

## Urban Growth and Decline: The Role of Population Density at the City Core

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In recent decades, some cities have seen their urban centers lose population density, as residents spread farther out to suburbs and exurbs. Others have kept populous downtowns even as their environs have grown. Population density in general has economic advantages, so one might wonder whether a loss of density, which may be a symptom of negative economic shocks, could amplify those shocks. We look at four decades of census data and show that growing cities have maintained dense urban centers, while shrinking cities have not. There are reasons to think that loss of population density at the core of the city could be particularly damaging to productivity. If this is the case, there could be productivity gains from policies aimed at reversing that trend.

The majority of people in the United States—eight out of ten—live in urban areas, or cities with more than 2,500 residents. Most economists who study cities believe that people tend to cluster together because they can work together more efficiently. In fact, denser areas are in general more productive than sparsely populated ones.

But there has been a trend over the past several decades of people spreading out. First, suburbs sprang up around nearly every large city, then outer-ring suburbs, and now exurbs. Some cities held onto residents in their central cities as their borders grew, while others lost density at their cores.

At the same time, many major cities struggled economically while others began to thrive. Former industrial powerhouses like Cleveland, Detroit, and Buffalo declined as the industries they depended on evolved. Meanwhile, cities like Boston, Chicago, and Philadelphia weathered the transition more successfully. At the other end of the spectrum, cities like Atlanta, Dallas, and Phoenix have grown rapidly.

One might wonder, since population density is correlated with productivity in general, whether it is also correlated with productivity within a metropolitan statistical area (MSA), and how density adjusts in different parts of an MSA as the population of the MSA grows or shrinks.

We take a detailed look at changes in population density within MSAs, focusing on differences between growing and shrinking MSAs. We see how patterns have changed over the past four decades. We find that growing MSAs have generally maintained dense urban centers, while shrinking MSAs have not.

### **Trends in City Populations**

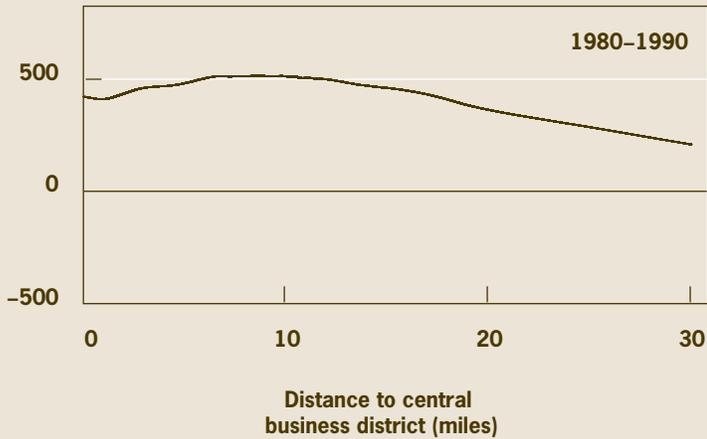
We examine population changes in about 180 metropolitan statistical areas (MSAs), using data from the 1980, 1990, 2000, and 2010 U.S. Census. We focus on these MSAs because each one contained at least 50 census tracts in 2000. We use city and MSA boundaries from 2000 so as to hold the geographical area constant (even though city and MSA boundaries may change over time).

Figure 1. Changes in Population Density

Growing cities

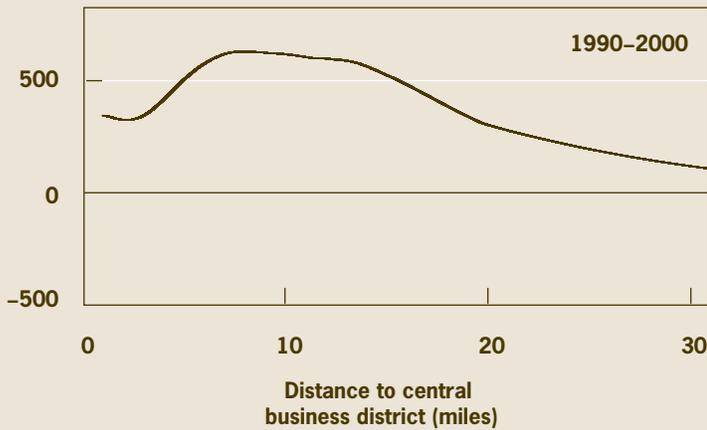
Panel A.

Changes in people per square mile



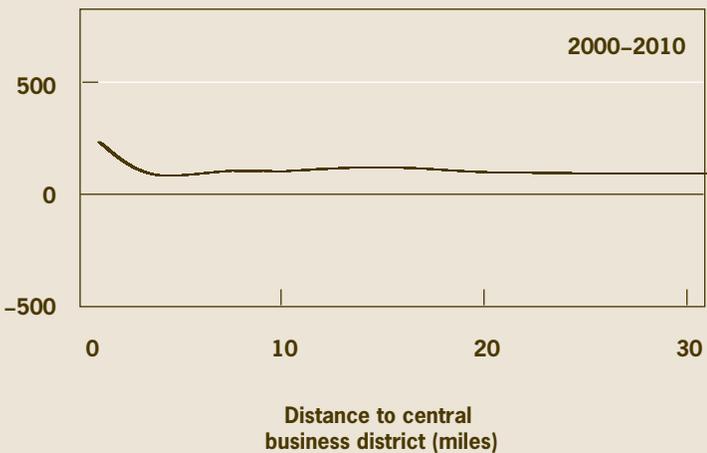
Panel B.

Changes in people per square mile



Panel C.

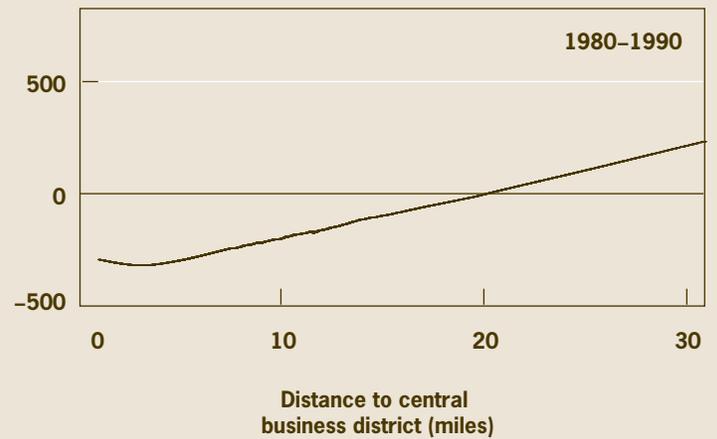
Changes in people per square mile



Shrinking cities

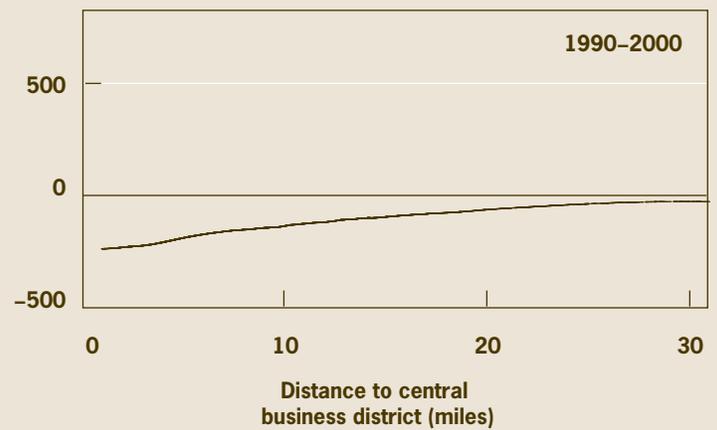
Panel D.

Changes in people per square mile



Panel E.

Changes in people per square mile



Panel F.

Changes in people per square mile

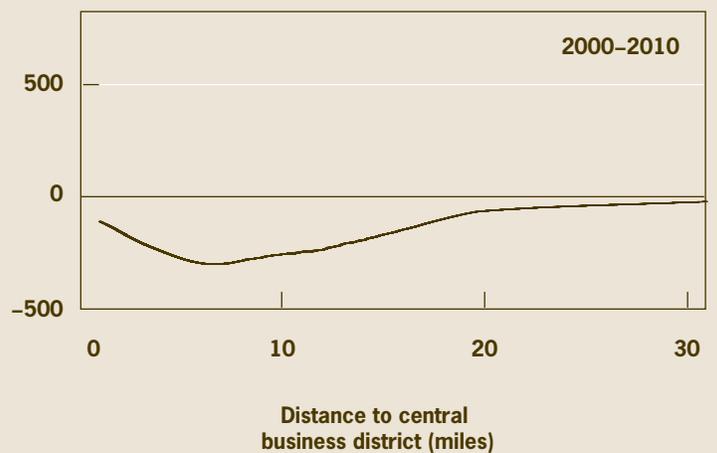


Figure 1 shows average changes in the population density of census tracts as a function of the distance of the census tract from the central business district of the largest city in the MSA. Growing MSAs are on the left, shrinking MSAs are on the right.

Panel A shows that the peak increase in population density in MSAs that were growing during the 1980s occurred about 10 miles away from the central business district. Panel B shows that this pattern was even more pronounced in MSAs that were growing during the 1990s.

Panel C shows a much different pattern of changes in population density for MSAs that were growing during the 2000s. The biggest increase in population density was near the central business district, while there was smaller growth in population density farther away from the central business district. This may be due to gentrification and redevelopment of neighborhoods closer to the city center.

Panel D shows a big drop in population density near the central business district for cities that were shrinking during the 1980s. However, at distances between 20 and 30 miles from the central business district, population density was actually increasing during this period. This pattern is consistent with a “filtering” story of home-buying habits, in which more affluent households upgrade to larger and newer housing farther from the center of the city, while less affluent households take up the housing left behind in the closer suburbs. If cities are not growing, however, the areas closer to the city center will not attract new occupants.

Panel E shows a similar but less pronounced pattern for shrinking cities during the 1990s, with the biggest loss of population density close to the central business district. The main difference is that rather than increasing population density at distances farther than 20 miles from the central business district, the change in population density is just below zero.

Finally, Panel F shows a pattern similar to the 1990s for MSAs that were shrinking during the 2000s, except that there is less of a drop in population density very close to the central business district. This may be evidence of gentrification and redevelopment occurring even in some of the shrinking MSAs.

While figure 1 shows average changes in population density patterns for a large number of MSAs, it is also interesting to look at individual MSAs. Figures 2, 3, 4, and 5 show population density maps of Atlanta, Chicago, Cleveland, and Detroit in 1980 and 2010. We selected these cities to illustrate how population density has changed over time in cities spanning a range of growth levels. Atlanta represents huge growth—the population living within the boundaries of the Atlanta MSA in 2000 grew more than 70 percent from 1990 to 2010. Chicago reflects moderate growth, about 15 percent since 1990. Cleveland represents slight decline, about 1 percent since 1990. And Detroit illustrates large decline, around 14 percent since 1990.

The density maps reveal an outward spread of low-density suburbs in all four metro areas. Atlanta seems to maintain or increase its density in the center, while Chicago becomes less dense on the West Side and South Side (within the City of Chicago) but becomes denser in the Loop and near the Loop, the central downtown commercial district. In contrast, Cleveland and Detroit lose much of their density in the central cities.

Overall, in growing cities, population density either remained the same or increased in most areas. In contrast, in shrinking cities, formerly high-density city centers saw the biggest drop in density, while the surrounding low-density areas saw an increase population density. In practice, this thinning out of high-density areas of shrinking cities is consistent with population movements out of urban areas and into the surrounding suburbs.

### Density and Education

In light of the evidence that denser places seem to be more productive than more diffuse places, a natural question to ask is whether cities that lose density in their core can maintain their economic advantages. The answer to this question may depend on the mechanism that is providing the urban productivity advantage. Economists have identified three such mechanisms: sharing, matching, and learning.

Sharing refers to spreading the cost of expensive goods and services like orchestras or professional football teams over many people. It also refers to businesses having the benefits of resources close at hand, for example, when a place with a large final goods sector has a wider variety of input suppliers in the area. Expertise is a resource, too, and places with dense populations can support more specialists and benefit from their input. There may in fact be gains to specialization that can only be realized in big cities.

Matching refers to an employer finding the best person for a job or a worker finding the best job for his or her skills. Bigger cities may allow employees with specific skills to match with employers looking for those skills more quickly and also to find an employer that they match with better.

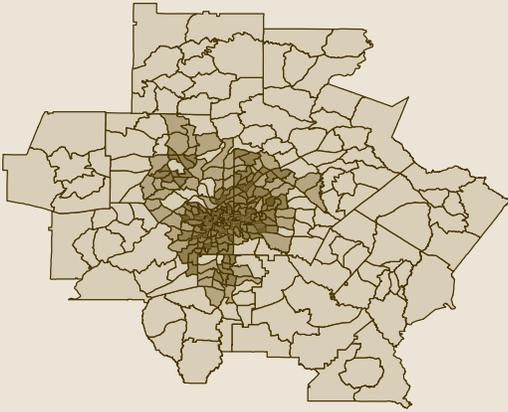
Learning refers to the production, diffusion, and accumulation of ideas and knowledge.

In general, cities grow when they appear relatively more attractive than other cities, and they shrink when they appear relatively less attractive. Cities look attractive if they offer high wages, a low cost of living, and amenities such as proximity to recreation (such as lakes, oceans, and parks), good weather, and low crime. Some cities grow faster than others because of changes in their relative attractiveness. When a city begins to look relatively more attractive, say because an industry which is concentrated in the city is booming and wages have been driven up, people will start to want to move there.



Figure 2. Population Density, Atlanta

1980



2010

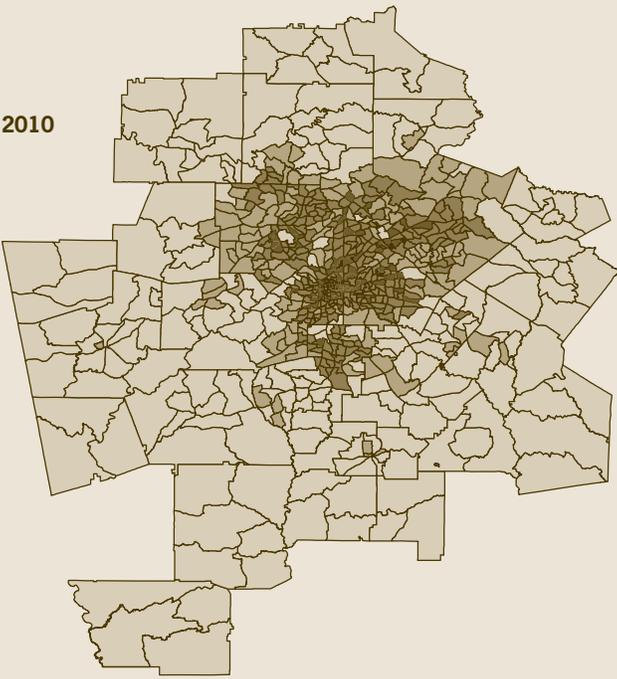
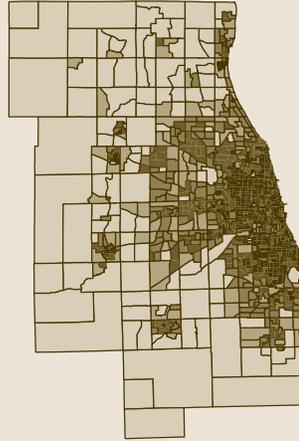


Figure 3. Population Density, Chicago

1980



2010

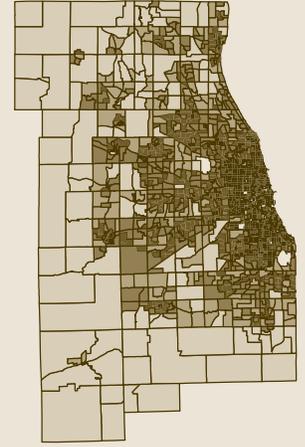
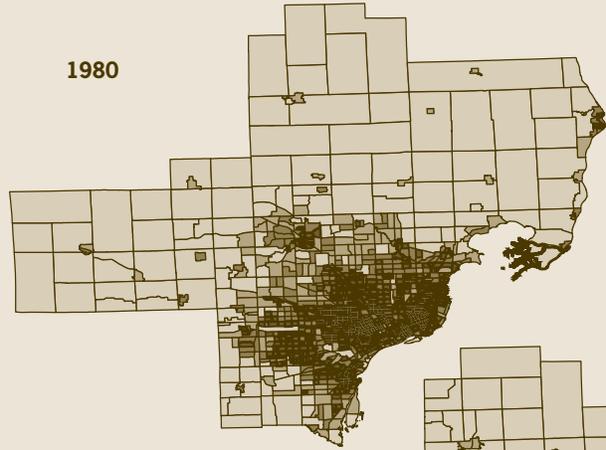


Figure 5. Population Density, Detroit

1980



2010

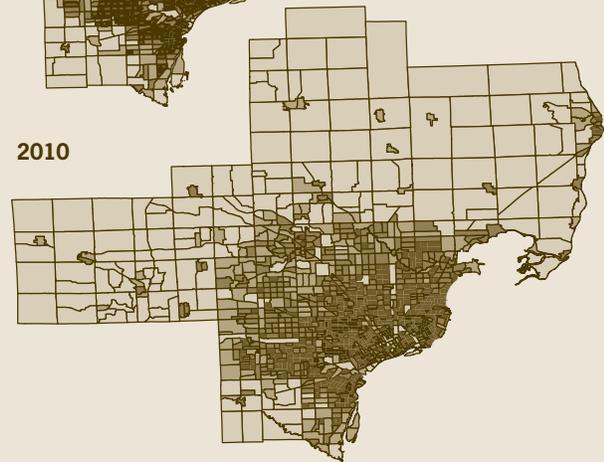
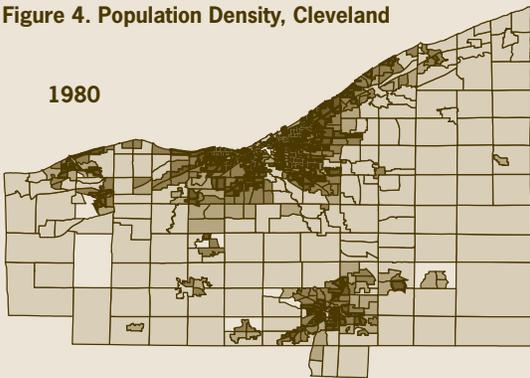


Figure 4. Population Density, Cleveland

1980



2010



People per square mile

- No data
- 0-1,000
- 1,001-2,000
- 2,001-4,000
- 4,001-7,000
- Greater than 7,000



Different cities may derive their economic advantage from one or more of the three mechanisms. However, it does seem to be the case that learning plays a role in one particular way.

Economists have documented a positive correlation between city growth and the average education level of the inhabitants. Edward Glaeser and Albert Saiz suggested that the reason it is the case that more educated cities tend to grow more quickly than less educated cities might be that more educated cities can adapt better to change and negative economic shocks. The evidence seems to support this hypothesis.

### Does Core Density Matter?

Evidence suggests that denser MSAs are more productive. We have shown that population loss at the MSA level tends to be associated with a drop in population density at the core of the MSA. A question for future research is whether core density is particularly important for productivity or if the average level of population density across the MSA is all that matters. If core density is important for productivity, then it might be important for policymakers across the entire MSA to consider measures aimed at keeping the center city densely populated.

Of course, policymakers need to take into consideration the desire that individual households may have for low-density housing far from the city center and weigh it against the productivity advantages of density. In some respects, by promoting a dense core they may just be undoing or counteracting other policy incentives that are already in place and distorting individuals' natural behaviors.

Economists have found evidence that the construction of the interstate highway system played a part in fostering the growth of suburbs, as it provided quick access to city centers from the periphery. In large cities with congested highways, long commute times provide a restraint on how far out people want to live. However, this restraint is less present in shrinking cities whose highways flow smoothly.

Other policies, such as the mortgage interest tax deduction, provide incentives for households to live in places with owner-occupied housing, which tend to be in less dense places that have more single-family homes. Better schools and lower crime are often cited as reasons to move to the suburbs, yet it is not clear to what degree these differences may have been driven by policies that provide incentives for wealthier people to move further away.

If population density near the heart of a city helps keep a city growing and more productive, policymakers may want to consider the possibility of creating incentives for higher-density living. This may be especially worth looking at in MSAs with declining populations.

### Recommended Reading

“Productivity and the Density of Economic Activity,” by Antonio Ciccone and Robert E. Hall, 1996. *American Economic Review*.

“Microfoundations of Urban Agglomeration Economies,” by Gilles Duranton and Diego Puga, 2004. In *Handbook of Regional and Urban Economics*.

“Urban Decline and Durable Housing,” by Edward Glaeser and Joseph Gyourko, 2005. *Journal of Political Economy*.

“The Wealth of Cities: Agglomeration Economies and Spatial Equilibrium in the United States,” by Edward Glaeser and Joshua Gottlieb, 2009. *Journal of Economic Literature*.

“Spatial Distribution of Economic Activities in North America,” by Thomas Holmes and John Stevens, 2004. In *Handbook of Regional and Urban Economics*.

“Human Capital Externalities in Cities,” by Enrico Moretti, 2004. In *Handbook of Regional and Urban Economics*.

“Did Highways Cause Suburbanization?” by Nathaniel Baum-Snow, 2007. *Quarterly Journal of Economics*.

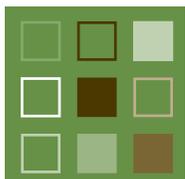


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