error	Sig
Income	α	0.07	-$3,512.00	$1,780.00	.	0.37	-$414.55	$1,822.68	
	β		-$0.12	$0.05	*		-$0.10	$0.05	.
	γ		$7,419.00	$2,303.00	**		$4,588.88	$2,307.00	*
Home Value	α	0.32	-$36,880.00	$7,188.00	***	0.32	-$35,280.00	$7,890.00	***
	β		$0.23	$0.08	***		$0.27	$0.08	***
	γ		$78,130.00	$10,510.00	***		$76,860.00	$11,020.00	***
Rent	α	0.32	-$62.41	$20.16	**	0.33	-$65.38	$22.27	**
	β		-$0.45	$0.07	***		-$0.44	$0.07	***
	γ		$190.86	$29.09	***		$194.18	$30.72	***
Vacancy Rate	α	0.35	1.5%	0.6%	*	0.40	0.5%	0.6%	
	β		-67.7%	7.5%	***		-73.5%	7.9%	***
	γ		1.2%	0.9%			2.4%	0.9%	**

Significance codes: '***'=.001, '**'=.01, '*'=.05, '.'=.1

The next test analyzed models with an explanatory variable for total funding per household and funding spent on housing related activities per household, only including neighborhoods that received NRP funding. As shown in Table 15 below, rent was the only indicator where coefficient γ was found to be significant. However, because the adjusted R^2 values for each model were especially low, this suggests that neither total funding nor housing related funding had much effect on the change in indicator values over time. Even though coefficient γ was significant when using rent as an indicator, the low adjusted R^2 value renders this result inconclusive.

Table 15: Regression Results with Funding Related Explanatory Variables

		Total Funding, n=67				Housing Funding, n=67			
Indicator	Coeff.	Adj R^2	Estimate	Std. Error	Sig	Adj R^2	Estimate	Std. Error	Sig
Income	α	0.02	$6,926.38	$2,240.87	**	0.06	$7,419.26	$2,115.03	***
	β		-$0.09	$0.07			-$0.11	$0.07	
	γ		-$0.34	$0.21			-$0.80	$0.35	*
Home Value	α	0.07	$50,557.86	$12,259.39	***	0.11	$56,080.06	$11,611.92	***
	β		$0.22	$0.11	.		$0.18	$0.11	
	γ		-$1.20	$1.12			-$3.64	$1.92	.
Rent	α	0.06	$184.72	$31.86	***	0.06	$181.89	$30.43	***
	β		-$0.21	$0.12	.		-$0.20	$0.12	.
	γ		-$0.01	$0.00	*		-$0.01	$0.00	*
Vacancy Rate	α	0.18	3.2%	0.0%	**	0.18	2.5%	0.9%	**
	β		-54.4%	17.0%	**		-62.4%	16.9%	***
	γ		0.0%	0.0%			0.4%	0.0%	

Significance codes: '***'=.001, '**'=.01, '*'=.05, '.'=.1

Following the analysis of the effect of funding, the study tested if the number of days between January 1, 2014 and the first date a neighborhood was eligible for funding had a relationship with the change in indicator value. The results are found in Table 16 below. This model produced some of the lowest R^2 values and few coefficients had any significance – even the coefficient for $Indicator_0$ and the intercept. This suggests there is little relationship between the change in an indicator and the amount of time the neighborhood participated in the NRP.

Table 16: Regression Results for Number of Days in Neighborhood Revitalization Program as Explanatory Variable

		Days in NRP, n=67			
Indicator	Coeff.	Adj R^2	Estimate	Std Error	Sig.
Income	α	0.01	$1,755.00	$961.10	.
	β		-$0.04	$0.06	
	γ		-$2.12	$1.57	
Home Value	α	0.10	$13,650.00	$5,156.00	*
	β		$0.29	$0.11	**
	γ		-$15.82	$8.46	.
Rent	α	0.00	$271.47	$140.19	.
	β		-$0.12	$0.12	
	γ		-$0.02	$0.02	
Vacancy Rate	α	0.19	7.1%	4.2%	.
	β		-62.0%	15.1%	***
	γ		0.0%	0.0%	

Significance codes: '***'=.001, '**'=.01, '*'=.05, '.'=.1

The final model tested whether neighborhoods that received NRP funding with a neighbor that received greater funding experienced any spillover effects. Table 17 below shares the results; the section labeled "Highest Amount" contains results of the model using a numeric value for the amount of funding received by the highest funded neighbor as an explanatory variable while the section labeled "Dummy" contains results of the model using a dummy variable to signify whether or not the highest funded neighbor received more funding. None of models had a significant coefficient γ, and the adjusted R^2 values were extremely low.

Table 17: Regression Results with Neighborhood Funding Explanatory Variables

		Highest Amount, n=67				Dummy, n=67			
Indicator	Coeff.	Adj R^2	Estimate	Std. Error	Sig	Adj R^2	Estimate	Std. Error	Sig
Income	α	-0.02	$4,969.11	$2,093.07	*	-0.01	$2,225.02	$4,511.31	
	β		-$0.06	$0.07			-$0.07	$0.07	
	γ		-$0.01	$0.16			$3,225.00	$4,686.36	
Home Value	α	0.05	$42,170.00	$10,720.00	***	0.05	$41,170.00	$23,670.00	.
	β		$0.26	$0.11	*		$0.26	$0.11	*
	γ		$0.14	$0.86			$142.80	$25,620.00	
Rent	α	0.01	$126.87	$28.48	***	0.04	$44.38	$61.31	
	β		-$0.13	$0.12			-$0.16	$0.12	
	γ		$0.00	$0.00			$114.49	$66.36	.
Vacancy Rate	α	0.18	2.4%	0.9%	**	0.18	1.3%	1.9%	
	β		-62.2%	15.6%	***		-58.7%	15.8%	***
	γ		0.0%	0.0%			1.6%	2.1%	

Significance codes: '***'=.001, '**'=.01, '*'=.05, '.'=.1

Chapter 5 Discussion and Conclusion

This study investigated the effects of the NRP on neighborhoods in Minneapolis using neighborhoods in St. Paul as a control group. This section will discuss the results outlined in the previous chapter, providing explanations for the results and why certain areas were more successful than others, and then make conclusions, discuss the limitations of the study, and provide suggestions for future research.

Given the above results, it is apparent that Minneapolis as a whole experienced an increase in income, home value, and rent from 1990-2014 at a rate greater than St. Paul. As shown in the raw data analysis, the cities had similar median incomes, home values, rents, and vacancy rates in 1990; however, the change between 1990 and 2014 was markedly different. After creating matched pairs of neighborhoods using propensity score matching, DiD analysis reiterated that when comparing a Minneapolis neighborhood to its most similar St. Paul counterpart, nearly half of Minneapolis neighborhoods experienced a greater increase in income and more than three-quarters of Minneapolis neighborhoods experienced a greater increase in both home value and rent. A t-test verified that the group of 67 Minneapolis neighborhoods was statistically different from the group of 67 St. Paul neighborhoods matched to those neighborhoods when using the indicators for home value and rent.

Although the regression analysis suggested that funding did not have a significant relationship with any of the four indicators, these results are inconclusive. Because the NRP was a neighborhood-controlled program, the variance in expenditure of funds and revitalization strategies may have also contributed to the success or failure of the NRP in a particular neighborhood. It is entirely possible that one well-funded neighborhood had a suboptimal expenditure plan while another poorly-funded neighborhood maximized the value of its funds.

In addition, the funding data does not reflect the value of volunteer labor and outside contributions; it is likely that more affluent neighborhoods, which generally received less funding, had greater support from volunteers than lower income neighborhoods, which generally received greater funding, where residents may not have the time or resources to contribute. The results support this claim, showing that protection neighborhoods generally had a higher value per dollar of funding.

As nonprofit organizations, the neighborhood associations could accept monetary donations from individuals and private corporations – again affluent neighborhoods are more likely to contribute or have the relationships with private corporations to encourage donations. Also, since residents selected their own revitalization strategies, the characteristics of a neighborhood's population, chiefly the education level and professional experience, may have also affected the outcomes. For example, neighborhoods with low educational attainment may suggest overly simple solutions to a complex problem that only treat the effects rather than the causes, whereas a neighborhood with greater education attainment are more likely to propose solutions that fix the underlying causes. Additionally, more affluent neighborhoods may have residents with professional experience addressing many of the problems found in the neighborhoods. These reasons may explain the major disparity in the value per dollar of funding between redirection and protection neighborhoods, as shown previously in Table 12.

Many of the neighborhoods had a delayed start to implementing their programs, and it is difficult to account for the difference in revitalization strategies among neighborhoods. While the neighborhood-level administration of funding allowed for significant flexibility and resident control, some neighborhoods may have chosen a suboptimal revitalization strategy. The varying scale and complexity of the underlying neighborhood problems could also affect each

neighborhood's success. Although redirection neighborhoods generally received the most funding, it is difficult to reverse the effects of urban poverty and decline; in contrast, protection neighborhoods, which generally received less funding, had subjectively smaller problems to address. Looking at the top five highest funded activities in each neighborhood (see Table 18 below) demonstrates the major difference in problems to address and funding amounts between redirection and protection neighborhoods.

Table 18: Comparison of Phillips and Linden Hills Top Five Highest Funded (excluding administration) Neighborhood Action Plan Strategies

Phillips (Redirection)		**Linden Hills (Protection)**	
Activity	Amount	Activity	Amount
Affordable Housing Opportunities	$3,657,000	44th Street Implementation (crosswalks and pedestrian safety improvements)	$284,000
Rental Subsidy Program	$805,000	Home Improvement Revolving Loan Program	$250,000
Franklin Theater Rehabilitation	$782,000	43rd and Upton/Sheridan Project (reconfigure intersection and add median)	$144,000
Housing for Homeless	$534,000	Linden Hills Library Project (capacity improvements)	$124,000
Demolish Snyder Liquor Store	$463,000	Community School Improvement Project (interior and exterior improvements)	$105,000

The study found several hot spots in the DiD values for home value and rent. All of the hot spots were protection neighborhoods and adjacent to a lake or the Mississippi River except for the Elliot Park neighborhood adjacent to downtown. The Kenwood and Lowry Hill neighborhoods, identified as hot spots for rent with 99 percent confidence, are two of the wealthiest neighborhoods in the city. Additionally, there is a cluster of hot spots for home value in the downtown area, which most likely benefit from adjacency to thriving downtown Minneapolis – that received City investment in the 1980s – and the presence of many in-demand neighborhood characteristics, such as walkability, transit access, historic buildings, and easy

access to recreational trails. As such, it is unlikely that the exceptional performance of these neighborhoods is attributable to the NRP.

Although the Moran's I test for spatial autocorrelation did not reveal statistically significant clustering of DiD values, a visual analysis suggests that spillover effects are present and that physical barriers create islands of affluent and low-income neighborhoods separated by highways and water bodies. Figure 20 below illustrates how these two physical barriers separate neighborhoods and affected the DiD value distribution for home value. Downtown Minneapolis (center of the city) is almost completely encapsulated by highways and the Mississippi River, and highways and the river separate the northwest corner of the city. Although these two areas share a common boundary, the physical separation is one explanation why they performed very differently in DiD analysis.

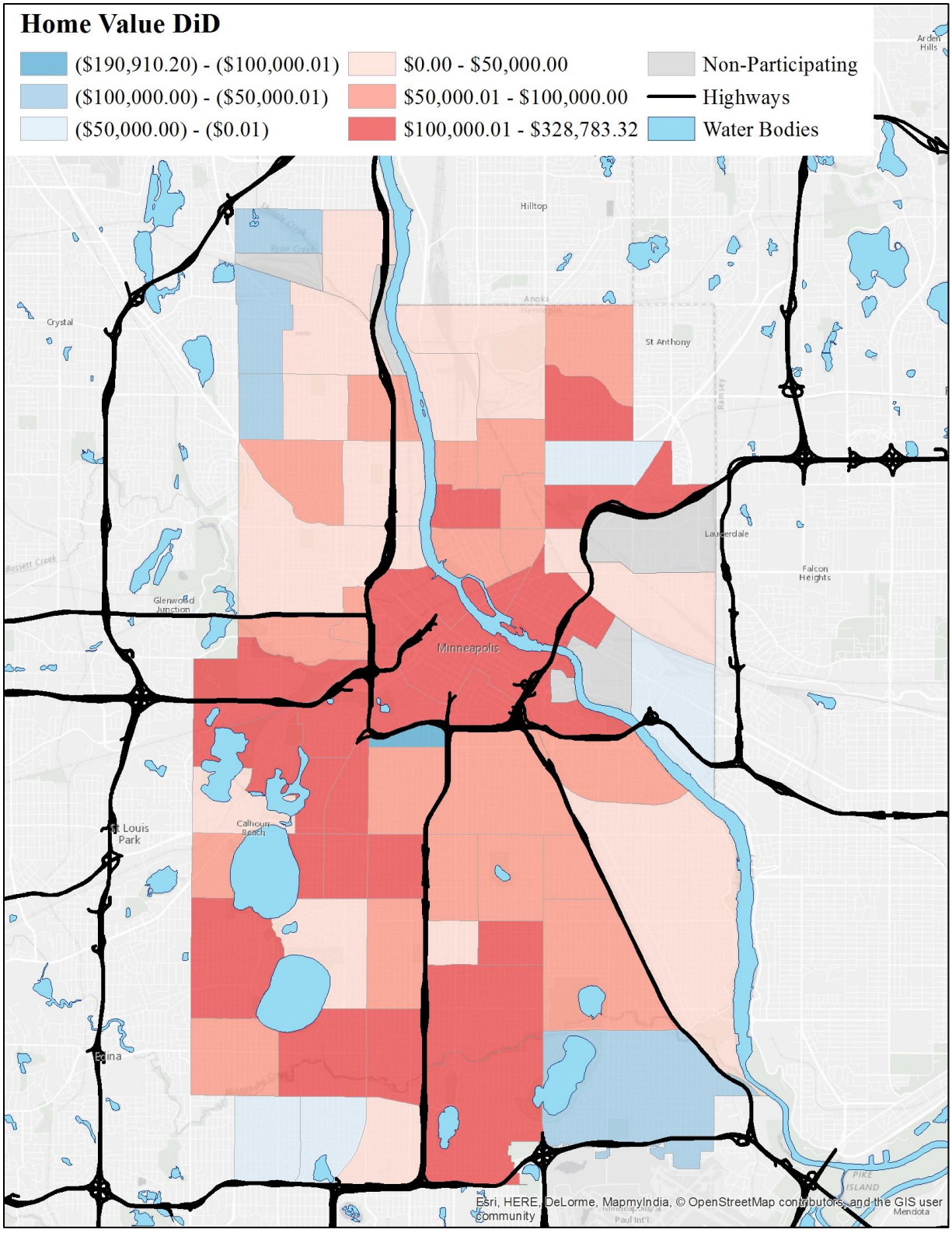

Figure 20: Neighborhood Barriers and Difference-in-differences Values for Home Value

Another question is whether or not strategies employed in redirection neighborhoods attracted impoverished residents from other neighborhoods. Affordable housing opportunities, rental subsidies, and housing for homeless could all potentially attract low income residents who could not afford their current neighborhood. Further research should check if displacement occurred as a result of neighborhood quality improvements, and whether or not the neighborhood quality improvements benefitted the existing residents or if the increases in indicator values were a result of more affluent people moving from other cities or neighborhoods.

One of the major criticisms of the NRP in the literature was that a disproportionate amount of funding went to strategies that benefited homeowners rather than renters. This is apparent in the DiD analysis, which shows that home values increased at a greater magnitude than rents (see Table 19 below). An important point is that homeowners directly reap the benefits of increased home values, whereas renters receive no tangible benefits from an increase in neighborhood quality. A better metric to gauge the effects on renters would be to analyze the proportion of income spent on rent; if rents are increasing at a rate greater than incomes, this presents a problem and could lead to displacement. A quick calculation of the neighborhood median gross rent divided by median household monthly income (yearly income divided by twelve) reveals that four neighborhoods had an average rental cost burden of greater than 30 percent of average monthly income in 1990 as compared to 8 neighborhoods in 2014. The average cost burden for the city in 1990 was 21 percent compared to 23 percent in 2014. Further research is necessary to determine the cost burden for renters and homeowners and its change over time.

Table 19: Magnitude of Difference-in-differences Value Compared to 1990 Value

	1990 Mean	Mean DiD	Magnitude
Income	-$13,137.51	$4,317.59	33%
Home Value	-$8,759.74	$78,966.44	901%
Rent	-$31.04	$176.11	567%
Vacancy Rate	1.7%	2.1%	122%

The evaluation of neighborhood revitalization is difficult given the complexity of defining neighborhood quality and the underlying processes that change neighborhood quality. The four chosen indicators are difficult to change through any one program because each indicator is dependent on a variety of different factors. For example, neighborhood level factors are not the only contributors to home value; physical aspects of the housing stock such as lot size, square footage, house age, and number of bedrooms may all help determine a home's value. The omission of these and other variables from the equations used in this study may be one reason the adjusted R^2 values were low. If data for these variables is made available, further research could include these as control variables in the equation to test if R^2 values increase.

Similarly, propensity score matching relies heavily on the assumption that each neighborhood in a matched pair would have had the same outcome without the intervention of the NRP. Given the complexity of neighborhood quality, the four indicator values used in propensity score matching create imperfect and illogical pairs because the process omits some factors that affect neighborhood quality. For example, one would expect downtown Minneapolis and downtown St. Paul to be matched pairs; however, downtown Minneapolis was paired with a neighborhood on the western border of St. Paul with a more suburban character and downtown St. Paul was not matched with any neighborhood in Minneapolis. In the future, it is critical to input variables that describe a neighborhood's character when propensity score matching to prevent odd matches.

The use of ACS data and areal interpolation to determine the indicator values for each neighborhood in Minneapolis and St. Paul introduces uncertainty. ACS data only provided estimates for 2014 as compared to the actual values provided by the decennial census. Five-year estimates were selected to maximize the accuracy of the estimates, but there is still some degree of error in the data. Using the most recent data from 2014 instead of the 2010 decennial census allowed this study to assess change over a longer period of time, which is essential to capture the longer term impacts of the program. Because ACS data also includes data for the margin of error, future work can assess the impact of using estimates instead of actual data from a decennial census. The uncertainty from areal interpolation was a necessary evil to assess the program at the neighborhood level. If the study were to use census block groups as the geographic unit instead of the defined neighborhoods, it would be impossible to determine the impacts of funding because portions of block groups could belong to different neighborhoods, hence receiving different funding amounts and employing different revitalization strategies. Additionally, areal interpolation is still necessary even when using raw census data because block group boundaries have shifted between 1990 and 2014. Future study could compare results between different geographic boundaries, such as the neighborhood boundaries from this study and block groups, evaluating the degree of uncertainty in this test.

Qualitative data assessing the perceptions of residents is a key component to any evaluation of the program, i.e. did residents perceive a change in their neighborhoods? Although census data may indicate changes, residents may not have experienced these changes at the same level. Resident surveys would allow researchers to explicitly rate a neighborhood's quality rather than using other indicators. The survey could also include qualitative questions, such as "What do you like most about your neighborhood?" or "What would you change about your

neighborhood?" to better understand the neighborhood. However, the bias inherent in survey data means a more objective means of assessing neighborhood quality is still necessary. As such, future studies and evaluations of community development programs should employ both quantitative and qualitative analysis and compare the results.

Future studies of the NRP should analyze the specific strategies employed in each neighborhood to determine which strategies were most successful and provided the greatest benefits to residents. This information could inform future iterations of this program, optimizing the use of funds and better targeting specific neighborhood problems. Researchers may download the NAPs and summaries from PlanNet (City of Minneapolis n.d.) to see every strategy and its required funding used by each neighborhood. Additionally, PlanNet also provides a categorical summary of expenditures for each neighborhood (also available in Appendix A) showing percentages for categories like housing, environment, parks and recreation, and schools and libraries. By completing this research, future revitalization programs can better understand the effectiveness of different strategies and create programmatic guidelines to encourage neighborhoods to pursue the best strategies.

Recent literature cautions that a major problem with any neighborhood revitalization program is that neighboring cities may experience negative externalities that outweigh the benefits to the city (Wheeler 2014). For example, Berger et al. (2000) found that homeownership rates increased during the Phase 1 of the NRP, but without research to prove otherwise, this could mean renters were displaced to surrounding cities, affecting the regional rental housing market as a result. Future research could investigate whether the NRP may have caused negative externalities to neighboring cities and then calculate the net regional benefit. Modern policy theorists such as Myron Orfield and Manuel Pastor view New Regionalism as a

solution, using collaboration between local governments in the pursuit of mutual benefits to create more efficient, equitable, and competitive metropolitan areas (Visser 2004). The NRP provides a small-scale model for implementing an effective regional-level community development program: the City of Minneapolis acted as a guide rather than an authority, providing funding and technical assistance to autonomous, resident-driven neighborhood associations united under a similar goal to improve their neighborhood. At a regional scale, a metropolitan planning organization (MPO) could establish a goal and distribute funding, much like the City of Minneapolis did, and the individual municipalities in the metropolitan area could develop expenditure plans to achieve the broader regional goal by using citizen participation, much like the neighborhood associations in the NRP. In the Twin Cities metropolitan area, the structure to implement this type of program already exists; the Metropolitan Council is the main regional agency that provides funding for many different programs, including programs for housing and public transportation. There is great potential to test the NRP at a regional scale within the same metropolitan area.

It is undeniable that Minneapolis neighborhoods experienced greater improvement than St. Paul neighborhoods during the time period of the NRP. While it is extremely difficult to isolate the effects of a community development program, this study suggests that the NRP was most likely one of the factors contributing to the increase seen in income, home value, and rent. What other factors may have contributed to the increase of Minneapolis as compared to St. Paul? The investment in downtown Minneapolis is reflected in the results, and the increases in downtown may also have encouraged businesses to remain or relocate there, making the rest of the city more attractive to people wanting access to those jobs. In addition, Minneapolis saw the opening of the region's first light rail line in 2004, connecting downtown to the airport and the

Mall of America in neighboring Bloomington. In contrast, light rail service did not begin in St. Paul until 2014. However, the impact of light rail is not apparent in any of the adjacent Minneapolis neighborhoods except for downtown, so it is difficult to conclude this had a major effect on results.

Knowing that Minneapolis experienced positive change during this time period, future research can investigate reasons why the city seemed to perform better than St. Paul. A deeper look into the performance of the three different neighborhood types – protection, revitalization, and redirection – reveals that redirection neighborhoods performed more poorly than the other types despite receiving more funding on average. The study also showed the improvement of downtown Minneapolis, which received heavy investment in the 1980s while the other neighborhoods in the city did not. This delayed reaction could potentially foreshadow the improvement in neighborhood quality for the rest of the city. Furthermore, this suggests that future studies of community development programs should allow sufficient time after the program ends before researching the impacts of the program.

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Appendix A: NRP Funding Allocations by Category

Neighborhood	Housing	Economic Development	Community Building	Crime and Security	Transportation and Infrastructure	Environment	Parks and Recreation	Human Services	Schools and Libraries	NRP Plan Coordination	Total Neighborhood Allocations
American Indian	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	$0
Armatage	29%	2%	0%	0%	0%	0%	0%	0%	61%	6%	$1,059,832
Audubon Park	66%	22%	1%	0%	0%	1%	6%	1%	0%	3%	$2,683,721
Bancroft	61%	12%	0%	0%	1%	1%	11%	0%	7%	7%	$1,876,884
Beltrami	65%	1%	1%	1%	1%	2%	22%	2%	0%	5%	$745,605
Bottineau	55%	25%	0%	1%	1%	2%	12%	2%	0%	3%	$1,463,033
Bryant	53%	7%	0%	5%	1%	0%	30%	4%	3%	0%	$1,954,107
Bryn Mawr	51%	14%	2%	0%	2%	0%	20%	0%	6%	4%	$652,005
CARAG	72%	6%	0%	3%	1%	3%	3%	1%	3%	7%	$2,252,293
Cedar-Isles-Dean	0%	0%	0%	0%	26%	13%	44%	1%	0%	9%	$829,600
Cedar-Riverside	39%	38%	0%	3%	1%	1%	0%	3%	0%	11%	$3,139,785
Central	62%	14%	6%	1%	0%	0%	4%	7%	5%	-1%	$5,956,865
Cleveland	79%	9%	1%	0%	0%	0%	1%	1%	0%	2%	$934,842
Columbia Park	54%	0%	3%	0%	7%	0%	31%	0%	0%	5%	$458,285
Corcoran	58%	5%	17%	5%	0%	0%	3%	4%	2%	6%	$2,527,243
Downtown East, West	54%	13%	5%	16%	0%	0%	0%	7%	0%	5%	$1,832,157
East Calhoun	34%	0%	6%	0%	7%	6%	40%	0%	0%	7%	$794,375
East Harriet	54%	4%	2%	2%	7%	3%	17%	0%	5%	4%	$1,509,942
East Isles	9%	1%	0%	34%	14%	1%	33%	0%	7%	1%	$1,130,853
Elliot Park	44%	27%	6%	0%	0%	0%	5%	2%	0%	16%	$4,312,159
EPIC	71%	0%	5%	0%	0%	0%	4%	13%	0%	6%	$1,205,124

Neighborhood	Housing	Economic Development	Community Building	Crime and Security	Transportation and Infrastructure	Environment	Parks and Recreation	Human Services	Schools and Libraries	NRP Plan Coordination	Total Neighborhood Allocations
Field, Regina, Northrop	62%	15%	0%	0%	0%	0%	7%	0%	9%	2%	$2,590,441
Folwell	69%	2%	2%	8%	0%	1%	0%	1%	2%	12%	$1,991,253
Fulton	21%	7%	5%	3%	12%	4%	12%	1%	20%	7%	$1,305,504
Hale, Page, Diamond Lake	17%	3%	0%	4%	0%	0%	36%	1%	20%	16%	$2,202,128
Harrison	63%	16%	10%	4%	0%	3%	0%	0%	0%	4%	$2,865,084
Hawthorne	68%	6%	1%	4%	0%	3%	4%	8%	0%	5%	$4,192,808
Holland	46%	17%	2%	4%	1%	19%	0%	3%	0%	8%	$3,320,932
Jordan	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	$6,691,000
Kenny	21%	2%	2%	0%	0%	16%	42%	0%	0%	20%	$454,136
Kenwood	0%	0%	0%	30%	0%	2%	40%	0%	7%	21%	$440,000
Kingfield	25%	33%	10%	0%	4%	1%	6%	2%	1%	12%	$2,675,736
Lind-Bohanon	61%	9%	2%	1%	0%	8%	8%	1%	0%	-1%	$1,441,633
Linden Hills	17%	3%	2%	0%	32%	15%	3%	3%	14%	9%	$1,716,601
Logan Park	65%	2%	11%	11%	0%	0%	5%	6%	0%	0%	$1,260,506
Longfellow	54%	13%	8%	2%	0%	1%	12%	4%	2%	3%	$9,068,404
Loring Park	26%	13%	3%	4%	6%	1%	34%	0%	0%	14%	$3,468,157
Lowry Hill	3%	17%	1%	23%	11%	0%	40%	0%	2%	2%	$1,084,613
Lowry Hill East	37%	8%	1%	24%	1%	8%	3%	0%	14%	5%	$3,799,364
Lyndale	71%	7%	3%	2%	0%	2%	2%	7%	0%	5%	$4,422,143
Lynnhurst	20%	4%	0%	9%	4%	13%	10%	0%	31%	9%	$1,006,333
Marcy Holmes	61%	14%	1%	2%	0%	2%	13%	1%	0%	4%	$4,230,462
Marshall Terrace	72%	0%	0%	1%	5%	26%	0%	0%	0%	1%	$644,553
McKinley	66%	2%	1%	1%	0%	1%	0%	13%	0%	9%	$1,751,749
Midtown Phillips	56%	25%	6%	0%	0%	0%	0%	8%	2%	3%	$1,376,207

Neighborhood	Housing	Economic Development	Community Building	Crime and Security	Transportation and Infrastructure	Environment	Parks and Recreation	Human Services	Schools and Libraries	NRP Plan Coordination	Total Neighborhood Allocations
Near North, Willard Hay	52%	12%	3%	5%	0%	0%	0%	25%	2%	1%	$8,313,020
Nicollet Island/East Bank	0%	68%	0%	4%	26%	0%	2%	0%	0%	0%	$240,780
Nokomis East	60%	7%	0%	1%	0%	9%	2%	9%	2%	11%	$4,069,705
North Loop	0%	14%	48%	0%	0%	9%	0%	0%	0%	29%	$172,895
Northeast Park	64%	3%	3%	0%	10%	0%	20%	0%	0%	1%	$510,000
Phillips	43%	23%	3%	4%	0%	1%	3%	15%	1%	6%	$17,835,269
Phillips West	61%	0%	8%	7%	1%	0%	0%	1%	0%	21%	$1,135,792
Powderhorn Park	51%	25%	4%	0%	0%	0%	11%	7%	0%	-1%	$5,042,995
Prospect Park	21%	1%	12%	13%	8%	3%	6%	10%	22%	3%	$3,219,356
Seward	51%	22%	4%	1%	0%	4%	9%	3%	0%	6%	$4,723,646
Sheridan	69%	19%	0%	3%	1%	0%	0%	3%	5%	1%	$1,841,480
Shingle Creek	88%	3%	1%	0%	2%	1%	5%	0%	0%	-4%	$749,000
Southeast Como	58%	3%	1%	1%	0%	9%	9%	1%	8%	8%	$2,397,432
St Anthony East	73%	0%	0%	4%	0%	0%	10%	9%	0%	3%	$1,184,647
St Anthony West	87%	2%	0%	3%	1%	2%	0%	2%	2%	1%	$1,394,703
Standish Ericsson	48%	8%	3%	3%	1%	7%	14%	4%	3%	9%	$3,312,413
Stevens Square	54%	22%	10%	6%	0%	4%	1%	1%	0%	-1%	$3,959,564
Sumner-Glenwood	0%	0%	0%	0%	0%	0%	0%	98%	2%	0%	$2,502,000
Tangletown	29%	11%	4%	4%	19%	0%	5%	0%	19%	9%	$978,091
University	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	$0

Neighborhood	Housing	Economic Development	Community Building	Crime and Security	Transportation and Infrastructure	Environment	Parks and Recreation	Human Services	Schools and Libraries	NRP Plan Coordination	Total Neighborhood Allocations
Ventura Village	86%	2%	0%	9%	0%	1%	0%	0%	0%	1%	$1,384,142
Victory	48%	13%	0%	1%	0%	2%	21%	1%	6%	8%	$937,794
Waite Park	55%	0%	0%	0%	0%	2%	23%	0%	17%	0%	$1,220,006
Webber-Camden	76%	7%	0%	2%	0%	1%	7%	0%	3%	3%	$2,331,829
West Calhoun	0%	61%	3%	14%	3%	7%	0%	0%	0%	12%	$605,000
Whittier	56%	10%	0%	0%	0%	0%	14%	3%	13%	3%	$7,701,929
Windom	6%	6%	86%	0%	0%	0%	0%	0%	0%	2%	$1,741,700
Windom Park	70%	22%	2%	0%	2%	1%	0%	0%	0%	3%	$2,818,000
TOTAL	**52%**	**13%**	**4%**	**4%**	**2%**	**2%**	**7%**	**7%**	**4%**	**5%**	**$183,641,671**