A Quantitative Approach to Gentrification: Determinants of Gentrification in U.S. Cities, 1970-2010

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Abstract
This paper uses tract-level Census data to provide a cross-sectional, historical analysis of gentrification in U.S. cities from 1970 to 2010. The paper develops an approach for identifying gentrifying neighborhoods that can be applied across multiple cities and, more importantly, across multiple time periods. Thus the first contribution of the paper is to document how gentrification levels in U.S. cities fluctuated between 1970 and 2010. The key results from this section is that gentrification levels were at their lowest in the 1970s, increased more in the 1980s than in any other decades, and peaked during the 1990s. The paper also develops an empirical model to identify the key determinants of the variation in gentrification activity in U.S. cities. Gentrification levels are found to be higher in cities where median household incomes are high relative to the suburbs, where central city household incomes are low relative, and where there was a larger increase in the percentage of central city residents with at least a bachelor's degree.

Keywords
Gentrification, Census Data, Neighborhoods, Urban History

I. Introduction

While there is no lack of gentrification research (see Lees. et. al (2008) for reviews of the existing literature), very little of it is in the form of quantitative research regarding questions such as how common gentrification is and how the incidence of gentrification has changed over time. One of the primary reasons for the dearth of quantitative research is that the idea of measuring gentrification with widely available data -- such as Census data -- has been viewed with much skepticism. This skepticism is often based on the belief that Census data is not able to capture many of the changes associated with gentrification. For example, Kreager, et. al (2011) identify two primary flaws associated with census-based approaches to gentrification. The first is that census-based measures frequently misidentify solidly middle- and upper-income neighborhoods as gentrifying. Secondly, they state that census-based measures of gentrification:

> "generally lack the detail required to identify gentrification processes as they occur on the ground. Neighborhood changes in average economic and population characteristics are likely to overlook local housing and business developments that are central to the gentrification process."

Put differently, gentrification is a process that creates both quantitative and qualitative changes in neighborhood character. Clearly, there are measurable changes in a neighborhood such as increases in average household income, the increased presence of college-educated residents, and increases in housing values and rents that census data is capable of capturing. However, gentrification also causes changes in such things as the local retail mix that census data does not capture and for which good quantitative measures either do not exist or require some form of fieldwork that makes comparisons across cities and, more importantly, at different points in time extremely difficult.

While these criticisms are valid and census-based approaches to gentrification are not likely to perfectly capture the gentrification process, there is much to be gained from approaching gentrification from a perspective that allows for cross-sectional and historical analysis of gentrification. Most existing gentrification research, since it relies on observational data in addition to quantitative measures, is limited to single-city case studies. While it is likely that such studies do a good job of identifying gentrifying neighborhoods, it is not clear that the results of such studies can be generalized to other cities.

The goal of this study is to approach gentrification from a purely quantitative direction and to provide results that are both cross-sectional and historical in nature. More specifically, this study is focused on making two main contributions to the gentrification literature. First, the study will propose a methodology that will generate a measure of gentrification incidence for a sample of U.S. cities and for multiple time periods. This will yield estimates of gentrification levels for a large number of U.S. cities across several time periods. Second, the study will use the measure of gentrification incidence to identify the primary determinants of gentrification levels in U.S. cities. The empirical model used to identify the determinants of gentrification will be based on several leading theories of gentrification and, therefore, will provide an empirical test of which theories appear to do the best job of explaining gentrification levels in U.S. cities.

The present study will not ignore the shortcomings of a purely quantitative approach to gentrification. A quantitative approach is likely to miss some of the subtler dimensions of the gentrification process. However, it is likely that the measurable components of gentrification are highly correlated with the non-quantitative components of the process. More importantly, the benefits that arise from studying gentrification in a large cross-section of cities and with an

historical perspective potentially outweigh what is lost from being unable to fully capture the street-level changes that are associated with the gentrification process.

This study also addresses the second shortcoming of census-based approaches: misidentifying higher-income neighborhoods as gentrifying. This problem can be avoided by adequately controlling for which neighborhoods have the potential to gentrify and which ones do not. Gentrification is a process in which higher-income households move into traditionally low-income neighborhoods. Thus, gentrification should only be possible in low-income neighborhoods and the process of identifying gentrifying neighborhoods should include two steps. First, the set of neighborhoods in which gentrification could take place should be identified. Then, once the set of "gentrifiable" tracts has been identified, further analysis should determine which of these tracts has undergone gentrification.

The next section of this paper will briefly review the relatively small number of existing studies that attempt to measure gentrification. The focus will be on the various ways that have been proposed for identifying "gentrifiable" neighborhoods as well as how to quantitatively identify gentrifying neighborhoods. This section will also outline the method that will be used in this study to identify the two types of neighborhoods.

The paper will then proceed to use the proposed methodology to measure gentrification in a sample of 50 U.S. cities in each of the four decades from 1970 to 2010. The results in this section will yield insights into how gentrification levels in U.S. cities have fluctuated over time.

Next, the paper will provide an empirical analysis of the variation in gentrification levels in U.S. cities from 1970-2010. This section will also summarize several prominent theories of gentrification and propose variables that can be included in the empirical analysis to test which

theories best explain the variation in gentrification levels in U.S. cities. The final section of the paper will summarize the paper's conclusions and provide suggestions for future research.

II. Literature Review

Only a few authors have attempted to study gentrification using a purely quantitative approach. This section of the paper will review the small number of papers that have used a quantitative approach to study gentrification. Papers that follow the two-step approach of first identifying "gentrifiable" or "potentially gentrifying" neighborhoods before identifying gentrifying neighborhoods are given special emphasis.

In identifying which neighborhoods are suitable candidates for gentrification, virtually all studies focus only on central-city neighborhoods. While there are studies who propose suburban or even rural gentrification (see Parsons (1980), Darling (2005), and Phillips (1993) for examples), almost all the quantitative studies of gentrification consider only central-city neighborhoods as having the potential to gentrify. This study will follow this convention and will require that a neighborhood be in the central-city of a metropolitan area to be a candidate for gentrification.

Since gentrification is a process in which middle- and upper-income households move into neighborhoods that have traditionally been occupied by low-income households, most quantitative studies of gentrification use an income measure to determine which central-city neighborhoods are candidates for gentrification. For example, Hammel and Wyly (1996), in their study of the Minneapolis-St. Paul area, consider only census tracts with median incomes that are below the central-city median income as having the potential to gentrify. Bostic and Martin (2003), in the first study to identify gentrifying neighborhoods in a cross-section of

metropolitan areas, use a stricter approach and only consider census tracts with median incomes that are less than 50 percent of the metropolitan area's median income as "gentrifiable".

McKinnish, et. al (2010) consider gentrification in all census tracts that are in a metropolitan statistical area with a 1990 population of at least 500,000 and that are located within 5 km of an incorporated place with a 1990 population of least 100,000. Thus, they do not limit gentrification to central-city neighborhoods since many inner-ring suburbs will meet their criteria for inclusion. Tracts in their sample are classified as gentrifiable if they are in the bottom quintile of average family income in 1990. It is difficult to determine how this cutoff compares to those employed by Hammell and Wyly and Bostic and Martin for two reasons. First, the authors do not report how the cutoff compares to the sample median. Second, their subset of gentrifiable neighborhoods is selected from the bottom of a distribution that includes all of the tracts in their sample. This is a key difference in that both Hammell and Wyly and Bostic and Martin identify gentrifiable neighborhoods by comparing neighborhood income to the local median income. It is likely that using a single national sample will lead to neighborhoods in low-income metropolitan areas being overrepresented and neighborhoods in high-income metropolitan areas being underrepresented in the sample of gentrifiable tracts. This paper will follow the example of Hammel and Wyly and Bostic and Martin and identify gentrifiable neighborhoods based on their income levels relative to the metropolitan area's income.

A different approach to identifying gentrifiable neighborhoods is found in Freeman (2005). Freeman is unique in identifying gentrifiable neighborhoods using variables other than income. Freeman begins with a conceptual definition of gentrifiable neighborhoods that includes three characteristics. First, gentrifiable tracts are central city tracts. Second, gentrifiable tracts

are populated by low-income households and, third, gentrifiable tracts have suffered from "disinvestment" over time.

One of the strengths of Freeman's approach is including disinvestment as one of the defining characteristics of a gentrifiable neighborhood. Since the cycle of investment and disinvestment is at the core of many early theories of gentrification (Smith (1979)), this is an important addition. Also, since it is specifically housing investment/disinvestment that is the primary driving force in many theories of gentrification, the use of a housing variable to capture disinvestment is also appealing. Freeman operationalizes his conceptual definition by defining low-income tracts as central city tracts with an income level at the MSA median or below. Tracts are considered to have suffered from disinvestment if their proportion of housing units built within the past 20 years is below the MSA median.

The primary shortcoming of this variable is one that cannot be overcome via census data. Much of the housing activity associated with gentrification is in the form of the rehabilitation and renovation of existing housing units rather than the construction of new housing units.[1] Thus, a neighborhood could be receiving a substantial amount of new investment without any new housing units being constructed. However, it is very likely that a low-income neighborhood in which a very small percentage of the housing stock is comprised of units built in the last 20 years (relative to the metropolitan area as a whole) is very likely to be receiving a low level of new investment.

This paper will follow Hammel and Wyly and Bostic and Martin and use only an income-based criterion for identifying gentrifiable neighborhoods. To be eligible to gentrify a neighborhood must meet two criteria. First, the neighborhood must be in the central-city of a

[1] "New-build" gentrification is often considering separately from traditional gentrification. See Davidson and Lees (2005), Boddy (2007), and Davidson and Lees (2010).

metropolitan statistical area and, second, the neighborhood's income must be below a threshold percentage of the metropolitan area's median income. The threshold that is employed in this study is to require that a central-city neighborhood have an income level that is less than 80% of the metropolitan median income to be considered to be gentrifiable. This threshold is consistent the criteria used by the U.S. Department of Housing and Urban Development which defines low-income households as those with income that are less than 80% of the area median income.

Once the subset of central-city neighborhoods that have the potential to gentrify has been identified, the next challenge is to identify which of the gentrifiable tracts gentrify. Specifically, the goal is to identify the quantifiable changes in a neighborhood that can distinguish which gentrifiable neighborhoods experienced gentrification. As was mentioned above, this is a more difficult task as there may be dimensions of gentrification that may not be captured by the available data.

One of the earliest attempts to quantify gentrification using census data is Hammel and Wyly (1996). While the study is a hybrid between field research and a Census-based approach and is neither cross-sectional (the study includes only Minneapolis-St. Paul) nor historical (the study includes only a single time period), it represents one of the first attempts to identify the Census variables that are most closely associated with gentrification. The authors use field work to identify which low-income neighborhoods gentrify and then identify a set of census variables that most accurately distinguish between low-income neighborhoods that gentrify and those that do not. Their set of variables includes measures of income, occupation, rent levels, house values, education, employment, and population.

The key weakness of Hammel and Wyly (1996) for the purposes of the present study is that it does not wholly rely on census data to identify gentrifying neighborhoods. Bostic and

Martin (2003) represents the first study to use a purely quantitative approach to identify gentrifying tracts in a cross-section of cities. However, the study is not historical in that it studies only a single period (1970-1990). Additionally, the focus of the study is on the interaction between gentrification and black home ownership so it does not measure the extent of gentrification across the cities in their sample.

Bostic and Martin (2003) use two approaches to distinguish between gentrifiable tracts that gentrify and those that do not. The first approach, dubbed the *naïve* approach, considers a tract to have gentrified if it is gentrifiable at the beginning of a period and not gentrifiable at the end of the period. While there is some intuitive appeal to this approach, this approach is overly simplistic and is not likely to accurately identify gentrifying neighborhoods. Moreover, the naïve approach is intended only to provide the cutoff points for the more in-depth second approach.

The second approach used by Bostic and Martin is based loosely on Hammel and Wyly's approach. The second approach is multidimensional and uses a set of nine variables that includes measures of education, income, housing tenure, age, poverty rates, household characteristics, and occupation. Gentrifiable tracts are scored by ranking them according to each of the nine characteristics and computing each tract's average score across all nine characteristics. Since this approach yields a continuum of gentrifiable neighborhoods, it is necessary to determine a cut-off point to separate the "gentrifying" neighborhoods from the "non-gentrifying" neighborhoods. Bostic and Martin determine the cut-off point by setting the number of gentrifying tracts in the multidimensional approach equal to the number of tracts that gentrified according to the naïve approach. Thus, if N tracts gentrified according to the naïve approach then the N tracts with the lowest gentrification score were classified as gentrifying.

This multidimensional approach is appropriate for Bostic and Martin in that their goal was to obtain a set of gentrifying neighborhoods so that they could compare changes in black homeownership in gentrifying tracts to those in non-gentrifying tracts. However, as was the case with Hammel and Wyly, the census data is not actually used to distinguish between gentrifying and non-gentrifying tracts.

Freeman (2005) provides an approach in which census data is used to distinguish between gentrifying and non-gentrifying tracts. Once he identifies the set of gentrifiable tracts he uses two variables to identify gentrifying tracts. In order to gentrify, a gentrifiable tract must (1) have an increase in the percentage of residents with a college degree that is greater than or equal to the increase for the entire MSA and (2) experience an increase in housing prices during the period. One of the more interesting aspects of this definition of gentrification is that it does not include income. The main problem with this is that omitting income risks missing a key element of the gentrification process. It is hard to prove that a neighborhood has gentrified without evidence that its income-level has increased over time.

The final study that uses census data to identify gentrifying neighborhoods is McKinnish, et. al (2010). After obtaining their sample of gentrifiable tracts using the definition outlined above, the authors define gentrifying tracts to be gentrifiable tracts that experience an increase in average family income of at least $10,000 between 1990 and 2000. The authors justify their use of a single income variable as allowing them to avoid having their gentrification definition determine their results. Since the goal of the study is to identify the characteristics of the individuals who move into gentrifying neighborhoods, it is proper to avoid including any of the characteristics that they seek to study in their definition.

While using a single income variable seems appropriate in this case, it is not clear that using an increase in income of $10,000 is the best approach. Given the large differences in income levels across metropolitan areas, a $10,000 increase in average family income represents a much larger increase in low-income metropolitan areas than in high-income metropolitan areas. A better approach would be to identify gentrifying neighborhoods as low-income neighborhoods that have moved up the metropolitan area's income hierarchy. Thus, a better way to identify gentrifying tracts is to identify low-income neighborhoods that experience income growth that exceeds the metropolitan average in some way. Using an absolute threshold of $10,000 does not guarantee that a neighborhood's income growth is above the metropolitan average. If a high-income metropolitan area is experiencing a high rate of income growth, a $10,000 income in neighborhood income could be below-average and the neighborhood would move down the metropolitan income hierarchy.

This study will follow McKinnish, et. al and use a single income variable to identify gentrifying neighborhoods. However, gentrifying neighborhoods will be identified as gentrifiable neighborhoods that experienced high rates of income growth relative to their metropolitan area. Two growth thresholds are used to identify gentrifying tracts. The first, or low, threshold will require that the neighborhood experience income growth that is 25% higher than metropolitan area's income growth. The second, or high, threshold will require that the neighborhood's income growth exceed the metropolitan area's income growth by at least 50%.

To summarize, gentrifiable tracts will be central-city tracts with incomes that are less than 80% of the metropolitan median income. Gentrifying tracts will be gentrifiable tracts that have income growth that exceeds the growth in metropolitan income by either 25 or 50%. Thus, two sets of gentrifying tracts are identified.

III. Data and Methodology

The previous section outlined the approach that will be used in this study. This section will describe the data and variables that will be used to provide a cross-sectional, historical analysis of gentrification in U.S. cities. This section will also provide the initial results regarding how gentrification levels have changed over time.

This study uses the Neighborhood Change Database (NCDB) to study gentrification. The NCDB is useful because it provides geographically-consistent census tracts for each decennial census between 1970 and 2010. Thus, the NCDB makes it possible to study gentrification trends over four decades. Additionally, since the data in the NCDB is provided at the census-tract level, census tracts will proxy for neighborhoods in this study. The methodology in the previous section will be used to identify gentrifiable and gentrifying census tracts between 1970 and 2010.

The sample used in this study includes the metropolitan areas of the 50 most populous cities in the U.S. based on 1970 population. The sample includes only 48 metropolitan statistical areas because there are two instances where two of the most populous cities are in the same MSA (Dallas-Fort Worth, Minneapolis-St. Paul). Central-city tracts are identified using the "Place" variable in the NCDB. Tracts are considered to be in the central city if the value of the Place variable is equal to the FIPS code from the U.S. Census Bureau for the city.

The income variable that is used to identify gentrifiable and gentrifying tracts is average household income. While median household income would be a preferable income measure, it is not available in the NCDB for 1970 and 1980. Average household income (AHI) is the only household income measure that is available for each year in the NCDB. The median income for each metropolitan area is calculated as the median AHI for all tracts in the metropolitan area.

Thus, the metropolitan median AHI is the income of the median tract in the metropolitan area and not the income of the median household.

As was mentioned in the previous section, gentrifiable tracts are central-city tracts with average household incomes that are less than 80 percent of the metropolitan area's median AHI. The number of gentrifiable tracts is calculated for each city for 1970, 1980, 1990, and 2000. Table l presents the results regarding the percentage of central-city tracts that are classified as gentrifiable for each of the four years.

The results in table 1 indicate that the percentage of central-city tracts that are gentrifiable is at its lowest level in 1970. The mean "percentage gentrifiable" in 1970 was 36.3 percent while the median was 32.2 percent.

The percentage of the central-city tracts that were gentrifiable increased during the 1970s. The mean gentrification potential increased by 9.4 percentage points which represents a 25.7% increase during the decade.

Gentrification potential also increased during the 1980s. However, the increase was much smaller during the 1980s than in the 1970s. During the 1980s the average gentrification potential increased by 3.3 percentage points which represented a 1.5% increase.

Finally, the 1990s were the decade with the smallest changes in gentrification potential. The average gentrification potential was unchanged during the 1990s.

Over the entire 1970-2000 time frame the average gentrification potential increased by 10.9 percentage points. However, almost 90 percent of this increase occurred during the 1970s. Thus, there was a large increase in gentrification potential during the 1970s followed by a period of relative stability in the subsequent decades.

Once the tracts with the potential to gentrify have been identified, the next step of analysis is to identify which of the gentrifiable tracts experience gentrification. As was outlined above, in this study a tract is considered to have experienced gentrification if it is gentrifiable at the beginning of a decade and experiences income growth during the decade that exceeds the growth in metropolitan median income by at least 25 percent (weak gentrification) or 50 percent (strong gentrification). Recall that tract income is measured by the tract's average household income and metropolitan median income is the median average household income for all tracts in the metropolitan area.

Table 2 contains the results regarding the percentage of gentrifiable tracts that experience gentrification (referred to as the *gentrification propensity*) for each decade between 1970 and 2010. Panel A presents the weak gentrification results while Panel B presents the results for strong gentrification.

The results are qualitatively similar across both gentrification thresholds. In both cases, gentrification activity was at its lowest level in the 1970s. During the 1970s the mean gentrification propensity was 10.4% based on the weak definition and 3.8% according to the strong definition.

The gentrification propensities in the 1980s were much higher than in the 1970s for both cases. Based on the weak definition of gentrification the mean gentrification propensity was 23.3% while the strong definition yielded a mean of 11.3%. Thus, the mean gentrification propensities increased by 124% based on the weak definition of gentrification and by 201% based on the strong definition.

The gentrification propensities in the 1990s were, once again, higher than the propensities from the 1980s for both cases. Based on the weak definition of gentrification the mean

gentrification propensity increased to 49.3% during the 1990s which was 112% higher than the propensity for the weak definition in the 1980s. Based on the strong definition the mean gentrification propensity increased to 31.2% during the 1990s which was 176% higher than the mean propensity during the 1980s. Thus, there was a large increase in the probability that a gentrifiable tract experienced gentrification in the 1990s relative to the 1980s.

During the 2000s, the gentrification propensities fell for both groups of tracts. Thus, the 1990s was the period in which gentrification activity was at its highest level between 1970 and 2010. Based on the weak definition of gentrification, the mean gentrification propensity fell to 38.9% which was 21% lower than the mean propensity in the 1990s. Based on the strong definition the mean propensity fell to 30.1% which was 3% lower than the propensity from the 1990s.

This section has analyzed the changes in gentrification potential and gentrification propensities in U.S. cities from 1970-2010. The "supply" of gentrifiable neighborhoods was at its lowest level in 1970, increased substantially during the 1970s, and remained relatively constant from 1980 to 2010. The level of gentrification activity (as measured by gentrification propensities) was at its lowest level during the 1970s, rose substantially during the 1980s and 1990s, and decreased during the 2000s. Thus, the peak period for gentrification activity in U.S. cities was the 1990s while the largest increase from the previous decade was in the 1980s relative to the 1970s.

In the next section an empirical model is presented that estimates gentrification propensities using a set of city and metropolitan area characteristics that have been presented in the literature as potential explanations of gentrification activity. The goal is to identify the key determinants of gentrification levels in U.S. cities.

Determinants of Gentrification

This section identifies the key determinants of the level of gentrification activity in U.S. cities in recent decades. The level of gentrification activity is measured using the gentrification propensities that were calculated in the previous section. Recall that the gentrification propensity for a city represents the percentage of the city's gentrifiable tracts that experience gentrification during a decade. Since gentrifiable tracts are identified as low-income central-city tracts (incomes less than 80% of MSA median income) and gentrification is identified as either weak (income growth that exceeds MSA income growth by at least 25%) or strong (income growth that exceeds MSA income growth by at least 50%), there are two sets of gentrification propensities that need to be estimated.

The set of potential determinants of gentrification is drawn from the gentrification literature and is meant to capture the leading theories of gentrification. The theories that are represented in this study are the "supply-side" explanations, "demand" explanations, and urban economic explanations. Supply-side explanations view gentrification being driven by central-city/suburban differences. In these explanations, gentrification is part of a continual cycle of central-city investment and disinvestment and gentrification occurs in the central-city when, after a period of disinvestment, central-city land values are low enough to attract new investment. The focus in these explanations is frequently on differences in property values between central-city and suburban locations that create attractive investment opportunities in the central-city when suburban values become much higher than central-city values. Thus, developers begin to "supply" new housing in gentrifiable neighborhoods when the land values sink to a level that makes such development financially feasible.

Demand-side explanations focus on changes in the demographic/socioeconomic characteristics of the population that may increase the number of moderate- and high-income households who may desire housing in traditionally low-income central-city neighborhoods. The focus for demand-side explanations is on such things as changes in the college-educated population or the occupational mix of the population.

Finally, Brueckner and Rosenthal (2009) predict that gentrification occurs when the central-city housing stock ages to the point where redevelopment becomes attractive. Thus, gentrification will be most common in older cities where the median age of housing units is high relative to the age of suburban housing.

The gentrification propensities for each city in each decade are estimated using a set of potential determinants of gentrification levels. A variety of specifications are used to provide more robust results. The variables that are included as potential determinants of gentrification are:

(1) Median home values or median gross rents

(2) Median household incomes

Each specification includes either home values or gross rents. In each case the impact of housing values or rents and household income is tested in three ways. First, the log of the the level of the variable in the central-city at the beginning of the decade is included to determine whether gentrification propensities are affected by levels of housing values, rents, and household incomes. Second, the change in each variable in the central-city during the preceding decade is included. These variables are included to determine whether gentrification propensities are affected by whether central-city housing values, rents, and/or incomes are increasing or decreasing and the magnitude of the changes.

Supply-side explanations of gentrification suggest that gentrification should be more common in cities with decreasing values and rents. Finally, the central-city/suburb ratio for each variable is included.[2] The ratio is included to determine whether gentrification propensities are affected by differences between the central-city and suburbs. Supply-side explanations of gentrification suggest that there should be higher levels of gentrification in cities where values, rents, and incomes are low relative to the suburbs.

(3) Central-City Manufacturing Employment Share

One of the factors that demand-side explanations of gentrification focus on is the role that deindustrialization played in creating opportunities for cities to gentrify. The role of deindustrialization is tested in two ways in this study. First, the manufacturing industry's share of central-city employment at the beginning of each decade is included in the model. This variable will test whether gentrification propensities are affected by the degree to which manufacturing is part of the central-city's employment base. Second, the 30-year change in the manufacturing industry's share of central-city employment is also included. This variable will test whether gentrification propensities are affected by the extent to which the central-city deindustrialized.

(4) Black population shares

(5) Percent of employed central-city residents in professional and executive occupations

(6) Percent of central-city residents aged 25 and over with at least a bachelor's degree

[2] The central-city and suburb values for each variable are obtained from the "State of the Cities" Data System which is available from the U.S. Department of Housing and Urban Development (https://www.huduser.gov/portal/datasets/socds.html). The SOCDS allows the research to specify the central-city within each MSA and returns values for the city of choice as well as the suburban area of the MSA.

The central-city black population share is included to test whether gentrification propensities are affected by the racial composition of the central city. The lagged change in the black population share is included to determine whether gentrification propensities are affected by the degree to which the central-city black population share is increasing or decreasing. Finally, the central-city/suburb ratio for the black population share is included to determine whether gentrification propensities are related to the relative racial composition of the central-city and the suburbs.

Two variables are included to test whether gentrification propensities are related to the occupational mix and/or education attainment of the central-city population. Demand-side explanations suggest that increased professionalization of the central-city workforce and/or an influx of college-educated residents increased the demand for housing in gentrifiable neighborhoods and, therefore, will lead to higher gentrification propensities. The impact of occupation and education is tested in two ways. First, the value of the variable at the beginning of each decade is included to determine whether there is a relationship between gentrification propensities and the degree to which central-city residents are professionals or college-educated. Second, the change in each of the variables in the previous decade is included to determine whether there is a relationship between gentrification propensities and the extent to which the central-city population is becoming more professional and more highly educated. Demand-side explanations of gentrification suggest that gentrification should be more common in cities that are becoming more professional and more highly educated. The impact of each of these variables is tested independently because they are highly correlated with one another.

(7) Percent of housing units built before 1939

(8) Median housing age

Both of these variables are included to determine whether, as suggested by Brueckner and Rosenthal (2009), gentrification is more common in cities where the central-city housing stock is older. The impact of both variables is tested in two ways. First, the variable's value at the beginning of each decade is included to test whether there is a relationship between gentrification propensities and the absolute age of the central-city housing stock. Second, the central-city/suburb ratio of each variable is included to test whether there is a relationship between the age of the central-city housing stock relative to the age of the suburban housing stock. Brueckner and Rosenthal suggest that there should be more gentrification activity in cities with older housing and where central-city housing is older relative to the suburban housing in the metropolitan area. The impact of each of these variables is tested independently since they are highly correlated with one another.

(9) Central-city employment share

The central-city share of total metropolitan employment is included to test whether there is a relationship between gentrification propensities and employment centralization.

(10) Gentrification Potential

The gentrification potential level at the beginning of each decade is included to test whether gentrification propensities are related to the percentage of central-city tracts that are gentrifiable. It is possible that a city in which a high percentage of tracts are gentrifiable will be less appealing to potential gentrifiers as it signals the relatively low economic standing of the city relative to the suburbs.

Recall that the dataset includes 50 cities in 48 metropolitan areas. In the previous section gentrification propensities were calculated for all four decades between 1970 and 2010. However, the use of lagged values of several of the variables means that gentrification propensities can only be estimated for three decades (1980-2010). The data for each of the three decades are combined into a single dataset with an indicator for decade included in the estimation (2000s is the omitted decade). Thus, the final dataset had 150 observations. Ordinary least squares is used to estimate the various gentrification propensities and the standard errors are clustered at the city level.

Tables 4 and 5 contain the estimation results for both sets of gentrification propensities. Each set of gentrification propensities is estimated using the same set of variables and the same variety of models are used in each case.

Table 4 contains the estimation results for the first set of gentrification propensities. For this set of propensities, central-city tracts were classified as gentrifiable if their incomes were less than 80 percent of the metropolitan median income and gentrifiable tracts are identified as undergoing gentrification using the weak definition of gentrification that required their income growth in a decade to exceed the growth in metropolitan median income by at least 25 percent.

Several clear results emerge in table 4. First, both of the decade dummy variables are statistically significant at the 5% level in every case. The coefficient on the 1980s variable is negative in every case and ranges from -14.32 to -24.81. Thus, gentrifiable tracts were much less likely to gentrify in the 1980s than in the 2000s. The coefficient on the 1990s variable is positive in every case and ranges from 6.85 to 14.55 indicating that gentrifiable tracts were much more likely to gentrify in the 1990s than in the 2000s. This supports the finding in the previous section that the 1990s was the decade in which the level of gentrification activity in U.S. peaked.

Among the value/rent/income variables there are several variables with coefficients that are statistically significant at a 5% level. The coefficient on the lagged percentage change in the median central-city home value is negative in every case and ranges from -0.13 to -0.15. This results indicates that gentrifiable neighborhoods were less likely to gentrify in cities that experienced higher levels of housing price growth in the previous decade. This result provides some support for supply-side explanations of gentrification in which central-city disinvestment is a precursor to gentrification.

The coefficient on the median home value ratio variable is positive in every case and ranges from 0.16 to 0.18. This indicates the gentrifiable neighborhoods are more likely to gentrify in cities where central-city home values are high relative to the suburban values. This result contradicts supply-side explanations which suggest that gentrification occurs when central-city values are driven down to levels that are low enough relative to suburban values that investment shifts from the suburbs to the central-city.

The coefficient on the lagged percentage change in central-city median gross rent is negative in every case and is consistently around -0.27. This is consistent with the result for the lagged change in central-city median home values and indicates that gentrifiable tracts are more likely to gentrification in cities with lower levels of rent growth in the central-city. This suggests that there may be an affordability component to gentrification in which high rates of growth in rents and values deter future gentrification.

The coefficient on the lagged change in central-city median household income growth is consistently positive and significant at a 5% level in two cases. This suggests that gentrifiable neighborhoods are more likely to gentrify in cities in which the growth in central-city household income is high. This is consistent with demand-side explanations in which an increase in the

number of high-income households would be predicted to increase the amount of gentrification activity.

The coefficient on the median household income ratio is consistently negative and significant at a 5% level in two cases. This suggest that gentrifiable neighborhoods are more likely to gentrify in metropolitan with relatively large difference in household incomes between the central-city and the suburbs. This is consistently with supply-side explanations of gentrification.

The value/rent/income results in Table 4 present an interesting picture of the determinants of gentrification. Gentrification is more common in cities with values that are high relative to the suburbs, incomes that are low relative to the suburbs and in which the growth in values and rents in the previous decade was relatively low.

Among the racial composition/occupation/education variables there is only one variable with a coefficient that is significant at a 5% level. The lagged change in the percentage of central-city residents with at least a bachelor's degree in positive in every case and significant in two instances. This suggests that gentrifiable neighborhoods are more likely to gentrify in cities in which the percentage of residents with college degrees increased in the previous decade. This is consistent with demand-side explanations of gentrification in which an increase in the number of college-educated residents generates higher levels of gentrification.

Finally, none of the variables measuring the age of the central-city housing stock are significant at the 5% level in any instances. However, the coefficients on both housing age ratio variables are positive in every case which is consistent with the Brueckner-Rosenthal explanation of gentrification.

Table 5 contains the results for the next set of gentrification propensities. In this case, a central-city tract is considered to be gentrifiable if its median income is less than 80% of the metropolitan median income and a gentrifiable tract is classified as gentrifying if its income growth during a decade exceeds the growth in metropolitan median income by at least 50 percent. Thus, this gentrification definition represents the stronger of the two used in this study.

As can be seen in table 5, the coefficient on the 1980s variable is negative and statistically significant at a 1% level in every case. Thus, as was the case for the previous set of results, gentrifiable tracts in the 1980s were less likely to gentrify than gentrifiable tracts in the 2000s. However, there is no evidence in this set of results that gentrifiable tracts in the 1990s were more likely to gentrify than gentrifiable tracts in the 2000s. Thus, the main difference in gentrification activity in the 1990s and the 2000s was that gentrifiable tracts were much more likely to experience income growth that exceeded the growth in metropolitan median income by between 25 and 50 percent. There was no discernible increase in more extreme levels of income growth.

Among the value/rent/income variables in table 5 the median household income ratio variable is the only variable with a coefficient that is statistically significant at a 5% level. The coefficient on this variable is negative in every case and statistically significant in two cases. This suggests that gentrifiable neighborhoods were more likely to gentrify in cities with incomes that were low relative to the suburbs. This result is consistent with the results in table 4 and is also consistent with supply-side explanations of gentrification.

Among the racial composition/occupation/education variables, the lagged change in the percentage of central-city residents with at least a bachelor's degree is the only variable with a coefficient that is statistically significant. The coefficient on the variable is positive in every

case and statistically significant at a 5% level in two instances. The result is consistent with demand-side explanations and also supports the result in table 4.

Among the housing age variables, there are two variables that have coefficients that are statistically significant at a 5% level. The coefficient on the central-city/suburb ratio for the percentage of the housing stock built before 1939 is positive in every case and statistically significant in three instances. This result suggests that gentrifiable neighborhoods were more likely to gentrify in cities where a higher percentage of the housing stock was built before 1939 relative to the suburban housing stock. This result supports the Brueckner-Rosenthal explanation of gentrification. Additionally, the coefficient on the median age of central-city housing units is negative in each case and statistically significant in two instances. This result suggests that gentrifiable neighborhoods were less likely to gentrify in cities with older housing in general. The Brueckner-Rosenthal explanation is grounded more in the relative age of central-city housing so this results does not necessarily contradict their prediction.

Tables 4 and 5 present the results from estimating the gentrification propensities using weak and strong definitions of gentrification. There are several consistent conclusions across both sets of results. First, in both cases the gentrification propensities for the 1980s were lower than the propensities for the 2000s. Second, in both cases gentrifiable tracts were more likely to gentrify in cities with median home values that were higher relative to the values in the suburbs. Third, gentrification propensities were higher in cities with median household incomes that were low relative to suburban household incomes. Finally, gentrification propensities were higher in cities in which there were larger increases in the percentage of central city residents with college degrees.

Additionally, the results for the gentrification propensities from the weak definition of gentrification finds several additional determinants of the level of gentrification activity. First, gentrification propensities in the 1990s were higher than those in the 2000s. According to the weak definition, the 1990s were the peak period for gentrification activity. Second, gentrification propensities were lower in cities with larger increases in median home values and median gross rents in the previous decade. This suggests that large increases in home values and rents may act as a deterrent to gentrification. Finally, gentrification propensities were higher in cities where the change in central city median household incomes was higher. Thus, when the lower threshold for identify gentrifying neighborhoods is used, gentrifiable neighborhoods are more likely to gentrify in cities where central-city incomes are rising and housing prices and rents experience smaller increases.

Finally, the results in table 5 find that the age of central-city housing stock also matters. The percentage of the central-city housing stock built before 1939 and the median age of the central-city housing stock are found to be inversely related to gentrification propensities with an older housing stock being associated with lower gentrification propensities. However, the ratio of the age of the central-city housing stock to the age of the suburban housing stock is found to be directly related to gentrification propensities. Gentrifiable neighborhoods are more likely to gentrify in cities where the central-city housing stock is older relative to the suburban housing stock.

Conclusion

This paper has provided a quantitative analysis of gentrification in U.S. from 1970 to 2010. The paper makes two primary contributions. First, it develops a methodology for using

Census data to identify gentrifying neighborhoods and provides a cross-sectional and historical perspective on how gentrification level have changed between 1970 and 2010. This section of the paper identifies the 1970s as the decade with the lowest level of gentrification activity, the 1980s as the decade with the largest increase in gentrification activity relative to the previous decade, and the 1990s as the decade in which gentrification levels were the highest.

The second contribution of the paper is to identify several of the key determinants of the variation in gentrification levels across U.S. cities. Gentrification levels are found to be higher in cities where median household incomes are high relative to the suburbs, where central city household incomes are low relative, and where there was a larger increase in the percentage of central city residents with at least a bachelor's degree.

Finally, the work in this paper points to several directions for fruitful future research. These include developing a multi-dimensional measure of gentrification that will identify gentrifying neighborhoods using more than just income. Another possibility is identifying the key determinants of which gentrifiable neighborhoods gentrify.

References

Bostic RW and Martin RW (2003) Black Home-owners as a gentrifying force? Neighbourhood dynamics in the context of minority home-ownership. *Urban Studies* 40(12): 2427-2449.

Bourne LS (1993a) The demise of gentrification? A commentary and prospective view. *Urban Geography* 14(1): 95-107.

Bourne LS (1993b) The myth and reality of gentrification: A commentary on emerging urban forms. *Urban Studies* 30(1): 183-189.

Freeman L (2005) Displacement or Succession? Residential Mobility in Gentrifying Neighborhoods. *Urban Affairs Review* 40(4):463-491.

Darling E (2005) The city in the county: Wilderness gentrification and the rent-gap. *Environment and Planning A* 37(6): 1015-1032.

GeoLytics, Inc., Urban Institute, and U.S. Census Bureau (2013) *Neighborhood change database (NCDB) 2010: tract data for 1970-80-90-00-10.* E. Brunswick, NJ: GeoLytics.

Hammel DJ and Wyly EK (1996) A model for identifying gentrified areas with census data. *Urban Geography* 17(3): 248-268.

Kreager DA, Lyons CJ, and Hays ZR (2011) Urban revitalization and Seattle crime, 1982-2000. *Social Problems* 58(4): 615-639.

Lees L, Slater T, and Wyly E (2008) *Gentrification*. New York: Routledge.

McKinnish T, Walsh R, and White TK (2010) Who gentrifies low-income neighborhoods? *Journal of Urban Economics* 67(2): 180-193.

Parsons D (1980) Rural gentrification: the influence of rural settlement planning policies. Department of Geography, University of Sussex, Brighton.

Phillips M (1993) Rural gentrification and the processes of class colonization. *Journal of Rural Studies* 9(2): 123-140.

Smith N (1979) Toward a theory of gentrification: a back to the city movement by capital, not people. *Journal of the American Planning Association* 45(4): 538-548.

Wyly EK and Hammel DJ (1998) Modeling the context and contingency of gentrification. *Journal of Urban Affairs* 20(3): 303-326.

Table 1
Percentage of Central-City Tracts Identified as Gentrifiable
Gentrifiable = Less Than 80% of MSA Average Household Income

	1970	1980	1990	2000
Mean	36.32%	45.67%	47.19%	47.19%
Median	32.16%	43.60%	44.21%	44.18%
Minimum	4.23%	13.59%	18.31%	15.70%
Maximum	76.47%	85.29%	82.35%	94.12%

Table 2
Gentrification Propensities 1970-2010
Gentrifiable = Less Than 80% of MSA Median Income

Panel A: Weak Gentrification				
	1970s	1980s	1990s	2000s
Mean	10.40%	23.30%	49.30%	38.90%
Median	8.56%	21.50%	48.20%	38.95%
Minimum	0.00%	0.00%	22.80%	14.65%
Maximum	46.70%	51.70%	81.20%	62.50%
Panel B: Strong Gentrification				
Mean	3.75%	11.30%	31.20%	30.12%
Median	2.34%	9.98%	29.40%	27.40%
Minimum	0.00%	0.00%	10.00%	12.50%
Maximum	26.70%	41.70%	58.00%	62.50%

Table 3
Summary Statistics

	1980				1990				2000			
	Mean	StDev	Min	Max	Mean	StDev	Min	Max	Mean	StDev	Min	Max
Central City Employment Share	47.26	15.23	20.43	81.99	43.02	15.99	17.48	79.65	38.68	16.29	12.33	76.48
LN (Central City Median Home Value)	11.62	0.35	10.91	12.51	11.72	0.47	10.63	13.09	11.82	0.42	11.21	13.11
Lagged % Change in Central City Median Home Value	24.69	27.95	-36.5	89.41	16.24	40.57	-32.5	180.38	13.44	28.24	-46.5	100.63
Median Home Value Ratio (Central City / Suburb)	82.25	18.31	42.69	118.86	84.99	18.23	33.52	118.69	81.34	21.31	10.63	130.89
LN (Central City Median Gross Rent)	6.39	0.11	6.16	6.61	6.55	0.17	6.23	6.98	6.59	0.16	6.31	7.05
Lagged % Change in Central City Median Gross Rent	-2.18	8.44	-17.6	20.77	18.59	14.89	-10.9	56.88	4.74	9.77	-15.6	34.03
Median Gross Rent Ratio (Central City / Suburb)	89.94	12.65	71.88	129.67	91.70	13.33	67.99	137.23	92.23	11.35	72.71	127.66
LN (Central City Median Household Income)	10.65	0.14	10.40	10.91	10.68	0.17	10.28	10.97	10.72	0.19	10.32	11.17
Lagged % Change in Central City Median Household Income	7.28	13.05	-12.9	45.40	3.82	11.43	-21.5	36.35	4.60	8.89	-16.5	25.02
Median Household Income Ratio (Central City / Suburb)	74.45	13.35	53.38	107.02	72.94	14.09	47.66	99.46	71.88	13.57	43.15	96.00
Central City Black Population Share	25.81	16.01	1.57	70.24	27.53	16.96	1.63	75.37	29.58	17.89	2.47	82.22
Lagged Change in Central City Black Population Share	3.95	3.93	-0.90	19.82	1.72	2.74	-4.37	12.61	2.05	3.29	-4.61	8.65
Black Population Share Ratio (Central City / Suburb)	7.20	7.28	0.81	41.31	6.33	6.70	0.96	39.92	4.76	4.22	1.05	22.43
Central City Manufacturing Employment Share	18.18	7.17	4.10	34.60	13.81	4.80	4.30	24.80	11.65	4.12	3.60	22.90
Lagged Change in Central City Manufacturing Employment Share	-4.55	5.77	-17.4	10.60	-8.93	6.01	-19.7	3.70	-9.15	5.70	-19.4	5.20
Percent of Employed Central City Residents in Professional and Executive Occupations	26.72	4.39	15.67	37.26	31.45	5.11	20.29	44.04	34.74	7.18	20.66	52.58
Lagged Change in % of CC Residents in Professional and Executive Occupations	4.03	1.99	-3.50	11.48	4.73	1.41	0.71	7.84	3.29	3.62	-12.6	15.58
Percent of Central City Residents with at least a Bachelor's Degree	18.01	5.56	6.38	30.24	22.82	6.73	8.08	37.67	27.13	8.26	10.97	46.74
Lagged Change in % of CC Residents with at least a Bachelor's Degree	6.60	2.31	1.21	11.59	4.81	1.85	0.36	9.60	4.31	2.29	-2.04	9.94
Percent of Central City Housing Units Built Before 1939	31.93	19.99	1.85	73.02	27.07	19.17	0.82	68.07	23.90	17.33	0.55	57.68
Housing Age Ratio (Central City / Suburb)	2.32	1.39	0.52	5.60	2.79	1.85	0.43	7.34	3.07	2.12	0.57	8.11
Median Age of Central City Housing Units	33.25	18.55	12.45	84.14	36.32	17.35	12.58	87.16	40.88	15.30	10.67	78.64
Median Housing Age Ratio (Central City / Suburb)	1.92	0.65	0.93	3.27	1.75	0.49	0.98	2.72	1.65	0.39	0.99	2.80

Table 4
Estimation of Gentrification Propensities
Gentrifiable = 80% of MSA Median Income
Gentrified =Income growth at least 25% higher than growth in MSA median income

	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Intercept	240.04***	94.06	198.16	116.39	215.21***	90.35	204.25	120	250.61**	91.42	218.87	111.85	225.72***	88.82	228.36	117.43
1980s	-14.84**	5.45	-14.32**	5.47	-23.27**	6.7	-19.35**	5.82	-16.48**	5.02	-16.57**	5.18	-24.81**	6.45	-20.98**	5.84
1990s	9.59**	3.39	14.55*	2.97	7.48**	3.43	13.64**	3.38	8.87**	3.35	13.78*	3.13	6.85***	3.39	13.25**	3.59
% Gent	-0.17	0.1	-0.19	0.1	-0.14	0.09	-0.15	0.09	-0.17	0.09	-0.19	0.1	-0.14	0.09	-0.15	0.09
CC EmpShare	0.07	0.09	0.02	0.09	0.09	0.09	0.03	0.09	0.06	0.09	-0.02	0.09	0.08	0.09	0.009	0.08
LN (CC Med Val)	0.82	5.01			1.74	4.53			1.41	5.16			1.94	4.77		
Lagged %Δ (CC Med Val)	-0.13**	0.04			-0.15**	0.04			-0.13**	0.04			-0.15**	0.05		
Med Val Ratio	0.16***	0.08			0.17***	0.06			0.16***	0.08			0.18**	0.06		
LN (CC Med Rent)			8.84	13.44			10.29	12.81			9.92	14.11			9.55	13.03
Lagged %Δ (CC Med Rent)			-0.26***	0.1			-0.27**	0.1			-0.28**	0.1			-0.28**	0.1
Med Rent Ratio			0.14	0.19			0.1	0.21			0.11	0.22			0.06	0.23
LN (CC Med HH Inc)	-18.19	12.26	-19.08	15.86	-16.37	11.61	-20.37	15.63	-19.83	12.21	-21.42	16.01	-17.37	11.78	-21.51	15.79
Lagged %Δ (CC Med HH Inc)	0.31***	0.13	0.17	0.12	0.23	0.13	0.08	0.14	0.32***	0.13	0.18	0.12	0.23	0.13	0.1	0.14
Med HH Inc Ratio	-0.34	0.18	-0.34	0.21	-0.38***	0.17	-0.3	0.23	-0.34	0.18	-0.34	0.22	-0.39***	0.17	-0.3	0.25
CC Black Pop Share	-0.05	0.12	-0.03	0.1	-0.06	0.1	-0.04	0.09	-0.04	0.11	-0.02	0.09	-0.05	0.1	-0.03	0.08
Lagged Δ (CC Black Pop Share	-0.18	0.41	-0.18	0.38	-0.13	0.39	-0.12	0.35	-0.2	0.42	-0.19	0.38	-0.15	0.4	-0.13	0.37
Black Pop Share Ratio	0.18	0.2	0.07	0.17	0.14	0.18	0.04	0.16	0.19	0.2	0.09	17	0.15	0.19	0.06	0.16
CC Man Emp Share	-0.14	0.19	-0.03	0.22	-0.07	0.19	-0.02	0.2	-0.16	0.19	-0.05	0.22	-0.12	0.2	-0.08	0.2
Lagged Δ (CC Man Emp Share)	0.08	0.26	0.17	0.26	0.19	27	0.21	27	0.1	0.28	0.18	28	0.28	0.29	0.28	28
CC % PROF	0.07	0.37	0.21	0.42					0.12	0.37	0.34	0.4				
Lagged Δ (CC % Prof)	0.44	0.63	0.43	0.6					0.42	0.62	0.39	0.58				
CC % College					-0.35	0.31	-0.004	0.33					-0.31	0.32	0.11	0.34
Lagged Δ (CC % College)					2.24**	0.84	1.53	0.83					2.14***	0.86	1.39	0.88
Percent Old	-0.06	0.1	-0.09	0.09	-0.09	0.09	-0.1	0.08								
Percent Old Ratio	0.7	0.75	1.1	0.84	0.74	0.69	1.11	0.81								
Median Housing Age									-0.09	0.11	-0.15	0.12	-0.07	0.1	-0.1	11
Median Housing Age Ratio									2.02	2.53	2.91	2.83	0.91	2.57	1.34	3.1
Adj R^2	0.5532		0.5391		0.5723		0.5491		0.5517		0.5362		0.5682		0.543	

Table 5
Estimation of Gentrification Propensities
Gentrifiable = 80% of MSA Median Income
Gentrified =Income growth at least 50% higher than growth in MSA median income

	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Intercept	120.77	82.64	132.66	99.29	102.94	77.51	135.09	100.94	144.26	79.41	166.04	94.9	124.93	74.32	169.45	97.54
1980s	-20.03*	4.07	-17.31**	4.6	-26.16*	5.33	-21.71*	5.03	-23.18*	3.8	-21.11*	4.14	-29.15*	5.16	-24.76*	4.99
1990s	-0.97	3	0.97	3.11	-2.05	3.29	0.28	3.36	-2.43	3.1	-0.4	3.07	-3.53	3.37	-0.78	3.6
% Gent	-0.15	0.08	-0.16	0.09	-0.12	0.08	-0.14	0.08	-0.15	8	-0.17	0.09	-0.13	0.08	-0.15	0.09
CC EmpShare	0.1	0.08	0.07	0.09	0.11	0.08	0.08	0.08	0.08	0.08	0.02	0.08	0.1	0.08	0.04	0.08
LN (CC Med Val)	-2.29	4.03			-1.64	3.59			-1.11	4.08			-0.62	3.78		
Lagged %Δ (CC Med Val)	-0.04	0.04			-0.06	0.04			-0.05	0.04			-0.06	0.04		
Med Val Ratio	0.20**	0.07			0.20**	0.05			0.20**	0.06			0.21**	0.05		
LN (CC Med Rent)			0.89	11.6			2.11	11.18			2.98	12.3			2.77	11.63
Lagged %Δ (CC Med Rent)			-0.01	0.09			-0.02	0.09			-0.04	0.09			-0.04	0.09
Med Rent Ratio			0.19	0.18			0.16	0.2			0.15	0.19			0.11	0.22
LN (CC Med HH Inc)	-5	10.55	-9.56	14.37	-4.05	9.64	-10.67	14.09	-8.56	10.27	-13.65	14.49	-7.11	9.64	-13.61	14.22
Lagged %Δ (CC Med HH Inc)	0.2	0.15	0.12	0.12	0.12	0.14	0.03	0.13	0.21	0.16	0.14	0.12	0.14	0.14	0.07	0.13
Med HH Inc Ratio	-0.28	0.16	-0.28	0.19	-0.32***	0.15	-0.27	0.22	-0.28	0.16	-0.28	0.2	-0.32***	0.15	-0.26	0.24
CC Black Pop Share	0.05	0.1	0.06	0.09	0.05	0.09	0.06	0.08	0.07	0.09	0.08	0.09	0.1	0.08	0.08	8
Lagged Δ (CC Black Pop Share	-0.06	0.37	-0.21	0.38	-0.01	0.36	-0.16	37	-0.09	0.38	-0.24	0.39	-0.06	0.38	-0.2	39
Black Pop Share Ratio	0.1	0.15	0.01	0.13	0.06	0.13	-0.01	0.13	0.13	0.15	0.04	0.13	0.09	0.14	0.02	0.12
CC Man Emp Share	-0.05	0.17	-0.01	0.2	0.05	0.17	0.06	0.19	-0.08	0.17	-0.03	0.2	-0.01	16	-0.02	18
Lagged Δ (CC Man Emp Share)	-0.11	0.23	-0.07	0.25	-0.02	0.25	-0.01	0.27	-0.1	0.24	-0.05	0.26	0.03	26	0.04	0.27
CC % PROF	-0.24	0.35	-0.1	0.38					-0.16	0.34	0.08	36				
Lagged Δ (CC % Prof)	0.65	0.59	0.55	0.56					0.6	0.57	0.47	0.52				
CC % College					-0.44	0.29	-0.21	0.32					-0.38	30	-0.06	0.32
Lagged Δ (CC % College)					1.96***	0.77	1.52***	0.75					1.72***	0.8	1.22***	79
Percent Old	-0.11	9	-0.15	0.09	-0.15	0.08	-0.17***	0.08								
Percent Old Ratio	1.19	0.6	1.67***	0.69	1.19***	0.58	1.65***	0.68								
Median Housing Age									-0.18	0.1	-0.25***	0.12	-0.18	-0.18	-0.22***	0.11
Median Housing Age Ratio	120.77	82.64	132.66	99.29	102.94	77.51	135.09	100.94	144.26	79.41	166.04	94.9	124.93	74.32	169.45	97.54
Adj R^2	-20.03	4.07	-17.31	4.6	-26.16	5.33	-21.71	5.03	-23.18	3.8	-21.11	4.14	-29.15	5.16	-24.76	4.99