Gentrification Trends in the United States, 1970-2010

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Abstract
This paper proposes a methodology that will allow for using Census data to measure the incidence of gentrification across a large cross-section of U.S. cities and across multiple decades. The methodology is used to measure gentrification activity for 52 U.S. cities for each decade from 1970 to 2010. The results make it possible to evaluate changes in both the incidence and geography of gentrification in the United States between 1970 and 2010. The paper's results indicate that gentrification was at its lowest level in the 1970s and peaked in the 1990s. Additionally, the largest increases in gentrification activity in the 1980s were for cities in the Northeast while Midwestern cities experienced the largest increases in the 1990s. Finally, gentrification levels in the 2000s, while lower than the levels in the 1990s, were still significantly higher than the levels in both the 1970s and 1980s.

Keywords
Gentrification, Neighborhood Change, Historical Analysis, Regional Shifts

Introduction

This paper provides a quantitative analysis of gentrification in the largest cities in the United States from 1970 to 2010. In doing so, the paper begins to fill a gap in the current gentrification literature. To date, there are no published papers that provide a cross-sectional, historical perspective on the incidence of gentrification in the United States. Toward this end, the paper has three primary goals. First, it will suggest a methodology for identifying gentrifying neighborhoods that can be implemented across a relatively large sample of cities as well as at different points in time. Second, it will determine whether gentrification has become more or less common over time and quantify the extent to which gentrification levels have fluctuated. Finally, it will identify any significant changes in the geographic patterns of gentrification in the United States between 1970 and 2010. The primary goal of the paper is to provide a better historical understanding of the incidence and location of gentrification.

The paper will begin by reviewing the relatively small number of papers in the literature that attempt to quantify gentrification. Next, the paper will outline the methodology that will be employed in this paper to measure gentrification and then use the methodology to measure gentrification in U.S. cities from 1970 to 2010. In identifying gentrification the focus will be on identifying how common the types of neighborhood income changes associated with gentrification are. The final section of the paper will summarize the paper's conclusions and provide suggestions for future research.

Literature Review

While gentrification has been heavily studied since the 1970s and the amount of existing research on the topic is massive, to the author's knowledge there are no published studies that

provide an historical, quantitative analysis of the subject.[1] The goal of this paper is to provide such an analysis. In doing so, one of the biggest challenges is that of developing a definition of gentrification that can be used to quantify gentrification in a relatively large cross-section of cities and that can also provide an historical perspective on gentrification.

The development of a purely quantitative measure of gentrification is not without controversy. In their recent article Kreager, et. al (2011) suggest that census-based measures of gentrification suffer from two primary flaws. The first is that census-based measures frequently identify solidly middle- and upper-income neighborhoods as gentrifying (Bourne, 1993a, 1993b). 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."

In other words, gentrification is a process that involves both quantitative and qualitative changes in a neighborhood. 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 for which census data is very useful. However, there are also changes in characteristics such as the local retail mix that census data does not measure 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 acknowledging that a purely quantitative approach to gentrification will not capture all of the dimensions of the gentrification process, this paper seeks to generate a quantitative definition that captures the main elements of the process. The measurable components of gentrification are likely to be highly correlated with the more qualitative, aesthetic changes

[1] See Lees. et. al (2008), for a comprehensive review of the gentrification literature.

associated with gentrification. Additionally, the paper will argue that the benefits from providing a cross-sectional, historical study of gentrification outweigh what is lost from being unable to fully capture the street-level changes that are associated with the gentrification process. Even if the methodology that will be proposed below is not a perfect measure of gentrification, employing the same methodology across cities and across time periods should still provide useful insights into the historical patterns of gentrification.

Additionally, the problem of misidentifying middle- and upper-income neighborhoods when using census data can be easily avoided by adequately controlling for which neighborhoods have the potential to gentrify and which ones do not. Specifically, gentrification, at its roots, involves the movement of higher-income households into traditionally low-income neighborhoods. Because of this, gentrification should only be possible in low-income neighborhoods. Thus, the identification of gentrifying neighborhoods should be a two-stage process. 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 gentrifiable tracts have experienced gentrification.

While there are very few quantitative studies of gentrification, there are several articles in the literature that follow this approach of identifying "gentrifiable" tracts before measuring gentrification. The earliest attempt to quantify gentrification using census data can be found in Hammel and Wyly (1996). This paper is actually a hybrid between field research and a Census-based approach. The study is limited to Minneapolis-St. Paul and the authors use field research to identify neighborhoods that are "gentrifying" or "maybe gentrifying". They then develop a set of Census variables that are likely to be associated with the gentrification process and identify the variables that do the best job of identifying the gentrifying neighborhoods.

The authors employ a "two-step" approach as was described earlier in that only tracts with median incomes below the central city median income are eligible to gentrify. Among these tracts the main criteria for determining whether or not a tract has gentrified is the level of visible reinvestment activity. The authors specifically look at the number of blocks within a census tract that have an "improved" housing unit and the percentage of structures on the block that show "evidence of reinvestment". Gentrifiable census tracts in which a majority of the blocks contain an improved housing unit and one-third of all structures show evidence of reinvestment are deemed to have gentrified.

Once the gentrifying tracts are identified, the authors develop a set of socioeconomic, housing, and population variables and test how well the various variables distinguish between gentrifying and non-gentrifying tracts. In their final analysis the authors end up with a set of nine Census variables that do the best job of discriminating between gentrifying and non-gentrifying tracts. These variables are:

(1) Median household income at the end of the time period

(2) Change in median household income during the time period

(3) Percent of workers employed in managerial, professional, and technical occupations at the end of the time period

(4) Change in median rent during the time period

(5) Median rent at the end of the time period

(6) Change in median house value during the time period

(7) Percentage of persons 25 and over with 4 or more years of college at the end of the time period

(8) Number of employed persons at the end of the time period

(9) Number of persons at the end of the time period

Since this paper is a hybrid of field research and quantitative analysis, it is possible to use the methodology to provide a cross-sectional, historical analysis of gentrification. However, the key contribution of this work for the purposes of this paper is identifying a set of census variables that are strongly correlated with gentrification. One curious aspect of their choice of variables is the large number of "end of time period" variables. These variables represent outcomes of the gentrification process and, thus, are not useful for identifying which gentrifiable neighborhoods gentrify and which ones do not.[2]

Bostic and Martin (2003) also study gentrification at the census tract level. Their study represents the first published study to measure gentrification using a cross-section of cities. Using the Neighborhood Change Database, the authors built a sample that includes all of the census tracts in the metropolitan statistical areas of the 50 largest cities in the United States as measured by their population in 1970. However, Bostic and Martin only study a single time period (1970-1990) and make no attempt to measure the extent of gentrification in the various cities in the sample or to analyze historical trends. Their study focuses on the interaction between gentrification and black homeownership.

The methodology employed by Bostic and Martin, however, is a good example of the two-step approach to identifying gentrifying tracts. The authors define a tract to be "gentrifiable" if it has a median income that is less than 50 percent of the median income of the metropolitan area containing the tract. After identifying the subset of gentrifiable tracts, the authors then make use of two approaches to identify which of the gentrifiable tracts gentrified.

[2] In a related paper (Wyly and Hammel (1998)) the authors expand the methodology to four cities (Chicago, Milwaukee, Minneapolis-St. Paul, and Washington).

The first approach considers a tract to have gentrified if it is gentrifiable at the beginning of a time period and no longer gentrifiable at the end of a time period. While there is some intuitive appeal to this approach, this definition sets the bar very low and will tend to overstate the amount of gentrification activity in a city. It will also be biased towards neighborhoods that are at the top end of the income distribution for gentrifiable neighborhoods.

The second, and preferred, approach employed by Bostic and Martin is a multidimensional approach that adapts the nine factors identified by Hammel and Wyly (1996) and Wyly and Hammel (1998). These nine factors are:

(1) Percentage of residents with college degrees at the end of the time period

(2) Growth in average family income during the time period

(3) Homeownership rate at the end of the time period

(4) Change in the share of the population aged 30 to 44 during the time period

(5) Poverty rate at the end of the time period

(6) White nonfamily households as a percentage of all households at end of the time period

(7) Black population share at the end of the time period

(8) Managerial and administrative workers as a percentage of the total workforce at end of the time period

(9) Percentage of residents with at least some college at the end of the time period.

Gentrifiable tracts are scored by ranking them according to each of the nine characteristics and calculating their average ranking across all nine characteristics. This is their "gentrification" score. 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.

The second approach is appropriate for the purposes of the Bostic and Martin study in which the goal was to create a set of gentrifying tracts and to analyze the changes in those tracts relative to gentrifiable tracts that did not gentrify. However, if the goal is to measure the incidence of gentrification, a multidimensional approach will require the determination of explicit cut-offs that can be used to separate gentrifying and non-gentrifying tracts.

Freeman (2005) provides another example of an attempt to measure gentrification using census data and, also, the use of the two-step process. Freeman's study is unique in that it identifies 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. Next, 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.

One of the strengths of Freeman's approach is his attempt to include 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 (see 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. The key question is whether Freeman's use of the percentage of housing units in the neighborhood that were built in the past twenty years is the appropriate measure of the "disinvestment" in a neighborhood that is typically viewed as a precursor to gentrification. The primary shortcoming of his focus on the construction of new housing units 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. Thus, a neighborhood could be receiving a substantial amount of new investment without any new housing units being constructed.

Returning to the two-step approach employed by Freeman, one weakness of Freeman's definition of "gentrifiable" is that the income threshold that he uses is much higher than the thresholds employed by earlier studies. Given the requirement that a gentrifiable neighborhood be a low-income neighborhood, including neighborhoods that are at the MSA median and below will include (by definition) many middle-income neighborhoods. It would be preferable to use a threshold that includes only low-income neighborhoods. One possible solution is to follow the definition of a low-income neighborhood employed by the U.S. Department of Housing and Urban Development and include only neighborhoods with incomes below 80% of median income for the metropolitan area (U.S. Department of Housing and Urban Development (2016)).

Freeman employs a two-variable approach in order to identify which of his gentrifiable neighborhoods experience gentrification. In order to gentrify, according to Freeman, 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 average increase in the MSA and (2) experience an increase in housing prices during the defined time period.

One of the more interesting aspects of this definition is that it does not include income as an indicator of gentrification. Freeman justifies this by suggesting that gentrification is more about class than income and that educational attainment captures class better than income does. Secondly, he suggests that income is less reliable than education because income tends to fluctuate over time while educational attainment (especially for those 25 and over) is stable over time. Finally, an income-based measure would not capture an in-migration of well-educated professionals with low incomes into a neighborhood.

The main problem with replacing income with educational attainment in measuring gentrification is that gentrification is fundamentally about an upward trajectory in a neighborhood's income. Thus, omitting income as a measure of gentrification could potentially miss a core element of the gentrification process. It is difficult to provide convincing evidence that a neighborhood has gentrified without proof that household incomes have risen over time.

As was the case in Freeman's definition of "gentrifiable" tracts, his thresholds for determining which gentrifiable tracts undergo gentrification are also set rather low. As mentioned above, Freeman requires two things of a gentrifiable tract: (1) It must have an increase in educational attainment that is equal to or greater than the increase experienced by the metropolitan area as a whole and (2) It must have an increase in housing prices. Both of these thresholds allow a tract to gentrify without experiencing any exceptional changes. The educational attainment threshold allows a tract to gentrify if it simply keeps up with the trends in the MSA while the housing price threshold only requires that housing prices increase. Thus, there is no requirement that the housing prices in a gentrifying neighborhood even keep up with the trends in the larger metropolitan area. Given the low bar that is set by these thresholds, it is likely that Freeman's approach over-identifies the extent of gentrification.

The final study in the literature that employs the two-step approach of first identifying "gentrifiable" neighborhoods and then identifying which of the gentrifiable neighborhoods experience gentrification is McKinnish, et. al (2010). The McKinnish study initially includes all of the census tracts in the 72 consolidated metropolitan statistical areas in the United States with a population of at least 500,000 in 1990. They then eliminate any tracts that are not within 5 km of an incorporated place with a population of at least 100,000. The authors then identify gentrifiable tracts as those that are in the bottom quintile of average family income in 1990. The authors do not report where the cutoff between gentrifiable and non-gentrifiable lies relative to the sample median income but it is likely that their approach is more restrictive than the approach employed in the previous studies. In fact, it is likely that their sample of gentrifiable census tracts primarily consists of very-low-income tracts and omits many tracts that would be considered to be "low-income" and, therefore, gentrifiable.

Another weakness of their approach to identifying gentrifiable neighborhoods is that the subset of gentrifiable neighborhoods is selected from the bottom of a distribution that includes tracts from the entire sample. Using a single national sample will likely lead to tracts in low-income metropolitan areas being overrepresented and tracts in high-income metropolitan areas being underrepresented in the subsample of gentrifiable tracts.[3] It would be preferable to follow the approaches in Hammel and Wyly (1996) and Bostic and Martin (2003) in which low-income neighborhoods are identified by comparing neighborhood income to the median for the entire metropolitan area.

[3] The authors state in a footnote that they performed their analysis using CMSA-specific cutoffs and that the alternate approach had little impact on their results. Since their primary goal was to identify the characteristics of the individuals who were moving into gentrifying neighborhoods, this is not surprising. However, when the purpose of the study is to measure the incidence of gentrification over time, the preferred approach would be to identify gentrifiable neighborhoods on a metropolitan area by metropolitan area basis.

After obtaining their subset of gentrifiable tracts, McKinnish, et. al identify gentrifying tracts as gentrifiable tracts that experienced 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.

Another deviation from the earlier studies is the use of an absolute income change rather than using a percentage change or an index of income growth relative to the metropolitan area's income growth. The authors' rationale for using an absolute change rather than a percentage change is that using a percentage change rule to identify gentrifying neighborhoods runs the risk of identifying a large number of very-low-income neighborhoods as gentrifying to the exclusion of low-income neighborhoods with higher income levels.

There are three primary problems with using an absolute change to identify gentrifying neighborhoods. First, since the study employs a national sample, a $10,000 increase for a gentrifiable neighborhood in a low-income metropolitan area would represent a much more significant change in the neighborhood's income than a $10,000 increase for a gentrifiable neighborhood in a high-income metropolitan area. Because of the significant differences in income levels across metropolitan areas across the U.S., an income measure that is based on neighborhood income growth relative to the income growth in the metropolitan area would more accurately identify gentrifying neighborhoods in a cross-section of metropolitan areas.

The second problem with the absolute measure is that it is harder to implement in a study that seeks to provide an historical perspective on gentrification. While any absolute threshold can be

adjusted for inflation, a consistent income threshold indexed to metropolitan area income growth will do a better job of identifying gentrifying tracks across multiple time periods.

Finally, the neighborhoods that are identified as gentrifying should be low-income tracts that have experienced household income growth that is in some way "exceptional". In high-income metropolitan areas or in areas that are experiencing high rates of income growth, an absolute threshold may lead to neighborhoods with below-average income growth being identified as gentrifying. Using an income threshold that is indexed to metropolitan-level income growth will avoid this error.

Methodology

The previous section surveyed the studies in the gentrification literature that have attempted to identify gentrifying neighborhoods using census data. There are several commonalities to be found in the studies that were reviewed. First, gentrification is primarily viewed as a central-city phenomenon. While the gentrification literature contains studies that consider rural and suburban gentrification (see Parsons (1980), Darling (2005), and Phillips (1993) for examples), most of the literature focuses on urban gentrification. Almost all of the quantitative studies in the previous section require that a tract be in the central-city in order to be gentrifiable.

Additionally, all of the studies surveyed employed a two-step process in identifying gentrifying neighborhoods. First, in order to gentrify a neighborhood must be gentrifiable. While there are exceptions, the most common approach is to define gentrifiable neighborhoods as central-city tracts with median incomes below some percentage of the metropolitan area's median income. Once the set of gentrifiable tracts has been identified, the next step is to identify which of the gentrifiable tracts have experienced gentrification. The studies surveyed vary

greatly in their criteria for identifying gentrifying neighborhoods. At one extreme, McKinnish, et. al (2010) use a single income-based measure to identify gentrifying neighborhoods. At the other extreme, Bostic and Martin (2003) employ a multidimensional approach that uses nine variables to identify gentrifying neighborhoods.

Identifying gentrifiable tracts

While the gentrification process can play out in many different ways, the one thing that all types of gentrification have in common is that they involve the movement of middle- and upper-income individuals and households into neighborhoods that have been traditionally low-income. The process of identifying "gentrifiable" and, later, "gentrifying" neighborhoods should be grounded in this defining characteristic.

The methodology chosen for this study will have two criteria that must be met in order for a neighborhood to be considered to be gentrifiable. First, it will need to be in the primary central-city of the metropolitan area and, second, it will need to be a low-income neighborhood. This paper will consider a neighborhood to be a low-income neighborhood if it has a median income that is less than 80 percent of the median income for the metropolitan area. Additionally, the paper will utilize a more restrictive approach in which a gentrifiable neighborhood is one with a median income that is less than 50% of the metropolitan area's median income. Thus the analysis that follows in the next section will look at two sets of "gentrifiable" neighborhoods: central-city neighborhoods with median incomes that are less than 80 percent of the metropolitan area's median income and central-city neighborhoods with median incomes that are less than 50 percent of the metropolitan area's median income.

Identifying gentrifying tracts

Once the set of neighborhoods that have the potential to gentrify have been identified, the next step in the analysis involves defining what it means for a gentrifiable neighborhood to gentrify. This paper will follow McKinnish, et. al and employ a single income-based measure of gentrification. This choice is based on the fact that, while gentrification can take many forms, all types of gentrification involve neighborhood incomes that are increasing over time. Moreover, gentrification typically involves neighborhood income growth that exceeds the trends for the city and/or metropolitan area as a whole. Thus, the set of gentrifying neighborhoods will consist of low-income, central-city neighborhoods that experience exceptional rates of income growth over time. This study focuses on determining how common it has been for low-income, central-city neighborhoods to undergo the type of income growth associated with gentrification and to analyze the historical and geographic trends between 1970 and 2010.

In order to identify gentrifying neighborhoods, the income growth in each gentrifiable neighborhood will be compared to the growth in the median income in the metropolitan area containing the neighborhood. This study will identify gentrifying neighborhoods using two different criteria for the level of income growth required for a gentrifiable neighborhood to gentrify. The first, and most permissive, definition of gentrification will identify a gentrifiable tract as having gentrified if its income growth in a time period exceeds the growth in the metropolitan area's median income. The second definition will raise the bar for the level of income growth necessary to qualify as a gentrifying neighborhood by requiring that a gentrifiable neighborhood's income growth exceed the growth in the metropolitan area's median income by at least 50 percent in order for the neighborhood to gentrify.

Data

This study will use census tracts as a proxy for neighborhoods. Thus, low-income neighborhoods will be defined as census tracts that are located in the central-city of a metropolitan area and that have median incomes that are either less than 50 or 80 percent of the metropolitan area's median income. The data that are used to conduct this study are drawn from the Neighborhood Change Database (NCDB) which is available from Geolytics. The key advantage of the NCDB is that it provides geographically-consistent data on census tracts in all U.S. metropolitan areas from 1970-2010. Thus, the researcher does not need to worry about how changes in census tract boundaries over time might affect results.

The sample employed in this study includes all of the census tracts in the metropolitan statistical areas (MSAs) of the 52 most populous U.S. cities according to their populations in 1970.[4] Central city tracts are identified using the FIPS Place code from the U.S. Census Bureau and the Place variable in the NCDB. A tract is considered to be in the central-city of the metropolitan area if the value of its place variable from the NCDB matches the FIPS Place code for the central-city from the U.S. Census Bureau.

Neighborhood income is measured using the average household income for each census tract. While median household income is the preferred income variable, it is not available in the NCDB for 1970 and 1980. The median income for the metropolitan area is calculated as the median average household income for all of the tracts in the metropolitan area. Thus, it is the income of the median tract rather than the income of the median person or household in the metropolitan area.

[4] In the Neighborhood Change Database the MSAs are drawn from the Core-Based Statistical Areas (CBSA) for the 52 cities. Since there are two cases in which two of the most populous cities (Dallas-Fort Worth and Minneapolis-St. Paul) are in the same CBSA, two additional cities were added to the sample to generate a sample of 50 metropolitan areas.

Results

The methodology described in the previous section is applied to all 50 metropolitan areas in the study sample. The results are reported below and are reported in two parts. This first part looks at changes in the percentage of central-city tracts that are gentrifiable over time. The second, and most important, part of the results reports the trends in the incidence and location of gentrifying neighborhoods using the study's two definitions of gentrification. The gentrification results are reported in two ways. First, the trends in the number of gentrifying tracts are reported. Second, the historical and geographical changes in the probability that a gentrifiable tract gentrifies (referred to as the *gentrification propensity*) are reported.

Results for gentrification potential

For each metropolitan area in the sample, the level of *gentrification potential* is measured as the percentage of central-city tracts that are classified as gentrifiable using the criteria outlined above. Gentrification potential levels are calculated for 1970, 1980, 1990, 2000, and 2010. Table 1 provides the gentrification potential levels for the sample as a whole and the average for all of the metropolitan areas in the sample. The table is divided into two panels with Panel A reporting the percentage of central-city tracts that are gentrifiable using "less than 80 percent of MSA median" as the criteria and panel B reporting the results using "less than 50 percent of MSA median" as the criteria.

As can be seen in panel A of table 1, in 1970 over 34 percent of central-city tracts in the sample had average household incomes (AHI) that were below 80 percent of the median AHI for tracts in the metropolitan area. This percentage rose to almost 44 percent during the 1970s and has risen by a small amount in each subsequent decade since 1980 so that, in 2010, 47 percent of

central-city tracts were gentrifiable. Additionally, in the average metropolitan area in the sample, 35.6 percent of the central-city tracts were gentrifiable in 1970 and, as was the case for the entire sample, there was a large increase to 45 percent during the 1970s. The level rose slightly to 47.6 percent by 2010. It is worth noting that, since the measure is based purely on each tract's income level relative to the income level of the metropolitan area, the gentrification potential measure primarily reflects the relative economic disadvantage of the central-city tracts in a metropolitan area. Thus, there was a large increase in the economic disadvantage of central-city tracts relative to suburban tracts during the 1970s but the relationship has stabilized during subsequent decades.

Panel B of table 1 provides the gentrification potential results when central-city tracts are considered to be gentrifiable if their incomes are less than 50 percent of the MSA's median income. Thus, the focus in panel B is on what would be classified as very-low-income neighborhoods. While the levels, by definition, are much lower, the trends are very similar to those in Panel A. The percentage of central-city tracts that are considered to be gentrifiable is at its lowest level in 1970 (3.5%) and rises substantially during the 1970s so that the level in 1980 (7.9%) is more than double the level from 1970. The level rises again in the 1980s, falls during the 1990s, and rises again during the 2000s so that the value in 2010 (9.9%) is only slightly higher than the value in 1980. However, unlike in Panel A, there is a large difference between the percentage of gentrifiable tracts in the sample and the value for the average metropolitan area in the sample for every year except for 1970. This indicates that there are several metropolitan areas in the sample that have a large number of very-low-income central-city tracts while the percentage of tracts with incomes less than 80% of the metropolitan median income is more uniformly distributed across the metropolitan areas in the sample.

Table 2 shows how the gentrification potential values vary across census regions. The table provides the results for 1970-2010 using both criteria for gentrifiable tracts. As was the case for Table 1, panel A provides the results when central-city tracts are required to have income less than 80 percent of the MSA median income in order to be considered to be gentrifiable and panel B focuses on very-low-income neighborhoods (incomes less than 50 percent of the MSA median income).

The results in panel A reveal that metropolitan areas in the Northeast and Midwest have much higher levels of gentrification potential than metropolitan areas in the South and West. In 1970, the average gentrification potential was 47 percent for metropolitan areas in the Northeast and 44 percent for Midwestern metropolitan areas. For metropolitan areas in the South and West the gentrification potential was 29 percent for both regions.

During the 1970s, there was a large increase in the percentage of gentrifiable tracts for metropolitan areas in all four Census regions. The largest increase was for Northeastern metropolitan areas where the average gentrification potential increased by almost 13 percentage points. The smallest increase was for Western metropolitan areas where the average increased by a little over 7 percentage points. After the changes in the 1970s, more than half of the central-city tracts in Northeastern and Midwestern metropolitan areas were candidates for gentrification.

As was indicated in table 1, the average gentrification potential of U.S. cities stabilized between 1980 and 2010. This was true across Census regions as well. During the 1980s, the average gentrification potential increased in three of the four regions. The only region to experience a decrease in gentrification potential was the Northeast where the gentrification potential decreased by 0.75 percentage points. The largest increase was for Midwestern metropolitan areas at 2.5 percentage points which was much lower than the smallest increase in

the 1970s (7.3 percentage points). During the 1990s, the only region that experienced an increase in its gentrification potential was the Northeast where the average increased by a fairly substantial 5.5 percentage points. Among the other three regions, the largest decrease in gentrification potential was for Midwestern metropolitan areas where the average gentrification potential declined by 2.3 percentage points. Finally, during the 2000s, the average gentrification potential in Midwestern and Southern metropolitan areas increased by 3.6 and 2.2 percentage points respectively while Northeastern and Western metropolitan areas experienced declines of 1.9 and 1.3 percentage points. Overall, the average gentrification potential increased between 1970 and 2010 for metropolitan areas in all four Census regions. However, in each case, almost the entire increase was due to the large increase in gentrification potential in the 1970s. Thus, the "supply" of gentrifiable neighborhoods increased substantially during the 1970s but has remained very stable since 1980s.

Panel B of Table 2 provides the average gentrification potential levels by Census region when a tract has to be a very-low-income neighborhood (income less than 50% of MSA median income) in order to be a candidate for gentrification. By definition, the percentages are much lower than those in panel A. There are several differences in the trends over time and across regions. In 1970, Midwestern cities had the highest average gentrification potential at 4.3%. The next highest value was for Southern cities at 3.9%. Western and Northeast cities had the lowest values at 3.5% and 2.1% respectively.

As was the case in panel A, there was a large increase in values during the 1970s. The largest increase was for Northeastern cities at 7.4 percentage points. Southern and Midwestern cities experienced very similar increases of 4.7 and 4.6 percentage points respectively. The smallest increase in gentrification potential during the 1970s was for Western cities at 1.7

percentage points. The increase in gentrification in Northeastern cities was large enough that their average gentrification potential went from the lowest of the four Census regions in 1970 to the highest in 1980.

Gentrification potential levels continued to rise during the 1980s for all four Census regions. The largest average increases were for Northeastern and Midwestern cities at 5.8 and 5.1 percentage points while the increases for Southern and Western cities were much smaller at 2.3 and 1.4 percentage points. Also, the period between 1970 and 1990 was marked by an increasing disparity in gentrification potential between Census regions. In 1990 the difference between the region with the highest value and the region with the lowest value was 8.7 percentage points. In 1970 the gap had been 2.2 percentage points.

During the 1990s, the average gentrification potential decreased for all four Census regions. The largest average decline was for Midwestern cities where the percentage dropped by 5.4 percentage points. The smallest decline was for Northeastern cities where the percentage fell by only 1.8 percentage points. Western and Southern cities experienced similar drops of 3.8 and 3.5 percentage points respectively. However, the different levels of change in the 1990s widened the disparity between the region with the highest average value and the regions with the lowest average value to 10.7 percentage points.

The 2000s were once again characterized by an increase in the average gentrification potential in all four Census regions. The largest average increases were in the Northeast and South at 7.2 and 5.9 percentage points respectively. The increases in the Midwest and West were both 1.1 percentage points. The large increase in the Northeast and the much smaller increase in the West meant that the disparity between the regions with the highest average gentrification potential and the region with the lowest increased to almost 17 percentage points

and the average gentrification potential in the Northeast was almost 5.5 times the average gentrification potential in the West. For sake of comparison, the highest average gentrification potential in 2010 using the 80% criteria was only 1.7 times higher than the lowest average gentrification potential.

Metropolitan areas in the Northeast and the South experienced a very large increase in the number of very-low-income neighborhoods when compared to metropolitan areas in the Midwest and West. The percentage of very-low-income tracts in the average metropolitan area in the Northeast was almost 10 times higher in 2010 than it was in 1970. The average metropolitan area in the West experienced an increase of only 10%. For sake of comparison, the largest increase between 1970 and 2010 using the 80% criteria was only 40% and the smallest increase was 23%.

This section has analyzed the trends regarding the number of gentrifiable tracts in U.S. metropolitan areas from 1970 to 2010. As was discussed above, this is the first step in identifying gentrifying tracts. Since gentrification typically involves the movement of higher-income households into neighborhoods that have been traditionally low-income, a neighborhood must be a low-income neighborhood before it can gentrify. This section looked at two sets of gentrifiable neighborhoods: tracts with median incomes less than 80% of the metropolitan area's median income (low-income neighborhoods) and tracts with median incomes less than 50% of the metropolitan area's median income (very-low-income neighborhoods). There are several results that are consistent across both groups. First, there was a large increase in the percentage of central-city tracts that was classified as gentrifiable during the 1970s. Second, the percentage of gentrifiable tracts increased between 1980 and 2010 but the increase was small and gradual. Almost all of the increase in the "supply" of gentrifiable tracts took place during the 1970s.

Third, in every case metropolitan areas in the Northeast had the highest average gentrification potential. Finally, the aggregate trends of a large increase in gentrification potential in the 1970s and a much slower increase between 1980 and 2010 are very consistent across Census regions. The next section will explore the trends regarding the number of gentrifiable tracts that experience gentrification and the likelihood that a gentrifiable tract gentrifies.

Results for number of gentrifying tracts

This section will document the trends in the incidence of gentrification over time and across Census regions. As was discussed above, the focus will be on how common the types of income changes that are consistent with gentrification are among gentrifiable tracts. Gentrifying tracts will be identified in two ways in this section. The first approach, the *weak* approach, will identify both gentrifiable and gentrifying tracts using the less stringent thresholds for both definitions. Specifically, gentrifiable tracts will be central-city tracts with median incomes that are less than 80% of metropolitan median income and the gentrifiable tracts that gentrify will be those that experience income growth that exceeds the growth in metropolitan median income. This approach is quite generous with respect to identifying gentrifying tracts and could be viewed as potentially placing an upper-bound on the number of gentrifying tracts. The second approach, the *strong* approach, will use the more stringent thresholds for both gentrifiable and gentrifying tracts. Specifically, the pool of gentrifiable tracts will be those central-city tracts with median incomes that are less than 50% of metropolitan median income and gentrifying tracts will be the gentrifiable tracts whose income growth exceeds that growth in metropolitan

median income by at least 50%. The stringency of this approach could potentially be viewed as yielding a lower-bound on the number of gentrifying tracts.[5]

Table 3 provides the results regarding the number of tracts that experience gentrification for the entire sample and for the average metropolitan area for both the weak and strong approaches to gentrification. For both approaches the number of gentrifying tracts is at its lowest level in the 1970s. The number of gentrifying tracts increased in both the 1980s and 1990s and then fell during the 2000s. Thus, the peak level of gentrification activity is in the 1990s for both approaches. During the 1980s the number of gentrifying tracts increased by 69 percent according to the weak approach and 295 percent according to the strong approach. Thus, there was a very large increase in the number of very-low-income central-city neighborhoods that experienced income growth more than 50% higher than the growth in metropolitan area median income. However, this result, since it is based on a percentage change, is likely skewed by the low number of gentrifying tracts in the 1970s according to the strong approach.

During the 1990s the number of gentrifying tracts according to the weak approach increased by 54 percent relative to the 1980s while the number of gentrifying tracts according to the strong approach increased by 243 percent. Once again, there was a very large increase in the number of very-low-income central-city tracts that experienced income growth that was more than 50% higher than the growth in metropolitan median income. The number of gentrifying tracts according to the strong approach in the 1990s was 13.6 times the number of gentrifying tracts in

[5] Nine different sets of gentrification results were actually computed. These include using three definitions of gentrifiable (less than 80% of metropolitan median income, less than 50% of metropolitan median income, and between 50 and 80% of metropolitan median income) and three gentrification thresholds (income growth exceeding growth in metropolitan median income, income growth exceeding growth in metropolitan median income by 20%, and income growth exceeding growth in metropolitan median income by 50%). The results are qualitatively similar across all nine sets of results. Only the two extreme results are reported here for the sake of brevity. All other results are available upon request from the author.

the 1970s. For the weak approach the number of gentrifying tracts in the 1990s was only 2.6 times the number from the 1970s.

For both approaches the number of gentrifying tracts decreased in the 2000s relative to the 1990s. However, the number of gentrifying tracts in the 2000s remained well above the number from the 1970s. According to the weak approach the number of gentrifying tracts decreased by 19 percent in the 2000s relative to the 1990s. However, the number of gentrifying tracts in the 2000s was still 2.1 times the number of gentrifying tracts from the 1970s. According the strong approach the number of gentrifying tracts in the 2000s was 41 percent lower than the number in the 1990s. However, the number of gentrifying tracts in the 2000s was still 8.1 times the number from the 1970s.

Table 4 breaks down the number of gentrifying tracts from 1970 to 2010 across Census regions for both the weak and strong approaches. The table provides both the number of gentrifying tracts in each Census region, the distribution of gentrifying tracts across Census regions, and the degree to which gentrifying tracts are over- or underrepresented relative to the region's share of central-city tracts.

As was the case for the sample as a whole, the 1970s yielded the smallest number of gentrifying tracts for all four Census regions. According to the weak approach, in the 1970s gentrifying tracts were most overrepresented in the Midwest where the share of gentrifying tracts was 3.5 percentage points higher than the region's share of central-city tracts. Gentrifying tracts were most underrepresented in the Northeast where, according to the weak approach, the share of gentrifying tracts was 4.9 percentage points lower than the share of central-city tracts. According to the strong approach, gentrifying tracts were most overrepresented in the West where the share of gentrifying tracts exceeded the share of central-city tracts by 6.3 percentage points.

Gentrifying tracts were, once again, most underrepresented in the Northeast where the share of gentrifying tracts was 8.3 percentage points lower than the region's share of central-city tracts.

As was the case for the sample as a whole, the number of gentrifying tracts increased in the 1980s for all four Census regions relative to the 1970s. Using the weak approach the largest increase was for the Northeast where the number of gentrifying tracts increased by 176 percent relative to the number from the 1970s. The smallest increase was for the South where the number of gentrifying tracts increased by 33 percent relative to the number from the 1970s. During the 1980s, according the weak approach the number of gentrifying tracts was most overrepresented in the Northeast where the region's share of gentrifying tracts was 7.2 percentage points higher than the region's share of central-city tracts. The number of gentrifying tracts was most underrepresented in the South where the region's share of gentrifying tracts was 7.0 percentage points lower than the region's share of central-city tracts.

Using the strong approach the number of gentrifying tracts also increased in all four Census regions. The largest increase was for the Northeast where the number of gentrifying tracts in the 1980s according to the strong approach was 6 times the number from the 1970s. The number of gentrifying tracts in the South and Midwest in the 1980s was at least 4 times the number from the 1970s. The smallest increase was for the West where the number of gentrifying tracts using the strong approach slightly more than doubled. In the 1980s, according to the strong approach gentrifying tracts were most overrepresented in the Midwest and the South where the share of gentrifying tracts was 3.5 and 3.2 percentage points higher than the regions' shares of central-city tracts. Gentrifying tracts were most underrepresented in the West where the share of gentrifying tracts was 6.6 percentage points lower than the region's share of central-city tracts.

The results in panels A and B for the 1980s indicate that the largest increase in gentrification activity during the 1980s was for cities in the Northeast. The weak approach indicates that the number of gentrifying tracts in the Northeast in the 1980s was 2.8 times the number in the 1970s. The strong approach indicates that the number of gentrifying tracts in the Northeast in the 1980s was 6 times the number in the 1970s. The other three Census regions also experienced substantial increases in the number of gentrifying tracts but, by far, the greatest surge in gentrification activity in the 1980s relative to the 1970s was for the Northeast.

During the 1990s the number of gentrifying tracts increased for all four Census regions relative to the 1980s for both approaches to gentrification. According to the weak approach the largest increase was for the Midwest where the number of gentrifying tracts increased by 102 percent while the smallest increase was for the Northeast where the number of gentrifying tracts increased by only 8 percent. The weak approach indicates that, in the 1990s, gentrifying tracts were most overrepresented in the Midwest where the share of gentrifying tracts was 8.5 percentage points higher than the region's share of central-city tracts. Gentrifying tracts were most underrepresented in the South where the share of gentrifying tracts was 3.6 percentage points lower than the region's share of central-city tracts.

The strong approach also indicates that the largest increase in the number of gentrifying tracts in the 1990s was for the Midwest where the number of gentrifying tracts in the 1990s was 4.8 times the number of gentrifying tracts in the 1980s. The Northeast, where the number of gentrifying tracts in the 1990s was 2.7 times the number from the 1980s, experienced the smallest increase. The strong approach indicates that during the 1990s gentrifying tracts were most overrepresented in the Midwest where the region's share of gentrifying tracts was 13.7 percentage points higher than the region's share of central-city tracts. Gentrifying tracts were

most underrepresented in the 1990s in the West where the region's share of gentrifying tracts was 6.9 percentage points lower than the region's share of central-city tracts.

The results for panels A and B of table 4 for the 1990s indicate that the largest increase in gentrification activity for the 1990s was for cities in the Midwest. According to the weak approach the number of gentrifying tracts in the Midwest slightly more than doubled between the 1990s and the 1980s while the strong approach finds that the number of gentrifying tracts in the Midwest in the 1990s was 4.8 times the number from the 1980s. The results also indicate a substantial slowdown in the growth in the number of gentrifying tracts in the Northeast. Whereas the number of gentrifying tracts in the 1980s in the Northeast was 2.8 times higher than the number of the 1970s, the number of gentrifying tracts in the 1990s was only 8 percent higher than the number from the 1980s. However, despite the slowdown in the growth in gentrifying tracts in the Northeast, the 1990s had the highest number of gentrifying tracts for all four Census regions.

The results for the 2000s in panels A and B of table 4 indicate that, with one exception, the number of gentrifying tracts fell in the 2000s relative to the 1990s. The lone exception is for the Northeast using the weak approach where the number of gentrifying tracts increased by 13 percent in the 2000s relative to the 1990s. Among the other regions, the largest decrease was for the Midwest and the West under the strong approach where the number of gentrifying tracts in the 2000s fell 50 percent in both regions relative to the 1990s. Under the weak approach the largest decline was for the Midwest where the number of gentrifying tracts fell by 38 percent relative to the number from the 1990s.

In the 2000s the weak approach indicates that gentrifying tracts were most overrepresented in the Northeast where the region's share of gentrifying tracts was 6.5 percentage points higher than

the region's share of central-city tracts. Gentrifying tracts were most underrepresented according to the weak approach in the 2000s in the South where the region's share of gentrifying tracts was 6.0 percentage points lower than the region's share of central-city tracts. According to the strong approach gentrifying tracts were most overrepresented in the 2000s in the Midwest where the region's share of gentrifying tracts exceeded the region's share of central-city tracts by 7.8 percentage points. Gentrifying tracts were most underrepresented in the 2000s according to the strong approach in the West where the region's share of gentrifying tracts was 9.2 percentage points lower than the region's share of central-city tracts.

The results in panels A and B of table 4 for the 2000s suggest an across-the-board decline in the number of gentrifying tracts in the 2000s when compared to the 1990s. The only exception to this general decline in gentrification activity was for the Northeast when using the weak approach. However the decreases are quite small when compared to the large increases in the number of gentrifying tracts in the 1980s and 1990s. Because of this, the number of gentrifying tracts in the 2000s was still much higher than it was in the 1970s.

The results in table 4 suggest that all regions of the U.S. experienced large increases in the amount of gentrification activity in the 1980s and 1990s and a slight decline in the 2000s. However, there were significant geographic shifts regarding where the increases were the strongest. During the 1980s the largest increase in gentrification activity was in the Northeast while the 1990s saw a much smaller increase for the Northeast and a very large increase in gentrification for cities in the Midwest. During the 2000s there was a general decline in the number of gentrifying tracts but gentrification activity was the strongest in the Northeast. Midwestern cities experienced the largest decline in gentrification activity in the 2000s.

Results for gentrification propensities

While the results in the tables 3 and 4 provide an interesting look at the historical and geographic patterns in the number of gentrifying neighborhoods across U.S. cities, they do not provide the best answer to the question of whether or not gentrification has become more or less common over time. Since the number of tracts that can gentrify is constrained by the number of tracts that are gentrifiable, a better way of looking at the question is to analyze changes in the propensity for gentrifiable tracts to gentrify over time. Thus, the next part of the analysis will look at how the probability that a gentrifiable tract gentrifies has changed over time. The analysis will look at the changes for the sample as a whole as well as the changes that have occurred across Census regions. As was the case for tables 3 and 4, the results will be reported for the two extreme definitions of gentrification (the weak approach and the strong approach). The results for alternate definitions of gentrification are qualitatively similar and are available upon request from the author.

Table 5 provides the results regarding the propensity to gentrify for the sample as a whole from 1970 to 2010. The table also reports the gentrification propensity for the average metropolitan area in the sample. The gentrification propensities under both approaches are at their lowest levels in the 1970s. Under the weak approach, slightly more than 30 percent of low-income central-city tracts experienced income growth that exceeded the growth in metropolitan median income in the 1970s while the strong approach indicates that 11.5 percent of very-low-income central-city tracts had income growth that exceeded the growth in metropolitan median income by at least 50%.

Gentrification propensities increased for both thresholds in the 1980s relative to the 1970s. During the 1980s, according to the weak approach, almost 40 percent of gentrifiable tracts

experienced income growth that exceeded the growth in metropolitan median income. This represents an increase in the gentrification propensity of 9.7 percentage points relative to the propensity from the 1970s. The increase in the gentrification propensity for the average metropolitan area in the sample was 7.4 percentage points using the weak approach. According to the strong approach the 1980s saw the gentrification propensity for the entire sample increase by 8.7 percentage points relative to the propensity from the 1970s while the gentrification propensity for the average metropolitan area increased by 12.9 percentage points. Both approaches to gentrification indicate that gentrifiable tracts in the 1980s were more likely to gentrify than gentrifiable tracts in the 1970s.

While there was an increase in gentrification propensities in the 1980s relative to the 1970s, there was an even larger increase in the 1990s relative to the 1980s. According to the weak approach the gentrification propensity for the entire sample during the 1990s was 19.7 percentage points higher than the propensity for the 1980s. The average metropolitan area in the sample experienced an increase in its gentrification propensity of 21.8 percentage points. The increase in the gentrification propensity according to the weak approach was such that approximately 60 percent of all gentrifiable tracts gentrified in the 1990s.

According to the strong approach the gentrification propensity for the entire sample in the 1990s increased by 32.7 percentage points relative to the propensity for the 1980s. Additionally, the propensity for the average metropolitan area in the sample increased by 24.0 percentage points. These results suggest that in the 1990s there was a very large increase in the probability that a very-low-income central-city census tract experienced income growth that exceeded the growth in metropolitan median income by at least 50%. The increases in gentrification propensity using the strong approach were such that more than 50 percent of very-low-income

central-city tracts experienced income growth at levels high enough to be classified as gentrifying.

During the 2000s the gentrification propensities decreased relative to their 1990s levels for both approaches. According to the weak approach, the gentrification propensity for the entire sample was 11.8 percentage points lower in the 2000s than in the 1990s while the propensity for the average metropolitan area in the sample declined by 13.7 percentage points. According to the strong approach the gentrification propensity for the entire sample fell by 6.4 percentage points relative to the 1990s while the propensity for the average metropolitan area fell by 2.4 percentage points.

While the gentrification propensities fell in the 2000s relative to the 1990s for both approaches, they remained much higher than the propensities from the 1970s. According to the weak approach the gentrification propensity for the entire sample in the 2000s was 17.6 percentage points higher in the 2000s than the propensity for the 1970s. For the average metropolitan area in the sample the propensity in the 2000s was 15.5 percentage points higher than the propensity for the 1970s. Using the strong approach the gentrification propensity for the entire sample was 35.0 percentage points higher in the 2000s than in the 1970s and the propensity for the average metropolitan area in the sample was 34.6 percentage points higher than it was during the 1970s. Gentrifiable tracts have become much more likely to gentrify between 1970 and 2010. The largest increase was in the 1990s. The increase in the likelihood that a gentrifiable tract gentrifies was especially pronounced when gentrifiable tracts are defined as those with median income below 50% of metropolitan median income and gentrifiable tracts are required to have income growth that is at least 50% higher than the growth in metropolitan median income in order to be considered to have gentrified.

Table 5 provided a picture of how the probability that gentrifiable tracts gentrified changed between 1970 and 2010 for the entire sample. Table 6 shows how gentrification propensities varied across Census regions over time. The results are provided for all four Census regions using both the weak and strong approaches for all four decades in the study.

As was the case for the sample-wide results, the 1970s was the decade with the lowest gentrification propensities. This is true for all four Census regions and for both approaches to gentrification. According to the weak approach the highest gentrification propensities in the 1970s were for the West and South where the propensities were 36.6 and 36.4% respectively. The lowest gentrification propensity in the 1970s was for the Northeast where the propensity was 22.6%. According to the strong approach the highest gentrification propensity was for the West where 15.6% of gentrifiable tracts gentrified in the 1970s. The lowest propensity according to the strong approach was for the Northeast where 9.9% of gentrifiable tracts gentrified.

During the 1980s the gentrification propensities increased for all four Census regions according to both approaches to gentrification. According to the weak approach the largest increase in gentrification propensity was for cities in the Northeast where the propensity increased by 23.5 percentage points relative to the 1970s. The smallest increase according to the weak approach was for cities in the South where the propensity increased by only 0.65 percentage points. According to the strong approach the largest increase in the 1980s was for cities in the South where the gentrification propensity for the 1980s was 12.5 percentage points higher than the propensity for the 1970s. The smallest increase in the 1980s according to the strong approach was for cities in the West where the gentrification propensity increased by 5.8 percentage points.

During the 1980s, according to the weak approach, gentrifiable tracts in the Northeast and West were the most likely to gentrify. In the Northeast 46.1% of gentrifiable tracts gentrified according to the weak approach while the comparable figure for the West was 44.9%. Gentrifiable tracts in the Midwest, where the gentrification propensity was 33.7% were the least likely to gentrify in the 1980s according to the weak approach.

The strong approach indicates the gentrifiable tracts in the South were the most likely to gentrify in the 1980s. The gentrification propensity for the South in the 1980s was 22.9%. Gentrifiable tracts in the Northeast were the least likely to gentrify. According to the strong approach, the gentrification propensity for the Northeast in the 1980s was 16.9%.

The results in table 6 for the 1980s are quite varied. Using the weakest definition of gentrification indicates that the highest gentrification propensity was for cities in the Northeast and the West and that the largest increase in gentrification propensity relative to the 1970s was for cities in the Northeast. However, using the strong definition indicates that the highest gentrification propensity was for cities in the South with the West and Midwest close behind. The biggest increase in gentrification propensity relative to the 1970s was for the South. Thus, when the criteria for being identified as a gentrifying tract are rather loose, gentrification was most common in the Northeast. However, it was the cities in the South where very-low-income tracts were most likely to experience relatively high levels of income growth.

In the 1990s the gentrification propensities increased for all four Census regions using both gentrification definitions. According to the weak definition the largest increase relative to the 1980s was in the Midwest where the gentrification propensity increased by 31.2 percentage points. The South and the West also experienced large increased in their gentrification propensities with increases of 25.8 and 18.2 percentage points respectively. While the

propensity also increased for the Northeast the increase was only 2.4 percentage points. Using the weak approach the highest gentrification propensities were for cities in the Midwest, West, and South with propensities of 64.9, 63.1, and 62.9% respectively. The Northeast lagged behind with a propensity of 48.5%.

According to the strong approach the largest increase in gentrification propensity during the 1990s relative to the 1980s was for the Midwest and the West where the propensities increased by 41.1 and 37.0 percentage points respectively. The South and Northeast still had large increases but the increases were much smaller at 28.2 and 24.8 percentage points. According to the strong approach the highest gentrification propensities in the 1990s was for the Midwest at 61.1%. The lowest gentrification in the 1990s was for the Northeast at 41.7%.

The results for the 1990s in table 6 indicate that there was a large increase in gentrification activity in all Census regions. The largest increase was for cities in the Midwest and the South while the smallest increase was for cities in the Northeast.

The results in table 6 indicate that there was a general decrease in gentrification propensities in the 2000s relative to the 1990s. The only exception is that the gentrification propensity for the Northeast increased by 2.5 percentage points according to the weak approach. In every other case the gentrification propensity in the 2000s was lower than the propensity for the 1990s. The largest decreases were for the Midwest and the South according to the weak approach where the propensities decreased by 22.1 and 16.0 percentage points respectively. According to the results in table 6, the highest gentrification propensities for the 2000s were for cities in the Midwest according to the strong approach and for cites in the West according to the weak approach. The lowest gentrification propensities were for cities in the Northeast according to the strong approach and for cities in the Midwest according to the weak approach.

The results in table 6 indicate that there was a slowdown in gentrification activity in the 2000s relative to the 1990s. Thus, as was the case regarding the number of gentrifying tracts, the peak period for gentrification propensities in every case was the 1990s. However, despite the slowdown in the 2000s, gentrification propensities remained much higher than they were in the 1970s in every case. The increase was most pronounced for the strong approach where the gentrification propensities in the 2000 were between 3 and 5 times higher than the propensities from the 1970s. The increases according to the weak approach ranged from a 29% increase for the South to a 125% increase for the Northeast.

Conclusions

This paper makes two important contributions to the gentrification literature. First, the paper surveys the existing literature that attempts to use census data to identify gentrifying tracts. The insights from this survey are used to develop a methodology that can be used to measure gentrification in a cross-section of metropolitan areas over multiple decades. The paper's second contribution is to provide an analysis of gentrification trends in U.S. cities from 1970 to 2010. The paper has focused on measuring the frequency of the types of income changes that are consistent with gentrification.

There are several key results from the analysis in this paper. First, gentrification levels were lowest in the 1970s, increased in the 1980s, increased further in the 1990s, and fell slightly in the 2000s. Thus the peak level of gentrification activity for U.S. cities was in the 1990s. Second, there have been significant geographic swings in gentrification activity. The 1970s saw relatively low levels of gentrification activity across all Census regions. During the 1980s there was a very large increase in the level of gentrification activity in cities in the Northeast. The

1990s, on the other hand, saw a surge in gentrification activity in the Midwest. During 2000s gentrification activity slowed down in all census regions with the smallest decrease for the cities in the Northeast.

The analysis in this paper points towards several avenues of useful future research. First, given that the methodology outlined in this paper makes it possible to distinguish between gentrifiable tracts that gentrify and those that do not, it would be useful to study which neighborhood characteristics are the best predictors of which tracts gentrify. Second, it would also be useful to study gentrification activity at the city level. The gentrification propensity measure developed in this study could be used to study the determinants of the level of gentrification activity across a cross-section of cities. Finally, it would also be useful to develop a multidimensional quantitative measure of gentrification that might reveal additional insights beyond those that can be gleaned from the income-based measure employed in this study.

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Table 1
Percentage of Central-City Tracts That Are Gentrifiable
1970-2010

Panel A: Gentrifiable = Less Than 80% of MSA Median Income

	1970		1980		1990		2000		2010
Entire Sample	34.21%		43.86%		45.39%		45.89%		47.01%
MSA Average	35.57%		45.01%		46.46%		46.43%		47.57%

Panel B: Gentrifiable = Less Than 50% of MSA Median Income

	1970		1980		1990		2000		2010
Entire Sample	3.53%		7.94%		10.41%		7.05%		9.92%
MSA Average	3.60%		14.65%		19.78%		14.68%		18.90%

Table 2
Percent Gentrifiable by Census Region 1970-2010

Panel A: Gentrifiable = Less than 80% of MSA Median Income

Census Region	1970	1980	1990	2000	2010
Northeast	47.30%	60.09%	59.34%	64.84%	62.91%
Midwest	44.44%	55.08%	57.60%	55.31%	58.87%
South	29.47%	38.02%	39.68%	39.09%	41.31%
West	29.23%	36.56%	38.12%	37.34%	36.04%

Panel B: Gentrifiable = Less than 50% of MSA Median Income

Census Region	1970	1980	1990	2000	2010
Northeast	2.11%	9.55%	15.39%	13.56%	20.71%
Midwest	4.27%	8.89%	13.95%	8.55%	9.65%
South	3.85%	8.59%	10.87%	7.41%	13.34%
West	3.54%	5.25%	6.65%	2.82%	3.88%

Table 3
Number of Tracts Experiencing Gentrification, 1970-2010

		Permissive	Strict
Entire Sample	1970s	1,121	44
	1980s	1,900	174
	1990s	2,934	597
	2000s	2,381	355
MSA Average		Permissive	Strict
	1970s	22.4	0.88
	1980s	38.0	3.48
	1990s	58.7	11.94
	2000s	47.6	7.10

Table 4
Number of Tracts Experiencing Gentrification, 1970-2010
By Census Region

Panel A: Permissive Approach

	1970s		1980s		1990s		2000s	
Region	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Northeast	216	19.27% (-4.9)	597	31.42% (+7.2)	645	21.98% (-2.2)	731	30.70% (+6.5)
Midwest	284	25.33% (+3.5)	441	23.21% (+1.4)	889	30.30% (+8.5)	554	23.27% (+1.5)
South	371	33.10% (+0.1)	494	26.00% (-7.0)	864	29.45% (-3.6)	644	27.05% (-6.0)
West	250	22.30% (+1.3)	368	19.37% (-1.6)	536	18.27% (-2.7)	452	18.98% (-2.0)

Note: The distribution of central city tracts across Census Regions is as follows: Northeast (24.2%), Midwest (21.8%), South (33.0%), and West (21.0%).

Panel B: Strict Approach

	1970s		1980s		1990s		2000s	
Region	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Northeast	7	15.91% (-8.3)	42	24.14% (-0.1)	113	18.93% (-5.3)	90	25.35% (+1.2)
Midwest	11	25.00% (+0.8)	44	25.29% (+3.5)	212	35.51% (+13.71)	105	29.58% (+7.8)
South	14	31.82% (-1.2)	63	36.21% (+3.2)	188	31.49% (-1.5)	118	33.24% (+0.2)
West	12	27.27% (+6.3)	25	14.37% (-6.6)	84	14.07% (-6.9)	42	11.83% (-9.2)

Note: The distribution of central city tracts across Census Regions is as follows: Northeast (24.2%), Midwest (21.8%), South (33.0%), and West (21.0%).

Table 5
Gentrification Propensities, 1970-2010

		Permissive Approach	Strict Approach
Entire Sample	1970s	30.22%	11.49%
	1980s	39.96%	20.21%
	1990s	59.62%	52.88%
	2000s	47.86%	46.47%
MSA Average		Permissive Approach	Strict Approach
	1970s	31.86%	12.68%
	1980s	39.26%	25.58%
	1990s	61.07%	49.61%
	2000s	47.37%	47.26%

Table 6
Gentrification Propensities, 1970-2010
Census Regions

		Permissive	Strict
Northeast	1970s	22.64%	9.86%
	1980s	46.14%	16.87%
	1990s	48.53%	41.70%
	2000s	51.01%	36.29%
South		Permissive	Strict
	1970s	36.44%	10.45%
	1980s	37.09%	22.91%
	1990s	62.93%	51.23%
	2000s	46.90%	50.64%
Midwest		Permissive	Strict
	1970s	26.94%	10.89%
	1980s	33.66%	20.00%
	1990s	64.89%	61.10%
	2000s	42.68%	53.57%
West		Permissive	Strict
	1970s	36.60%	15.58%
	1980s	44.93%	21.37%
	1990s	63.13%	58.33%
	2000s	51.89%	48.28%