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Forces Affecting City Population Growth or Decline: The Effects of Interregional and Inter-municipal Competition

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The publication of the 2010 U.S. Census documents the continued popula-
tion decline of a number of storied American cities. Declines that started
between 1960 and 1970 continue. Central cities that at one time dominated their
regional markets for business locations are now just one potential location among
many in much less dense and much larger metropolitan areas. In fact, some of
these metropolitan areas are themselves experiencing population decline.

To begin to understand why this is happening, critical questions need to be
answered, first about the metropolitan region and then about the central city.
What are the characteristics of the region's portfolio of products? How does that
portfolio influence the way companies invest in the region and use regional re-
sources? How is the region growing in terms of jobs and population? What is
the economic purpose of the city? What is the central city's potential value to
households and businesses relative to the rest of the region? What is its share of the
regional market of households and businesses?

The purpose of this chapter is to analyze the causes of population decline in
large U.S. cities and the implications of this decline for future urban stabilization
and/or regeneration efforts. To accomplish this, we examine a variety of hypoth-
eses that have been suggested about the causes of population shrinkage in central
cities. Our method is to focus on cities that have lost population and compare
them to those that have not, and then to examine cities that, after initially losing
population, have rebounded and are now growing and compare them to cities that
have continued to decline.

There are many reasons, reflecting implicit hypotheses, given for city popu-
lation declines, and many approaches are being pursued to stem these declines
based on the implicit acceptance of one or more of these hypotheses. In this chap-
ter we make explicit these implicit hypotheses and examine the plausibility of each
as a guide for assessing city policy. We do this by asking two questions: Which
factors show a relationship to city population change? And, have the various de-
velopment strategies worked in changing the population trajectories of declining
central cities?

We begin by examining city population change over the past half century and
identifying different types of shrinking and growing cities. We then set forth a
variety of theories that might explain those changes. In the third section we form
a series of testable hypotheses from these theories, as well from a number of widely
accepted economic development strategies that are intended to bring about city
regeneration. These hypotheses are tested in the fourth section to determine the
extent to which they—and the various strategies that flow from them—are sup-
ported by data. Finally, we discuss the implications of these quantitative findings.

Central Cities In The United States: Growth And Decline

In this section we classify all major central cities in the United States according to their population dynamics from 1960 to 2010, identifying four major central city subsets: shrinking, growing, positive-turnaround and negative-turnaround cities. We also examine the distribution of these four city types and their distribution by Census Division (see appendix 1 for a map of the divisions).

### *The Universe of Major Central Cities in the United States*

Three categories of city were included in our universe of major central cities. The first named central city, frequently called the primary central city, for each metropolitan statistical area (MSA) that existed in 2000 was included as long as it had 50,000 residents in 2000.[1] Additional central cities in a metropolitan area were included as long as they had populations of at least 150,000 in 2000. Those municipalities in the metropolitan area with populations less than 150,000 were also included if their population was at least half that of the primary central city in 1990 or in 2000.[2]

Data were collected on each of these municipalities from the 1960, 1970, 1980, 1990, and 2010 U.S. Censuses and were supplemented with data on Gross Metropolitan (Domestic) Product and employment by industry from 1970 to 2007 from the Moody's Analytics Economy.com county database.[3]

We first divided our universe of cities into two categories: all major central cities that gained population between 1960 and 2010 (these numbered 301) and all that lost population over that time period (94). However, this initial classification hides more than it reveals, for two reasons: changes in population dynamics that took place during the fifty-year time interval studied and the public policy implications of those dynamics. Therefore, both population-losing and population-gaining central cities can be meaningfully subdivided and, in one special case, combined for analytical purposes.

Our statistical analysis rests on four major categories, or subsets, of central cities: shrinking, growing, positive-turnaround, and negative-turnaround. The categories of shrinking and growing central cities are clear. Shrinking cities lost population from 1960 to 2010 and their lowest population level was reached in 2010; growing cities increased their population over that same time period and reached their highest population level in 2010. The category of positive-turnaround central cities consists of groups of cities that lost population during the first-part of the study period and then changed trajectory and began to grow. The negative-turnaround category consists of two groups of central cities that increased their population from 1960 to 2010 but experienced intercensus population declines toward the end of the period. We emphasize these latter two definitions because a

Figure 1.
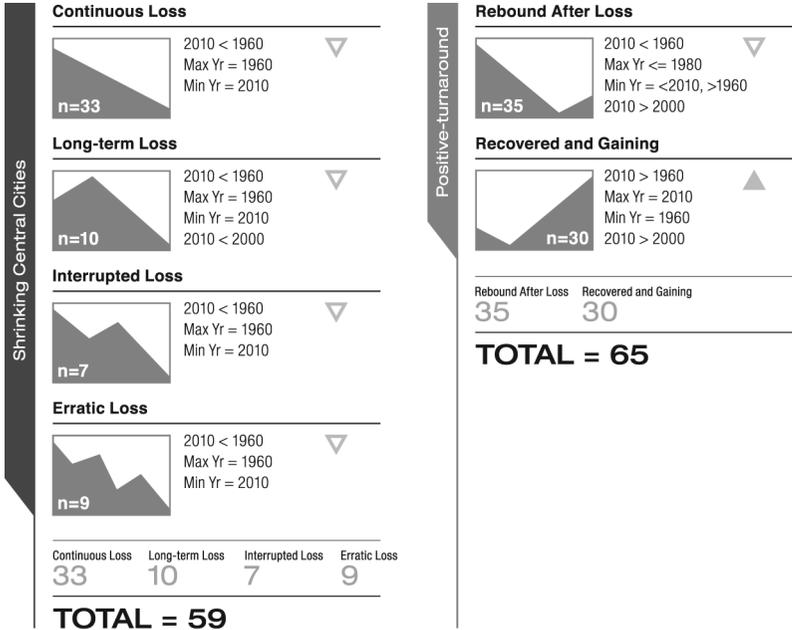
quick reading may cause confusion later in the chapter. We examine each of these four categories and their components below. Examining *Figure 1* should help in understanding the way the final four groups of central cities were composed.[4]
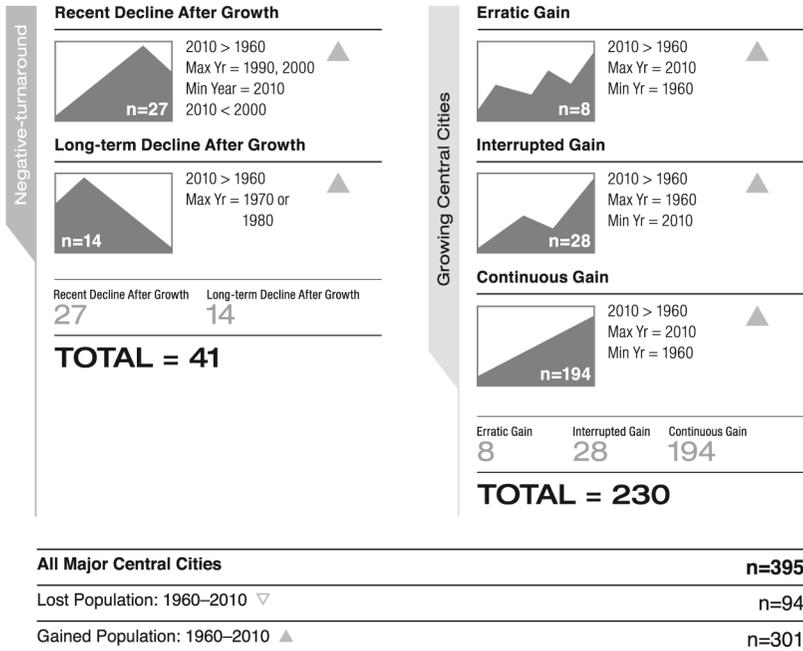
Shrinking Central Cities

Shrinking central cities are composed of four specific subsets of central cities. All lost population between 1960 and 2010, but they did so in different ways. Most experienced population loss decade after decade; some grew for a decade or two after 1960 and then entered a period of long-term decline; others declined from 1960, experienced a decade or two of growth, and then reentered decline. There are two characteristics common to all of the central cities that are in the shrinking central city category: They have lower populations in 2010 than in 1960, and they lost population from 2000 to 2010.

    Shrinking cities can be divided into those that have experienced consistent population loss over each decade of the period 1960 to 2010 and those that have not but still lost population between 1990 and 2010. The thirty-three cities that continuously lost population in every decade after 1960 make up the largest number of places in this group. These include Detroit, Cleveland, Evansville, Illinois and Gary, Indiana, as well as Birmingham and New Orleans in the south.

    Ten central cities experienced long-term population loss. The 2010 population of each is lower than their 1960 population, and population decline set in

Figure 1. *(cont)*

Negative-turnaround		
Recent Decline After Growth		
n=27	2010 > 1960 Max Yr = 1990, 2000 Min Year = 2010 2010 < 2000	▲
Long-term Decline After Growth		
n=14	2010 > 1960 Max Yr = 1970 or 1980	▲

Recent Decline After Growth	Long-term Decline After Growth
27	14

TOTAL = 41

Growing Central Cities		
Erratic Gain		
n=8	2010 > 1960 Max Yr = 2010 Min Yr = 1960	▲
Interrupted Gain		
n=28	2010 > 1960 Max Yr = 1960 Min Yr = 2010	▲
Continuous Gain		
n=194	2010 > 1960 Max Yr = 2010 Min Yr = 1960	▲

Erratic Gain	Interrupted Gain	Continuous Gain
8	28	194

TOTAL = 230

All Major Central Cities	**n=395**
Lost Population: 1960–2010 ▽	n=94
Gained Population: 1960–2010 ▲	n=301

sometime between 1960 and 1980. This is where Kalamazoo, Michigan is found, along with Pensacola, Florida.

Seven cities lost population in each decade except one (they experienced interrupted population loss). Chicago is the largest city in this group. The others were manufacturing centers that rose and fell with their industry: these include South Bend, Indiana, where decline in the automotive sector could not be offset by growth in higher education; the oil-refining centers of Galveston and Port Arthur, Texas; and the former mill-towns of Fall River, Massachusetts and Pawtucket, Rhode Island.

Nine central cities experienced erratic population loss. Each had mild rebounds, but their overall trend was negative and population was lower in 2010 than in 1960. Mobile, Alabama is in this group, as is Wilmington, Delaware.

Positive-turnaround Central Cities
These central cities experienced population gains after at least a decade of decline. One set gained population over the fifty-year time period studies; the other reverse its trajectory of decline even though its population in 2010 was lower than it was in 1960. Together they are termed *positive-turnaround*.

Thirty-five central cities rebounded after losing population. Their populations declined from a peak in 1960, 1970, or 1980 and then experienced growth but did not reach the previous peak. Despite long-term population losses, the change in the population dynamic of these cities is significant. Boston, Philadelphia, and

Washington, D.C. are good examples, as are the central cities in New York City's orbit: Jersey City, Newark, and Bethlehem, Pennsylvania, which has experienced spillover from both Philadelphia and New York. Some cities outside the Northeast are in this set as well, such as Richmond, Virginia, and Salt Lake City.

A second group of central cities reversed population losses to the extent that they ended up with 2010 populations larger than their 1960 populations. Thirty central cities recovered from population losses and gained population. They fit our broad definition of growing central cities, but their change in trajectory led us to combine them with rebounding cities and call the combined group *positive-turnaround cities*. These include Denver, New York, and San Francisco, as well as smaller places such as Portland, Oregon, and Topeka, Kansas.

Negative-turnaround Central Cities

Two types of central cities may be considered growing in that their 2010 population is larger than their 1960 population, but they began to lose population toward the end of the fifty-year study period. These two subsets form a group that we call *negative-turnaround cities* due to these more recent changes in their population trajectories. As with the *positive-turnaround* group, this set of central cities may offer lessons for public policy.

Twenty-seven cities grew from 1960 until 1990 or 2000 and then experienced losses in population, though their 2010 population remains above 1960 levels. These cities may be the mirror image of the *positive-turnaround* central cities. While they are predominantly in the South, especially in Florida, five are in California, and several are in the Midwest. Ann Arbor, Battle Creek, and Grand Rapids in Michigan are part of this set, as are Tulsa, Memphis, and Honolulu.

An additional fourteen cities, while they experienced overall population growth from 1960 to 2010, had multi-decade population declines during the latter part of that period. The Ohio cities of Elyria and Mansfield join Lansing, Michigan, and Jackson, Mississippi, in this group. This is a set of central cities that are in long-term decline after experiencing a burst of growth after 1960. These places may have more in common with declining cities than with growing cities.

Growing Central Cities

Fifty-eight percent of America's central cities are members of this set. The great majority gained population without interruption over the fifty-year period, while a small percentage experienced some downturns along the way. Their common ground is that their populations were higher in 2010 than in 1960 and rose between 1990 and 2010. *Growing central cities* can be divided among those that continuously gained population over every decade of the study period (these number 194) and those that, while experiencing overall growth, had brief downturns before returning to their growth path (36).

Fewer than half of all major central cities in the United States are in the continuously gaining category, with populations in 2010 that are larger than in 1960 and gains in each decade. The list is heavily weighted toward cities in the South and West, but it includes some from the Midwest and East as well.

The twenty-eight cities that experienced one decade of population shrinkage between 1960 and 2000 were labeled interrupted gaining cities; these cities include Rockford and Joliet, Illinois, as well as Indianapolis and Fort Wayne Indiana. Eight cities experienced multiple population downturns over the period, and gained population erratically. These cities include Muncie, Indiana, and Chattanooga.

Table 1: *The Distribution of Population by Type of Central City in 1960, 2000, and 2010*

Type of Central City	Number by Type	Central City Population			Percent by Type	Percent Distribution by Type of Central City			
						Central City Population			Share of 2010
		1960	2000	2010		1960	2000	2010	U.S. Population
Growing	230	19158472	44155175	49862827	58.2	31.2	53.4	56.4	16.2
Shrinking	59	16966942	12255618	11116367	14.9	27.7	14.8	12.6	3.6
Negative-turnaround	41	3,977,714	5,746,809	5,591,941	10.4	6.5	6.9	6.3	1.8
Positive-turnaround	65	21250951	20538070	21826853	16.5	34.6	24.8	24.7	7.1
Total	395	61354079	82695672	88397988	100.0	100.0	100.0	100.0	28.6

Source: U.S. Census of Population, various years.

Table 1 presents summary statistics below on the number of cities and the total population in our four major subsets, or categories, of central cities: *growing*, *shrinking*, *negative-turnaround*, and *positive-turnaround*.

In 2010, 49.9 million Americans lived in central cities that grew consistently since 1960; contrasted with 11.1 million residing in shrinking central cities. The population living in these shrinking central cities is 34.5 percent smaller than it was in 1960. At the same time, 21.8 million Americans lived in positive-turnaround central cities, cities that experienced growth after decades of decline. In other words, more than seven percent of the nation's population, and nearly 24.7 percent of all central city residents, live in central cities that experienced positive population turnarounds.

The Distribution of Major Central Cities by Census Division

The distribution of central cities in each of the nine U.S. Census Divisions by their population classification and by Location Quotients (LQ), reflecting the share of cities by type in each division, is presented in Appendix 2. (An LQ over 1.0 indicates a higher-than-proportional share of population living in the region relative to the share in the nation as a whole, while an LQ under 1.0 indicates a lower share.) What do these data indicate about the geographic distribution of the various types of central cities?

While *shrinking* central cities are present in all Census Divisions, except the Mountain Division, they are disproportionately concentrated in the Middle Atlantic, East North Central, and West North Central regions. The LQ of population for the East North Central states is 4.34, and it is 2.04 for the West North Central states. If the metropolitan areas of upstate New York and central and western Pennsylvania were added to the East North Central Census Division, then the concentration would be stronger still. New York's upstate cities of Binghamton, Buffalo, Rochester, and Syracuse are classified as shrinking, as are Altoona, Erie, Pittsburgh, Scranton, and Wilkes-Barre in Pennsylvania.

The Middle Atlantic region, however, has a smaller proportion of the nation's shrinking city population than expected when compared to the percentage of people living in shrinking cities nationally. The Middle Atlantic region's central city population disproportionately lives in positive-turnaround cities.

The group of cities we term *negative-turnaround* reflects the negative aftereffects of recent shocks. In terms of the number of these cities, there were higher-than-expected concentrations in New England, the East North Central Division (predominantly cities that specialized in auto parts production), and the East South Central Division. The East South Central Division has a population LQ of 3.44, which means that the concentration of population in cities that are negative-turnaround is 244 percent higher than expected based on the region's share of central city population, a reflection of the impact of Hurricane Katrina on Biloxi and Gulfport, Mississippi. The other higher than expected concentration of negative-turnaround cities is in the Pacific Division, with six of California's central cities and Honolulu.

Positive-turnaround central cities are concentrated in New England and the Middle Atlantic states. This demonstrates the resurgent strength of the cluster of metropolitan areas anchored by Boston and New York City. However, as we noted earlier, positive-turnaround central cities exist in all Census Divisions.

Growing central cities are disproportionately concentrated in the West South Central Division, Mountain Division, and Pacific Division. This is true both in terms of the number of cities and in terms of the population LQ. There is a 12 percent higher concentration than expected in the South Atlantic Division in terms of population.

The LQ data demonstrates that while the four major types of central cities are regionally concentrated, geography alone does not explain central city performance. Market, institutional, and structural forces determine the fate of America's central cities. In the next section of this chapter we examine the hypotheses that have been suggested as causes of long-term population change in American central cities.

The Context of City Population Change: Theory and Expectations

Two broad sets of forces can put a city or a region on a downward population trajectory: loss in *interregional* competitive position and loss of *intraregional* competitive position (Beauregard, this volume). Underlying both is a simple premise: To be sustainable, a city must have an economic purpose, and it must be competitive—both with other regions and within its own region.

Loss of Interregional Competitive Position: Product Initiated Decline

The first of the two forces triggering population loss reflects changes in the competitive position of products that form a region's traditional economic base. It also emphasizes the close relationship between the economic and demographic fortunes of a city and of its region. If the entire region is experiencing economic decline, then the region's core city is virtually certain to be doing so, and city population is likely to decline as well.

An economic region can be seen as being made up of a portfolio of products, with each product having a position in the product life cycle and its associated S-curve.[5] The overall growth of the economy is then dependent on the growth and volatility of the elements of the portfolio weighted by its share of gross regional product.[6] Population decline can set in as the product moves through its life cycle and the locational requirements of production changes or when the product's market declines or collapses. Population decline can also occur because of institutional sclerosis, wage and income rigidities, and inflexible cost structures, such as overly rigid work rules that allow lower-cost competitor regions to gain market share. This is usually accompanied by population decline in the traditional production center, or headquarters city, of these corporations. [7]

Theoretically, decline in key parts of the region's product portfolio takes place when products that have been historically central to the region's output, or product, portfolio move along the product cycle and either enter the maturity stage, where growth slows, or into decline.[8] Decline is then transmitted through the cluster of economic activity that surrounds the product or industry, either through forward linkages (which are sales to customers) or through backward linkages (which are purchases made from the supply chain).[9]

Decline associated with the maturation of products that form a large part of a region's product portfolio is often associated with regional population decline or slow growth, since it can trigger population losses through the labor market. Less demand for the region's products leads to less demand for labor; less regional demand for labor, in turn, results in outmigration of those who have lost jobs and of younger adults who are searching for careers and paychecks. A second source of population loss can take place in cities that were industrial centers during the early 20th century: With a decline in job growth and, with it, a decline in perceived

opportunity, the domestic and foreign immigrants that historically fueled these cities just stop coming. Moreover, population decline will be more concentrated in those cities and neighborhoods that house workers with occupational skills that are no longer in demand,[10] and in municipalities with tax bases that are most dependent on declining industries.[11]

If the root of the region's decline rests with a product portfolio dominated by mature or declining industries, then economic development solutions may include endogenous development strategies, such as encouraging entrepreneurship leading to new products; assisting in product revitalization (a form of technology-based development); lowering transaction costs that inhibit local firms from expanding; or engaging in import substitution through activities such as buy-local campaigns. A second set of strategies focuses on exogenous development by either encouraging external demand for local products through trade promotion or attracting external investment in the regional economy.

Loss of Intraregional Competitive Position

The second major force behind central city population decline is its competitive position relative to its neighboring municipalities, or its locational advantage. Cities compete for residents and businesses based on a combination of location, quality of services provided with an accompanying tax cost, quality and appropriateness of infrastructure, and quality and appropriateness of its building stock. This second set of forces can be thought of as the determinants of a city's market share of metropolitan area population and of business activity.

Somewhat different forces determine the value proposition (value obtained for the cost of the location both in terms of purchase price, operating costs, and tax cost) considered by businesses and households when it comes to intraregional locational decisions. Some forces pull users toward a city's land and others push users away from that land. Businesses evaluate these factors through their income statements; households do so through their utility functions.

Suburban pull factors for households include the positive aspects of suburban living, particularly more land at affordable prices and a lifestyle that is attractive to many households. Suburban pull factors for businesses are major changes in transportation, communication, and infrastructure that have reshaped the competitive position of land uses within the metropolitan area since the 1950s.[12] For the retail and service sectors, the growth of population and disposable income in suburban areas and their decline in the city provides additional incentive, or pull, to locate in the suburbs in order to be close to their customers.

Central city push factors for households include quality-of-life issues, such as crime, density, and the quality of services (primarily education); tax costs for services received; obsolescence of building stock; and racial or ethnic change. For

businesses these include some of the household factors (crime, tax cost, obsoles-
cence of building stock) but may also include congestion, deteriorated infrastruc-
ture, and a lack of local government responsiveness and transparency.

Companies choose locations (both intra- and inter-regionally) based on the
impact the location has on gross income or sales (the top lines of their income
statement) and/or on their operating costs (the middle lines). For most traded sec-
tors of the economy, those that export their goods and services to customers out-
side the region, location within a metropolitan area should not affect gross sales;
however, it can influence operating costs, as well as a company's ability to attract
and retain scarce labor or talent.[13]

Factors Associated With City Population Decline: Hypotheses

What are the forces that can explain why some cities have experienced long-term
population growth while others have suffered decline? Above we divided these
forces into interregional and intraregional factors that affect the locational deci-
sions of households and businesses. Here we present specific hypotheses and note
which of these provide the intellectual foundation for specific types of economic
development strategies. In the following section we test these hypotheses and pol-
icy strategies based on them to assess their validity.

Drawing on the above discussion, we offer several hypotheses on possible fac-
tors contributing to city population decline between 1960 and 2010. Since some
of these potential explanations are implicitly embodied in city economic develop-
ment strategies, the extent to which each is valid may have important implications
for urban economic development policy.

We divide our hypotheses into those that relate to interregional competitive
forces that might affect the entire metropolitan area and thus also affect city popu-
lation growth or decline, and those that reflect possible intraregional forces that
reflect the distribution of metropolitan area population between a central city and
its suburbs.

Interregional Competitive Forces

At the base of any city or region's population growth is the health and vitality of
its economy in relation to that of its competitor regions. In this section we pres-
ent eight hypotheses that relate to interregional competitive forces, looking first
at four hypotheses about the demand side of the market for the factors of pro-
duction—land, labor, capital, and knowledge—followed by hypotheses about the
performance of the supply side of those markets.

Hypotheses about the demand side of markets for metropolitan factors of production

Hypothesis 1: Low metropolitan area economic growth is expected to be associated with central city population decline. This reflects the observation that a region's economic success is necessary for it's central cities to remain viable.[14]

Hypothesis 2: Central cities whose residents were disproportionately employed in the manufacturing sector at the beginning of the period were likely to grow more slowly or decline over the course of the period. We hold this expectation for several reasons. First, these manufactured products are most likely to be old in terms of their position in the product cycle and, therefore, growing slowly or declining. Second, plants are likely to be old, built to accommodate outdated modes of transportation, and most likely difficult and expensive to modify. Third, if the manufacturing activity is abandoned, the building site will be expensive to adapt for alternative or new land uses. And fourth, we know that heavy industries with central city operations have declined. The quest to reinvigorate declining manufacturing is a major economic development strategy in many regions.

Hypothesis 3: Central cities that had a disproportionately high share of employment in the manufacturing sector in 2000 are expected to experience population decline over the period. U.S. manufacturing experienced severe difficulties from about a year and a half before the 2001 recession began through the 2007 recession. While the most dramatic set of losses revolved around the Detroit-based auto industry, U.S. manufacturing in general experienced a competitive onslaught from offshore competitors, especially for routine manufacturing production dominated by low-skilled and semiskilled jobs. We expect that declines in regional manufacturing employment will be associated with net outmigration from the region and from the central city.

Hypothesis 4: Central cities located in metropolitan areas that had a disproportionately high share of employment in the health sector in 2000 are expected to experience population growth over the period. One of the most dramatic changes in the modern U.S. economy has been the rise in the share of gross domestic product spent on health care and the growing importance of health care employment in central cities. We expect that the larger the share of health care jobs in the metropolitan economy, the greater the gain in central city population. This hypothesis underlies the "meds" part of an "eds and meds" economic development strategy.

Hypotheses about the supply-side of markets for metropolitan factors of production. Work and economic opportunity are attracted to a city and region due to the cost and quality of the factors of production, both in the economic region and in the

city itself. There are four broad factors in modern production: land, labor, capital, and knowledge. Since most portions of the capital market are national or global, our investigation focused on the other three "sticky" factors of production that define the competitive and comparative advantages of regional economies.

Hypothesis 5: Central cities whose residents had lower levels of higher education attainment in 1960 were more likely to experience population decline from 1960 to 2010. This hypothesis directly addresses the role that advanced education plays in the labor market. As the economy has moved increasingly to producing traded services, managerial occupations and technical occupations that demand an educated workforce have grown. Many researchers argue that demand for workers with high skill levels and advanced education provides large central cities with a comparative advantage in the competition for the location of businesses that produce and trade services outside of their immediate market area. Robert Reich called people with these skills "knowledge workers and symbolic analysts."[15]

This hypothesis lies behind the efforts of many cities to pursue a "get smarter" economic development strategy, designed to improve the educational quality of their labor force. Such a strategy implies raising rates of educational attainment (degrees and certificates earned), deepening levels of educational achievement (improving soft skills, critical thinking, literacy, and numeracy), and developing pools of tradable knowledge. Education is seen as the root not only of increased labor productivity but also of increased multifactor productivity.

Hypothesis 6A: Increases in labor supply brought about by regional economic growth are expected to be associated with city population growth. Migration is a critical way in which cities and metropolitan economies augment and enhance their labor supplies. The supply of labor increases through several stages as regional labor markets tighten.[16]

In the very short run, unemployment rates go down as employers hire those who are not working and are actively seeking work. The second stage of an increase in the labor supply takes place when potential workers with reasonable skills believe that their chances of being employed at a wage above their reservation wage is improving.[17]

They then move into the labor force, either directly to work, or into unemployment; this is when the labor force participation rate increases and secondary workers are attracted into the regional labor market. In the next stage those with lower skills who were previously either unemployed or not participating in the labor market gain employment as labor markets tighten. The last stage of increasing the labor supply takes place when people are attracted into the regional labor market through migration in response to economic opportunity.

Hypothesis 6B: Regional amenities are likely to be associated with higher levels of city population growth. Cortright, Glaeser, Florida, and others have suggested that interregional migration is not wholly influenced by job and wage concerns but is also affected by a desire for regional amenities.[18] This hypothesis is the basis for the pursuit of amenity-based economic development strategies by cities and regions.

We could not collect data on the list of amenities frequently mentioned, with one prominent exception: mean July temperature. It is well known that the United States has experienced a long-term internal migration to the South and West, which has resulted in a broad deepening of the labor supply in those regions. It is assumed that this migration is in part stimulated by a search for warmer winter temperatures now that air conditioning has taken away the discomfort of hot, humid summers.

Hypothesis 7: Cities located in regions with better-quality and more modern infrastructure and with a more "business friendly" environment will likely be associated with greater population growth. The land market for business locations has two parts. The first is the cost, access, and other characteristics of the land itself. Unfortunately we do not have data on these characteristics. The second aspect of the cost of land is the cost and quality of public services and the public policy environment that is associated with a region. Economic activity, and the population associated with it, will gravitate toward regions whose land and other attributes provide a better operating environment. The cost and quality of public services is the basis for much local economic development policy, manifested in efforts to reduce costs through business tax incentives, through infrastructure improvements, and through regulatory reform to create a more business-friendly environment.

Hypothesis 8A: The presence of research universities in a metropolitan area is likely to be associated with greater central city population growth. This hypothesis directly addresses the knowledge portion of the new production function. The presence of a research university may lead to localized success in translating knowledge creation into viable new products, new industry formation, and, relocation.[19] Encouraging academic research is a popular economic development strategy.

Hypothesis 8B: Agglomeration economies and density are expected to be associated with central city population growth. There are two competing hypotheses with respect to city density and population size. Clarke and Gaile and Glaeser both hypothesize that a competitive advantage of central cities is their density, based on the traditional argument for "agglomeration economies."[20] Density facilitates the exchange of ideas and will—as Alfred Marshall argued in the late 1890s—enhance labor pooling, since central cities have enough density of people and of jobs that those

with rare skills have a higher probability of finding work that matches their skills. This makes density a component of the knowledge base of a region. The dense co-location of different knowledge industries will create demand for skilled labor. Porter has also made this argument about the development advantages of central cities.[21] Agglomeration economies are the intellectual core for the economic cluster strategies that have been widely adopted in the past two decades. The opposing hypothesis is that density triggers a series of negative externalities in terms of congestion and accompanying noise, dirt, deterioration in safety, and other inconveniences and increased production costs, so that it provides an incentive to move to less dense regions.

Intraregional, or intrametropolitan area, competitive position

Central cities compete for residents with other jurisdictions within a metropolitan area. They may have had a historical advantage based on access to dense locations of work, but this advantage has eroded over time with the establishment of multinuclear metropolitan regions. Other locational factors include the tax cost associated with a residence, safety, quality of schooling, the ability to attract and acculturate immigrants, and the age and density of the housing stock. We collected data on many of these hypothesized relationships to see how much each was associated with change in central city populations from 1960 to 2010, first focusing on factors that are external to individual household decision-making about which municipality to live in and then moving onto factors that directly influence household choice.

Factors that are external to individual household locational choice.
Hypothesis 9: It is expected that greater increases in regional population will be associated with greater increases in central city population. This would be true even if the share of the regional increase is lower in the central city than in the rest of the region.

Hypothesis 10: The historical flow of international migration to a city is expected to be positively associated with population growth. This hypothesis is based on the expectation that existing foreign-born populations would be a foundation for subsequent chain migration. A number of central cities that have experienced sharp population losses have shown great interest in drawing international migrants as new sources of population. Part of this interest is based on the observation that Hispanic immigration has been critical to sustaining population levels in Chicago and in California's major central cities;[22] another part is based on the realization that international migration has the potential to offset suburban outmigration and an appreciation of the traditional role of central cities as the entry point for international migrants, who then move out as they move up the income ladder.[23]

Hypothesis 11: Cities that have the ability to annex land on their borders are expected to be able to increase their populations more rapidly than those that are unable or unwilling to do so. There are three reasons for this: First, the annexed land will contain existing residents who will immediately add to the city's population. Second, cities annex only land that is desirable. Third, the larger the portion of the metropolitan area contained within the municipal corporate limits, the better its ability to accommodate further population growth.[24]

Factors that directly bear on household locational choice.
People choose where to live within a metropolitan area by balancing a number of characteristics about their family, access to work and amenities, the full cost of living at a particular location, conditioned upon their wealth and income. Life-cycle stage and family structure play roles, as do the characteristics of the potential residence itself. While there is little that public policy can do to directly affect location decisions in the near term, it can influence important factors such as crime rates and the quality of education, which, over a longer time period, will affect those decisions.

Hypothesis 12: The quality of the city public school system is likely to be positively related to central city population change. A public school system seen to be poorly performing will lead middle-class families with children to migrate from the central city to suburbs with better schools. The process is self-reinforcing, since the reduction of middle-class students leaves the school system with a greater proportion of students from low-income families, whom research has shown are more expensive and difficult to educate.

Hypothesis 13: Higher rates of city crime are expected to be associated with population movement from the central city to suburbs and thus result in lower city population. Cities increasingly recognize that crime reduction is related not only to population out-migration but to their local economic development success because business owners understand that it is difficult to attract and retain employees in dangerous neighborhoods, customers are repelled by street crime, and operating costs (including insurance) are driven up by crime.

Hypothesis 14: A higher rate of poverty among central city residents is expected to be associated with city population decline. It is widely held that the larger the share of low-income families living in a central city, the lower will be the city's long-term population growth rate. One reason for this expectation is that low-income families cannot pay for the local public services that they consume, raising the tax burden on families that are not poor. The second concern is over the concentra-

tion of the poor. Much work has been done on tipping points and the impact of high densities of low-income families on social problems associated with poverty, including crime and educational achievement.[25]

Hypothesis 15: An observation commonly made during the time period studied is white residents frequently flee established residential neighborhoods following an influx of African-Americans; this is termed racial succession. Therefore, *it is hypothesized that rapid racial succession and negative attitudes among white residents toward African-Americans integrating neighborhoods added a propulsive force to suburbanization during the late 1960s through the 1970s.*[26] Our expectation is that the retention of the white population would be inversely associated with the percentage of African-Americans in the city population at the beginning of the period and that population loss would be associated with white flight. We also hypothesized that the frequency and intensity of racially identified riots or civil disturbances from 1964 to 1971 would be shown to have stimulated white flight and long-term population loss.

The above discussion has set forth the hypotheses that underlie many efforts to improve local economies and to reverse population decline (although we note that a review of these hypotheses suggests that many strategies to address population push factors depend on policies and practices that lie outside the purview of the economic development department and require improving the operating conditions of the city). The extent to which these hypotheses are supported by the analysis we present below should clarify whether the policies and strategies are well grounded.

Factors Associated With Central City Population Decline: Testing The Hypotheses

The goal of the statistical portion of the chapter is to test a set of variables that reflect, or operationalize, the specific development hypotheses set forth above. Each of these variables reflects a social, demographic, or economic factor that is held to be associated with population change in American central cities from 1960 to 2010, the period covered by this study, or is the outcome of a public policy strategy designed to influence population change. Because we are interested in population change over this time period we selected variables at the start of the time period, or as close to 1960 as possible, to shed light on what caused subsequent population movements.

We use three analytic methods. *Correlation analysis* shows how closely each of these variables is individually associated with the percent change in central city population between 1960 and 2010. *Multiple regression analysis* allows us to esti-

mate the effect of a variable on central city population change while controlling for the effects of other variables. *Difference in means* tests show the difference in the mean value of a particular variable between two groups of cities, such as the difference in the average poverty rate between growing and shrinking cities.

To interpret the results of a correlation analysis we must first determine whether the sign of the coefficient (positive or negative), corresponds to what our hypothesis would predict. The sign indicates the direction of the relationship between the two variables. Second, we must determine whether the correlation between the two variables is statistically different from zero or whether there is no statistical association.[27]

The results are given in *Table 2* which contains the correlation coefficients, the critical values for each type of central city based on the number of observations in each group (this indicates the value required for the correlation to be deemed to be statically significant given the size of the subset or group), and the probability that the result is statistically significant. In addition to this information Jacob Cohen suggests that qualitative statements can be made about the association between the two variables based on the size of the correlation coefficient, where values above 0.5 are considered large or strong, between 0.3 and 0.5 moderate, between 0.1 and 0.3 small or weak, and less than 0.1 trivial or insubstantial.[28] The results are presented in *Table 2* for all major central cities in the nation as well as for each of the nine Census Divisions. The data are arrayed by the size of the correlation coefficients for the national set of central cities, moving from the largest positive correlation to the largest negative correlation.[29]

Correlation analysis is limited. It does not determine causation, nor can it measure the independent effects of each variable on population change. This is because all of the variables we are investigating influence the percent change in central city population simultaneously. To assess the independent effect of each of the variables while controlling for the other variables requires multivariate analysis. Thus our second approach is to test a multiple regression model for which the dependent variable is percent change in central city population from 1960 to 2010. (*See Appendix 3 for the presentation of the model and results*).

Our third approach is to utilize difference in means tests to compare the means of the independent variables for the four different subsets of central cities: growing, shrinking, positive-turnaround from decline, and negative-turnaround from growth. This supplements our correlation analysis and allows us to better understand what leads to either successful growth or positive economic transition among central cities. There are very large differences in population growth rates across the four groups of central cities, and we expect that a close examination of differences in the independent variables can help explain why or how those differences occurred.

The results from the difference in means tests are displayed in *Table 3*. This table presents the mean values for the variables for the four subsets of central

cities. The mean for each variable for each subset is tested to determine whether it is statistically different from the mean of the other groups, and is reported in the section on the left side of *Table 3*. The results from the tests are reported on the right-hand section of the table, along with the statistical significance of the test. The variables are ordered according to their association with central city population growth rates as displayed in *Table 2*.

Four horizontal lines divide *Table 3*. The four variables above the first (solid) line had strong positive correlations with city population change that were statistically significant at the 99 percent confidence interval for the universe of major central cities, as depicted in *Table 2*. The variable between the solid line and the following dashed line (Annexation) was positively correlated with population change and was significantly different from having no association at the 95 percent confidence interval. The two variables between the lower dashed line and the lower solid line had statistically significant negative correlations with population change at the 95 percent confidence level. The six variables below the second solid line had correlations that exceeded the 99 percent critical value.

In the following section we present the findings derived from an analysis of our full set of cities.[30] We refer to findings within individual regions only when relevant. A more systematic presentation of within-region results is presented in Appendix 4.

Interregional Competitive Forces

Hypotheses about the demand-side of markets for metropolitan factors of production

Hypothesis 1: Low metropolitan area economic growth is expected to be associated with central city population decline. There is a strong statistical association between the employment growth rates of metropolitan areas from 1970 to 2007 and population growth rates of their central cities from 1960 to 2010. This reinforces the observation that regional economic success is necessary for central cities to remain viable. The correlation coefficient is 0.302 among the universe of central cities, the second-highest correlation coefficient. Controlling for the other variables in the multivariate model, we found that an increase of one percentage point in the typical metropolitan area's employment growth from 1970 to 2007 was associated with a 0.98 percentage point increase in central city population from 1960 to 2010.

Metropolitan population and employment growth rates distinguish the performance of shrinking central cities from growing central cities, shrinking central cities from central cities that have experienced a positive-turnaround from decline, and those that have gone through a negative-turnaround from growing central cities. Metropolitan area population growth rates in positive-turnaround cities (i.e., cities that first suffered declines in population after 1960 but then began grow-

Table 2.

Correlations with Percent Change in Central City Population from 1960 to 2010
Sorted from the highest national correlation statistic to the smallest

Hypothesized Causal Variables	United States	New England	Middle Atlantic
Percent change in MSA population from 1980 to 2000[1]	0.380 ***	0.195	0.620 ***
Percent change in MSA employment from 1970 to 2007[2]	0.302 ***	0.269 *	0.094
Average July temperature	0.204 ***	-0.069	0.595 ***
Percentage of MSA population that is Hispanic in 2000	0.192 ***	0.115	0.685 ***
Right-to-work state in 1960	0.164 ***	.	.
Annexation: percent change in land area from 1990 to 2000	0.099 **	0.101	-0.043
Percentage of central city population that is Hispanic in 1970	0.066	-0.209	0.654 ***
Percentage of central city population age 25+ with 4 or more years of college in 1960	0.065	-0.022	0.189
Percentage of MSA population age 25+ with bachelor's degree or higher in 2000	0.030	0.356 **	-0.056
Percentage of central city families with incomes below $3,000 in 1960	0.022	-0.365 **	-0.210
Number of Universities in MSA that are high or very high in research activity[3]	0.008	-0.144	0.305 *
Percent change in MSA GDP per capita from 1980 to 2000[2]	-0.039	0.376 **	0.006
Percentage of central city population that was foreign born in 1970	-0.064	-0.281 *	0.274 *
Intensity of central city civil disturbances from 1964 to 1971[4]	-0.083 **	-0.265 *	-0.130
Percentage of central city population that was African-American in 1960	-0.100 **	-0.177	-0.187
Percentage of MSA jobs in the manufacturing sector in 2000	-0.127 ***	-0.006	0.043
City age[5]	-0.128 ***	-0.226	-0.004
Percentage of employed central city residents working in manufacturing in 1960	-0.181 ***	0.205	0.141
Central city robberies per 100,000 residents in 1992	-0.189 ***	-0.367 **	-0.061
Central city population density in 1980[6]	-0.197 ***	-0.512 ***	0.107
Percentage of MSA jobs in health care sector in 2000	-0.219 ***	-0.406 **	-0.187
Number of central cities	395	28	30
Critical value, one-tail test 90% confidence *		0.250	0.241
Critical value, one-tail test 95% confidence **	0.073	0.317	0.306
Critical value, one-tail test 99% confidence ***	0.103	0.437	0.423

Notes:

1   A common Metropolitan Statistical Area (MSA) definition was used for all years based
on the 2003 MSA definitions of the U.S. Office of Management and Budget. Data were
provided by the Building Resilient Regions Network.

2   Data obtained from Moody's Analytics' Economy.com data service. MSAs were based on
2003 definitions and were constructed from Economy.com's county data files.

3   Research university: Number of universities in the MSA classified by the Carnegie Founda-
tion as having either "high" or "very high" research activity.

Table 2. *(cont)*

Census Division						
East North Central	*West North Central*	*South Atlantic*	*East South Central*	*West South Central*	*Mountain*	*Pacific*
0.496 ***	0.541 ***	0.157 *	0.616 ***	0.293 **	0.649 ***	0.115
0.434 ***	0.778 ***	-0.020	0.326 *	0.205 *	0.654 ***	0.093
0.320 ***	-0.106	0.083	-0.418 **	0.174	0.644 ***	-0.004
0.152	-0.271	0.085	0.764 ***	0.033	0.083	0.162
.	-0.023	0.141	-0.646 ***	0.074	0.379 **	.
0.426 ***	0.484 ***	0.142	-0.018	-0.033	-0.064	0.089
-0.062	-0.286 *	-0.029	0.148	-0.072	-0.100	0.011
0.377 ***	0.705 ***	0.030	0.057	-0.039	-0.188	-0.064
0.308 ***	0.521 ***	0.008	0.136	0.273 **	-0.159	-0.095
-0.483 ***	-0.069	-0.140	0.450 **	-0.103	0.151	0.080
0.179 *	-0.081	0.099	0.033	0.392 ***	0.164	-0.084
0.453 ***	0.135	-0.203 *	-0.099	0.211 *	0.138	0.043
-0.218 **	-0.054	-0.010	0.239	-0.026	-0.134	-0.131
-0.270 **	-0.312 *	-0.095	-0.255	-0.102	-0.192	-0.099
-0.527 ***	-0.385 **	-0.363 ***	-0.042	-0.063	0.142	-0.219 **
-0.014	-0.265 *	-0.093	0.151	0.042	0.062	0.054
-0.115	-0.710 ***	-0.069	-0.162	0.124	0.095	-0.115
-0.246 **	-0.635 ***	-0.241 **	-0.132	0.235 **	0.136	-0.048
-0.505 ***	-0.491 ***	-0.285 ***	-0.416 **	-0.256 **	-0.063	-0.264 **
-0.382 ***	-0.301 *	-0.264 **	-0.526 ***	-0.191 *	-0.468 ***	-0.208 *
-0.383 ***	0.288 *	-0.073	-0.158	-0.222 *	-0.369 **	-0.116
68	27	72	21	51	35	63
0.157	0.255	0.153	0.291	0.183	0.222	0.164
0.201	0.323	0.195	0.369	0.233	0.283	0.209
0.282	0.445	0.274	0.503	0.325	0.392	0.293

4   Civil disturbance: Riot severity index from Collins and Margo (2004a).

5   City age: Number of years from the Census decade in which the central city reached a population of 50,000 to 2010.

6   Population density: City data are primarily from 1980; 1990 data were substituted for 12 central cities where 1980 data were unavailable. Two cities were omitted because 1980 and 1990 data were unavailable.

Degrees of freedom for the significance test is (n-2); that is two less than the number of central cities in the group or subset.

Table 3.

Difference in Means Between Shrinking, Growing, Positive-Turnaround, and Negative-Turnaround Central Cities

Dependent Variable	Mean growing	Mean shrinking	Mean negative turnaround
Percent change in central city population from 1960 to 2010	522.37	-28.30	160.33
Hypothesized Causal Variables			
Percent change in MSA population from 1980 to 20002	47.36	6.22	24.38
Percent change in MSA employment from 1970 to 20073	182.43	47.32	99.19
Average July temperature	77.67	74.29	75.88
Percentage of MSA population that is Hispanic in 2000	16.67	5.00	11.09
Annexation: percent change in land area from 1990 to 2000	26.02	1.24	12.00
Percentage of central city population that is Hispanic in 1970	7.99	2.15	4.89
Percentage of central city population age 25+ with or mote 4 years of college in 1960	11.12	6.28	10.32
Percentage of MSA population age 25+ with bachelor's degree or higher in 2000	24.82	22.12	24.30
Percentage of central city families with incomes below $3,000 in 1960	19.19	17.81	17.43
Number of Universities in MSA that are high or very high in research activity4	1.08	1.10	1.90
Percent change in MSA GDP per capita from 1980 to 20003	48.58	44.33	48.33
Percentage of central city population that was foreign born in 1970	3.90	4.63	5.69
Intensity of central city civil disturbances from 1964 to 19715	0.0039	0.0294	0.0034
Percentage of central city population that was African-American in 1960	9.10	14.40	11.53
Percentage of MSA jobs in the manufacturing sector in 2000	11.46	15.47	13.95
City age6	63.11	108.64	86.58
Percentage of employed central city residents working in manufacturing in 1960	19.94	33.97	26.70
Central city robberies per 100,000 residents in 1992	265.36	485.82	352.11
Central city population density in 19807	5.67	7.23	6.07
Percentage of MSA jobs in health care sector in 2000	9.30	11.37	10.06

Significance level or confidence intervals: * 90% confidence; ** 95% confidence;

*** 99% confidence.

Notes:

1   Differences in means are calculated by subtracting the mean value of the second set of central cities from the mean value of the first named set.

2   A common Metropolitan Statistical Area (MSA) definition was used for all years based on the 2003 MSA definitions of the U.S. Office of Management and Budget. Data were provided by the Building Resilient Regions Network.

3   Data obtained from Moody's Analytics' Economy.com data service. MSAs were based on 2003 definitions and were constructed from Economy.com's county data files.

Table 3. *(cont)*

	Difference between[1]					
Mean positive turnaround	*Shrinking & growing*	*Shrinking & positive turnaround*	*Positive- turnaround & growing*	*Negative- turnaround & growing*	*Negative- turn- around & posi- tive- turnaround*	*Shrinking & negative- turnaround*
18.15	-550.67***	-46.45***	-504.22***	-362.04*	142.18**	-188.63***
21.91	-41.15***	-15.69***	-25.45***	-22.98***	2.47	-18.16***
90.25	-135.10***	-42.93***	-92.17***	-83.24***	8.93	-51.86***
75.66	-3.38***	-1.37*	-2.005**	-1.79	0.22	-1.59
8.69	-11.67***	-3.69***	-7.98***	-5.58**	2.40	-6.09***
24.48	-24.78**	-23.24	-1.54	-14.02	-12.48	-10.76***
3.82	-5.85***	-1.67**	-4.17**	-3.10	1.07	-2.74**
7.97	-4.83***	-1.69***	-3.15***	-0.80	2.35*	-4.04***
26.21	-2.70***	-4.09***	1.39	-0.51	-1.91	-2.19*
18.47	-1.39	-0.66	-0.72	-1.76	-1.04	0.37
2.02	0.02	-0.914*	0.932***	0.819**	-0.11	-0.801*
55.60	-4.25	-11.26**	7.01	-0.25	-7.26	-4.01
5.84	0.73	-1.20	1.94***	1.79**	-0.15	-1.05
0.0203	0.0255	0.01	0.0164***	0.00	-0.0169*	0.026**
12.73	5.30***	1.67	3.63**	2.44	-1.19	2.86
11.50	4.01***	3.96***	0.04	2.49**	2.45*	1.52
111.38	45.53***	-2.74	48.27***	23.47***	-24.80**	22.06**
25.74	14.03***	8.23***	5.81***	6.77***	0.96	7.27***
493.81	220.46***	-7.99	228.44***	86.74*	-141.70*	133.72*
7.68	1.56	-0.46	2.02	0.40	-1.62	1.16
10.48	2.06***	0.89**	1.18***	0.76*	-0.42	1.31***

4   Research university: Number of universities in the MSA classified by the Carnegie Foundation as having either "high" or "very high" research activity.

5   Civil disturbance: Riot severity index from Collins and Margo (2004a).

6   City age: Number of years from the Census decade in which the central city reached a population of 50,000 to 2010.

7   Central city population density: City data are primarily from 1980; 1990 data were substituted for 12 central cities where 1980 data were unavailable. Two cities were omitted because 1980 and 1990 data were unavailable.

ing again) were nearly 16 percentage points higher from 1980 to 2010 than in shrinking cities. The clear lesson is that the economy is regional, as are population dynamics that are derived from economic performance.

Hypothesis 2: Central cities whose residents were disproportionately employed in the manufacturing sector at the beginning of the period were likely to grow more slowly or decline over the course of the period. This variable has the fourth largest negative association with change in central city population nationally (-0.181). That association is strongest in the Midwest, the historic industrial heartland of the United States.

There were large differences in the share of employed central city residents who worked in manufacturing in 1960 among the four groups of central cities. The largest share was in the group of shrinking cities, 34.0 percent, and the smallest in growing cities, 19.9 percent; with the mean for the positive-turnaround central cities being 25.7 percent. The differences between all these means were statistically significant. Cities whose residents were historically disproportionately employed in the manufacturing sector were likely to experience greater population decline.

Hypothesis 3: Central cities that had a disproportionately high share of employment in the manufacturing sector in 2000 are expected to experience population decline over the period. The correlation between employment in the manufacturing sector in 2000 and population change from 1960 to 2010 is negative, as the hypothesis suggests, but the result is only weakly statistically significant. We also correlated employment in the manufacturing sector in 2000 with population growth from 2000 to 2010, which showed a slight increase in the relationship.

The difference in means tests also suggests a modest negative relationship. The highest percentage, 15.5 percent, was in regions with shrinking central cities; the lowest was in regions with growing central cities, 11.5 percent, which was the same as that of central cities that experienced positive-turnaround. The difference in the proportion of people employed in manufacturing was statistically meaningful between shrinking central cities and the other two groups of cities. The rate of employment in the manufacturing sector in 2000 in shrinking central cities was than more than four percentage points higher than in positive-turnaround cities.

Hypothesis 4: Central cities located in metropolitan areas that had a disproportionately high share of employment in the health sector in 2000 are expected to experience population growth over the period. We found the opposite to be true. This result is very strong. The correlation between the share of regional employment in the health care sector in 2000 and the percent change in central city population for both 1960 to 2010 and 2000 to 2010 is negative. In fact, it has the largest negative relationship with population change from 1960 to 2010 among the universe of central cities. The multivariate analysis in Appendix 3 supports this finding.

This surprising result persists in the difference in means analysis. Growing central cities had the lowest share of employed workers in the MSA working in the health care sector in 2000, 9.3 percent of jobs; the mean for the group of shrinking central cities was the highest, at 11.4 percent, with positive-turnaround central cities at 10.5 percent. The differences are statistically meaningful. How could this be true when cities are focusing on higher education and health care, the "eds and meds," as engines for both job and community development? These results call for taking a deeper look at the role that the regional health care sector plays in local economic and community development.

Three speculative explanations about this relationship come to mind. First, the health care sector, with the exception of metropolitan areas with major research institutions and hospitals that draw significant patient revenue from outside the metropolitan area is largely a local service sector. As such, the share of employment in the sector (other than that which is exported) is likely to be much the same, whether the city is growing or declining. Indeed, as decline sets in across the economy and jobs and population leave, health care jobs may not disappear at the same rate, due to the fact that health care is a nontraded sector of the regional economy and its major institutions are relatively immobile. In fact, it is rare to see a major health care anchor move, although one may close as its suburban competition captures its paying customers.

 Second, as a city's population declines the share of elderly among those who remain could increase, requiring relatively more health care services, which can be supported through public health insurance and public and retiree health care plans. Third, most new health care jobs may be suburban, following migration of the population with money and medical insurance.

Hypotheses about the supply-side of markets for metropolitan factors of production

Hypothesis 5: Central cities whose residents had lower levels of higher education attainment in 1960 were more likely to experience population decline from 1960 to 2010. There were clear differences among the four types of cities in their shares of adults with four years or more of college, and the differences are consistent with our expectations. The mean share of the adult population of shrinking central cities with four or more years of college in 1960 was 6.3 percent; it was 11.1 percent for growing central cities and nearly 8 percent for positive-turnaround cities. The differences between these types of cities were all statistically significant at the 99 percent confidence level.

The share of adult workers with advanced education grew substantially between 1960 and 2000, so we also examined the relationship between the percentage of adults with higher education in the metropolitan area in 2000 and city

population change. The positive-turnaround central cities were in metropolitan areas with the highest mean level of advanced educational achievement in 2000, 26.2 percent, followed by growing central cities at 24.8 percent; the lowest mean attainment level (22.1 percent) was in the metropolitan areas of shrinking central cities. There was a statistically meaningful difference of more than four percentage points between the educational levels of residents of metropolitan areas with positive-turnaround central cities compared with those of shrinking central cities. There were also statistically significant differences between shrinking and growing central cities.

Hypothesis 6A: Increases in labor supply brought about by regional economic growth are expected to be associated with city population growth. We employ the growth rate in gross metropolitan product between 1980 and 2000 to examine this hypothesis.[31] While there was no statistically significant correlation between regional economic growth and city population change at the national level, there was a strong and significant positive correlation in the East North Central states (0.453) and in New England (0.376). In these states, there was a substantial and statistically significant difference between growth in regional economic output in turnaround cities and shrinking cities, with the latter having output growth 11 percentage points than the former between 1980 and 2000.

Hypothesis 6B: Regional amenities are likely to be associated with higher levels of city population growth. There are many types of amenities and people hold widely varying preferences for them. Here we focus only on one amenity, climate, testing the common observation that internal migration is shifting people toward warmer locations. The variable we use is July average temperature, and we expect a positive relationship between that and central city population growth. Indeed, the correlation between the two over this fifty-year period is very high. In the multivariate analysis, an increase in one degree of average July temperature was associated with a 8.7 percentage point increase in central city population from 1960 to 2010.

The relationships among the regional Census Divisions suggest a somewhat different dynamic: a search for less extreme climates, rather than simply for the warmest climate. In the Mountain Division the association between long-term population growth rates and temperature is a very strong 0.644. We note that the Mountain states run the length of the nation, from north to south and cover a wide range of temperatures. In the Middle Atlantic Division the correlation is 0.595, making the July temperature the fourth largest positive correlation for that region. The relationship is reversed in the four East South Central states. These range from Mississippi and Alabama in the Deep South to more temperate Tennessee and Kentucky to the north. The coefficient is a moderately strong negative one, indicating that central city population change in this region is inversely associated with the temperature in midsummer. The true search may be for moderate temperatures, not just pure heat.

Growing central cities have an average July temperature 3.4 degrees above that of the average shrinking city, while positive-turnaround cities have a July temperature 1.4 degrees above that of shrinking cities. The U.S. population appears to be heat-seeking, to the benefit of the supply side of regional labor markets in warm-weather regions of the nation. There is nothing, however, that local and state government can do about their average July temperature.

Hypothesis 7: Cities located in regions with better-quality and more modern infrastructure and with a more "business friendly" environment will likely be associated with greater population growth. We use city age, measured as the number of years between 2010 and the census year when the central city first reached a population of 50,000, as the proxy for city infrastructure quality. A city's age is directly tied to the age of its infrastructure and the cost of maintaining and modernizing that infrastructure, the ability to accommodate modern forms of transport, and the ability of the existing building stock to accommodate modern modes of production and housing. There may also be an indirect association between the economic age of the central city and the composition of its product portfolio. Our expectation was that city age is negatively associated with central city population growth over this time period, which is indeed the case, and the relationship is statistically significant.

In terms of our four types of cities, growing cities are the youngest and therefore presumably have the highest-quality infrastructure. Their mean age is 63.1 years. Shrinking cities are much older, with a mean age of 108.6 years. But the oldest group of cities is the one that is composed of places that are reversing their decline, the positive-turnaround central cities, with a mean age of 111.4 years. The 2.7-year difference in the mean age of shrinking cities and positive-turnaround cities is not statistically significant; the differences between both shrinking and positive-turnaround central cities and growing central cities are large and statistically meaningful.

Regarding business-friendly environments, we use the right-to-work status of the state in which the central city is located as a proxy for the "business friendliness" of a state, as well as for the value some employers place on locating in a regional labor market where the costs of an organized workforce can be avoided. Our expectation was that location in a right-to-work state would be positively associated with central city population growth. The right-to-work state variable was positively associated with central city population growth, as expected, and is statistically significant.

Hypothesis 8A: The presence of research universities in a metropolitan area is likely to be associated with greater central city population growth. We expected a positive correlation between the number of universities in a metropolitan area that the Carnegie Foundation rated "high" or "very high" in terms of their research activity

and the city population growth rate. In the multiple regression equation the relationship was statistically significant, at the 90 percent confidence level. If a metropolitan area were able to increase the number of research intense universities by 1, the fifty-year population growth rate would increase by 36 percentage points.

Moreover, those central cities that have experienced a positive-turnaround have, on average, more research universities than do the other groups of central cities. They have, on average, two such universities, compared with 1.08 for the average growing central city, and 1.10 for the average shrinking central city. This finding, combined with that on educational attainment, suggests that research universities have played a role in the turnaround of formerly shrinking central cities.

This expectation was not met in the correlation analysis. While the correlation between the two variables was positive, it was not statistically significant.

Hypothesis 8B: Agglomeration economies and density are expected to be associated with central city population growth. This expectation could not be supported by our statistical findings. Central city density, as measured by population per acre in 1980, was negatively correlated with the growth rate of central city populations from 1960 to 2010. In the multivariate analysis, city density is statistically significant from having no effect: For every additional person per acre in 1980, central city populations declined from 1960 to 2010 by 20.5 percentage points. Mean density in growing central cities was 5.67 people per acre, which is much lower than the density of 7.23 people per acre in shrinking cities. What muddies the waters a bit is the fact that in Table 3 the differences in the mean number of people per acre between each of the groups of cities were not statistically different from each other. We interpret the different results between the regression equation and the difference in means tests as indicating that at very high levels of density the costs of congestion outweigh the benefits of intense economic interaction.

Intraregional, or intrametropolitan area, competitive position

Hypothesis 9: It is expected that greater increases in regional population will be associated with greater increases in central city population. This would be true even if even if the share of the regional increase was lower in the central city than in the remainder of the area. The strongest statistical association between any independent variable and the percent change in central city population is the percent change in metropolitan area population from 1980 to 2000, where the correlation coefficient is 0.380. This is followed closely by the correlation between metropolitan area employment growth from 1970 to 2007 and central city population growth.

Of all of the factors studied, these two regional variables have the most consistent impact of all of the factors studied on differences in the central city population growth rates. The mean regional population and employment growth rates

distinguish the performance of shrinking central cities from growing central cities, shrinking central cities from central cities that have experienced a positive-turnaround from decline and those that have gone through a negative-turnaround from growing central cities. Repeating our earlier statement: The lesson is that the economy is regional, as are population dynamics that are derived from economic performance.

Hypothesis 10: The historical flow of international migration to a city is expected to be positively associated with population growth. We found no statistical association between overall immigration and central city population growth. Given the importance of Hispanic immigration, we looked just at the percent of central city population that is Hispanic in 1970 with the expectation that chain migration would play an important role in attracting further waves of Hispanic residents to central cities. However, the percent of the central city population that was Hispanic in 1970 was not correlated with central city population growth rates from 1960 to 2010 nationally; the only statistically positive relationship was in the Middle Atlantic region, where the coefficient was a very strong 0.654.

However, there are statistically significant differences in the means of this variable between shrinking and growing cities—the 1970 mean for city Hispanic population was nearly 6 percentage points higher in growing central cities and 1.7 percentage points higher in positive-turnaround central cities when compared with shrinking central cities.

We also introduced the percent of a metropolitan region's population that was Hispanic in 2000 to capture the association with more current migration chains. The regional share of the population that was Hispanic in 2000 had the fourth-highest positive relationship with central city population change from 1960 to 2010. The correlation between the percent of a metropolitan region's population that was Hispanic in 2000 and population change from 2000 to 2010 was even higher.

Growing central cities had a much higher share of Hispanic residents in their metropolitan area population than did any other type of central city in 2000. The difference was nearly 12 percentage points higher for growing central cities compared with shrinking cities. The positive-turnaround cities had, on average, 3.7 percentage points more Hispanic residents in their metropolitan area than did shrinking cities. This difference also appears for cities that we termed negative-turnaround. It is, of course, difficult to determine the chronological or causal relationships involved: Does attracting Hispanic immigrants lead to growth and turnaround, or are Hispanic immigrants attracted to the economic opportunities that exist in growing and positive-turnaround cities?

The ability to take advantage of new and emerging sources of international chain migration allows central cities to continue their historical function as gateways to the U.S. economy and social integration. Migrants, however, are

economically rational, heading toward work and job opportunities. While there are information lags and imperfections that will direct migrants to long-established gateways, this should dissipate over time. We note that migrants are increasingly choosing to live outside central cities if work opportunities are located elsewhere in the metropolitan area.

Hypothesis 11: Cities that have the ability to annex land on their borders are expected to be able to increase their populations more rapidly than those that are unable or unwilling to do so. The correlation analysis found that, across the national set of central cities, the association between the percentage of land area a central city added between 1990 and 2000 and its percent change in population from 1960 to 2010, while positive, as expected, and statistically significant, was trivial. This may be because the public policy variable covers only a ten-year time span (consistent data from before this point in time could not be found). The mean percent change in the land area of growing central cities from 1990 to 2000 was 26 percent; compared with 1 percent for shrinking cities. The mean percent change in the land area of positive-turnaround cities was 24.5 percent. Despite the size of the difference between shrinking cities and positive-turnaround cities, the difference was not statistically significant.

Factors that directly bear on household locational choice

Hypothesis 12: The quality of the city public school system is likely to be positively related to central city population change. Unfortunately, we could not test this important hypothesis, since we were unable to locate consistent data on K to 12 educational performance at the municipal level for the start of the time period examined.

Hypothesis 13: Higher rates of city crime are expected to be associated with population movement from the central city to suburbs and thus result in lower city population. Our measure of crime was the number of reported robberies in 1992 per 100,000 residents of the central city. We expected the variable to be negatively associated with central city population growth over the time period examined.

The crime variable was both negative and large; it had the third-highest negative association with population change (-0.189) and was highly statistically significant. Using the multivariate analysis to control for other variables we find that an increase of 100 robberies per 100,000 residents in 1992 was associated with a decline of 0.355 percentage points in central city population from 1960 to 2010. The correlation between crime and city population change was significant in seven of the nine Census Divisions, the exceptions being the Middle Atlantic and Mountain Divisions.

There were major differences in 1992 crime rates between the different groups of central cities. The lowest rate was for growing central cities, with a rate of 265

per 100,000 residents, while the crime rate for shrinking central cities was 486. Surprisingly, the rate was highest for the positive-turnaround cities, at 494 per 100,000 people, and not significantly different from that for shrinking cities.

That raises the question of whether crime rates have dropped for the positive-turnaround cities since 1992 and whether this decline was associated with the turnaround. To evaluate this, we examined the crime rate for the four types of cities in 2007. The mean reported rate was 319 per 100,000 residents in positive-turnaround cities compared with 383 per 100,000 residents in shrinking cities, a statistically significant difference at the 90 percent confidence level. This indicates that over the 1992 to 2007 period positive-turnaround cities increasingly distinguished themselves from shrinking cities in terms of crime reduction. The correlation coefficient between the crime rate in 2007 and the long-term central city population growth rate was the highest negative correlation we observed.

Hypothesis 14: A higher rate of poverty among central city residents is expected to be associated with city population decline. We included the percentage of families living in central cities with incomes below $3,000 in 1960 as the measure of poverty with the expectation that it would be negatively associated with the long-term city population growth rate. At the national level there was no statistical association between the family poverty variables and the percent change in central city populations from 1960 to 2010. There were only very small differences in 1960 poverty among the four types of cities, none of which were statistically significant. To the extent that there are significant differences in poverty level today among the four city types, they are likely to be the product of other forces.

Hypothesis 15: It was hypothesized that rapid racial succession and negative attitudes among white residents toward African-Americans integrating neighborhoods added a propulsive force to suburbanization during the late 1960s through the 1970s. Our expectation was that the retention of the white population would be inversely associated with the percentage of African-Americans in the city population in 1960 and that population loss would be associated with white flight. We also hypothesized that the frequency and intensity of racially identified riots or civil disturbances from 1964 to 1971 would stimulate white flight and long-term population loss.

Our expectation was correct in that the percentage of the central city's population defined as African–American in 1960 is negatively associated with the central city population growth rate from 1960 to 2010 at the 95 percent confidence interval. The association is weak, however, with a correlation coefficient of -0.100. The negative associations between these variables are much stronger, however, in three of the Census Divisions: East North Central (-0.527), West North Central (-0.385), and South Atlantic (-0.363).

We also hypothesized that the frequency and intensity of racially identified riots or civil disturbances from 1964 to 1971 would stimulate white flight and

long-term population loss. Collins and Margo provided the index for our use. [32] The results for this variable are similar to those of the African-American share of 1960 city population. There is a negative association, but it is weak, with a correlation coefficient of -0.083 for the universe of central cities. The only Census Division where the variable had an impact that was significant at the 95 percent confidence level was the East North Central Division, where the correlation coefficient was a modest -0.270. This division contains Ohio, Michigan, Indiana, Illinois, and Wisconsin, where intense race riots took place.

Shrinking central cities had higher shares of African-American residents in their population in 1960 (14.4 percent) than did growing central cities (9.1 percent) and positive-turnaround cities (12.7 percent). There is a statistically meaningful difference between shrinking and growing cities in terms of the racial makeup of their populations in 1960, but not between shrinking and positive-turnaround cities.

Summary and Implications

We have examined a variety of hypotheses related to the population growth or decline of central cities over the past half century. Many of these hypotheses underlie, although usually implicitly, widely used or proposed local economic development policies. What can we learn from these results?

Correlation analysis

Our correlation analysis indicated that city population change is associated with the following at various levels of strength:

Strongest Positive Association

- Long-term metropolitan area population growth rate; i.e., slow-growing regional population growth is associated with slow-growing or declining city population.

- Long-term metropolitan area employment growth rate, i.e., slow-growing regional employment growth is associated with slow-growing or declining city population.

Moderately Strong Positive Association

- Amenities as measured by average July temperature: Extreme climates, particularly cold climates, are associated with declining central city population. We saw signs that population movements may be toward moderate temperature rather than toward pure heat.

- Hispanic share of the metropolitan area population in 2000; i.e., cities in regions with higher proportions of Hispanic households are likely to grow faster than those with lower, though the direction of this association is uncertain—that is, Hispanic migration may be leading job and native population growth into the metropolitan area or following it.

- Business-friendliness as measured by the existence of state right-to-work legislation. Cities in states with such legislation experience greater population growth; those in states without it are more likely to suffer population declines.

Moderate Negative Association

- Employment in the health care sector: Cities in metropolitan areas with a greater proportion of employment in health care jobs in 2000 were more likely to experience population decline.

- City crime rate: Cities with higher crime rates are more likely to experience population decline.

- City population density in 1980: Dense central cities had lower population growth rates than did less dense central cities.

- Employment in the manufacturing sector: Cities with a higher percentage of employed city residents working in manufacturing in 1960 were more likely to experience population decline.

- Infrastructure quality as measured by city age: Older cities, with presumed lower infrastructure quality, were more likely to experience population loss between 1960 and 2010.

Weak Negative Association

- Racial succession and white flight. Cities with a higher proportion of the city population that was African-American in 1960 and those that experienced more intense central city civil disturbances from 1964 to 1971 had slower population growth.

Differences between positive-turnaround cities and shrinking cities

We are particularly interested in the differences between shrinking central cities and positive-turnaround central cities, which declined immediately after 1960 but whose 2010 population was greater than its population in 2000. We find that, compared to shrinking cities, positive-turnaround cities were more likely to:

- be located in metropolitan areas whose population, employment, and gross metropolitan product were more rapidly increasing;

- have had a lower proportion of their residents employed in the manufacturing sector in 1960;

- have slightly older infrastructure;

- have lower crime rates;

- have a greater number of research universities in the metropolitan area; and

- have a higher proportion of residents with higher education

In many respects the positive-turnaround cities were from the beginning of the period midway between shrinking cities and growing cites, in the sense that their conditions for the factors related to population change were not as good as those in growing cities nor as poor as those in shrinking cities. The result was that these cities declined for a period and then bounced back.

There are, however, a few positive-turnaround cities whose conditions were as bad as or worse than those of many shrinking cities in earlier years. Philadelphia, a positive-turnaround central city, had a four percentage point higher poverty rate in 1980 than did Pittsburgh, a shrinking city, and more of Philadelphia's 1960 employed population worked in manufacturing than Pittsburgh's (33.2 percent versus 26.1 percent), In 1960, Newark's poverty rate nearly equaled that of Detroit (18.9 percent versus 19.0 percent) and its share of manufacturing workers in its population was similar—36.2 percent and 37.4 percent. Newark is a turnaround story, and Detroit is the poster child for population loss, prompting one to speculate about the effect of the former's proximity to the economic dynamo that is New York City. The positive-turnaround central cities certainly are worth further investigation to determine the reasons for their turnaround.

What are the implications for city and regional economic development policies? Clearly some of the factors that distinguish growing from shrinking cities, and particularly shrinking from positive-turnaround cities, are beyond the control of cities, and others are beyond their control in at least the short term. For example, cities cannot change their climate, nor can they escape their historical legacy as manufacturing centers. The educational attainment of their labor force is subject to change, but only slowly.

There is much, however, in our analysis that can inform city action. First, city economic and population performance is highly conditioned upon population, employment, and overall growth of the region as a whole. As noted elsewhere,[33] there are hardly any examples of growing cities in slow-growing or declining regions. This stark conclusion should emphasize the importance of focusing on regional growth as opposed to simply city growth. Regional growth may not necessarily ensure city growth or health, but city growth and health are not likely to occur without regional growth.

Implications of our findings for City Economic Development Strategies

Human Capital Strategies

Our findings, as well as other research, indicate that these strategies are well founded, although the evidence from our analysis was rather modest. Nonetheless, positive-turnaround cities had a higher percentage of residents with higher education than did shrinking cities and also were in metropolitan areas with a higher percentage of such residents than were shrinking cities. What is not clear is how the increase occurred. Were the additional highly educated adult workers locally grown? Or were they attracted to the region by career opportunities, lifestyle amenities, or local higher educational institutions and found jobs in the regional economy?

Eds and Meds Strategies

The evidence here was mixed. The presence of research universities in the metropolitan regions mattered for central city population growth, and the more there were, the more it mattered. This certainly suggests that cities should do whatever they can to take advantage of this presence to assist in translating knowledge creation into viable new products, company relocations, and new industry formation. It also suggests that encouraging existing universities that are not heavily engaged in research to do so could be productive. In this context, the research arms of major health care complexes are more like the "eds" than the "meds," because they are primarily research organizations and their products are traded services.

The "meds" part of the strategy is more problematic. We found no evidence that the percentage of workers in the health care sector of the average city has any positive effect on population growth. Fostering a city or region's health care sector as an economic development strategy may make sense only if that sector includes a strong health care research component or if it provides substantial services to people from outside the metropolitan area for treatment—that is, it functions as an export industry or traded service rather than as part of the local service sector.

We recognize that the medical sector generates large numbers of jobs across a very broad range of skills and occupations in nearly all central cities. The "meds" in central cities where the medical industry does not export its services beyond the region can be an anchor institution, but its existence depends on the continued ability of health care institutions located in the central city to defend their market shares against competing suburban institutions. In these cities staffing medical facilities is both a workforce and anti-poverty strategy and a community development issue.

Improving Infrastructure as a Means of Increasing Productivity

Our evidence supports this strategy. We approximate the infrastructure quality in a city by estimating its economic age; while nothing can be done to change

city age, older cities can renew their infrastructure and increase its quality. While shrinking cities are much older than growing cities, positive-turnaround cities are just as old as shrinking cities, which suggests the possibility that one factor in their turnaround was that these cities improved their infrastructure more than shrinking cities.

Agglomeration Effects
Our correlation analysis shows a strong negative relationship between agglomeration economies as measured by density at the city level and central city population growth. The multivariate analysis, which controls for other variables, also found a negative relationship. This is contrasted with a body of existing research that demonstrates that agglomeration economies at the regional level are positively related to economic growth primarily at the regional level. While density at the level of the central city may not be the best indicator of agglomeration economies, our use of it does not support the observation of density's positive effect on central city population growth.

Improving City Public services as an Economic Development Strategy: Crime Reduction and Education Quality
The evidence shows that crime rates are strongly associated with population decline and that cities that have experienced a positive-turnaround have reduced their crime rates below those of shrinking cities. While we were unable to analyze data on the quality of education provided by the public school system, a substantial body of existing research links perceived poor school quality with decisions by families with children to move to the suburbs.

Conclusion

We conclude by returning to the question posed at the start of this chapter: Have the various development strategies worked in achieving urban regeneration, or at least in changing the development trajectory of central cities? The answer is a qualified yes.

Our key finding is that nothing supports central city population growth better than being in a fast-growing region with growing employment. In other words, economic opportunity promotes population growth. People and businesses are attracted to regional economies that provide economic opportunity. Regional growth in residential and business locations is then distributed across the region according to the value propositions offered by competing jurisdictions. The inter-regional competitive position of the region and of its central cities is hypothesized to depend in large part on the competitive position of its products and of its factors of production. The intraregional distribution of people and work then takes place as jurisdictions compete for regional market shares of population and business activity based on services provided, amenities, and cost.

At the heart of any central city's ability to retain population or not to shrink are two central propositions: Successful metropolitan areas have an economic purpose and through that purpose income and opportunity are generated, and successful central cities offer competitive residential services within the context of the broader regional economy. In other words, cities should cooperate with the metropolitan region on economic development but compete with other jurisdictions in the region on community development.

The ability of the region to reload its product portfolio and to overcome the challenges that economic age brings to both the built environment and the product portfolio is fundamental to its economic success. Buildings must be recycled, and the economy must promote flexibility, especially in the labor market.

In conclusion, while some population loss and economic hardship was probably all but inevitable for cities that were perilously positioned in 1960, continued decline is not inevitable, as shown by those cities that had a positive-turnaround after a period of decline. Our findings should be useful in helping to better understand both the forces that contributed to those turnarounds and the economic development strategies and activities that can promote similar turnarounds elsewhere.

Notes

1. The 2007 definitions of Metropolitan Statistical Areas (MSA) were used throughout. Naming conventions were in accordance to the Metropolitan Statistical Area designation of the U.S. Office of Management and Budget. Due to data limitations, the central cities of Puerto Rico were not included.

2. This set of selection criteria is similar to that used by Wolman et al. (2008).

3. We decided to begin this investigation in 1960 for three reasons. First, population patterns in 1950 were an aberration. Cities were extremely crowded, and the twenty-year hiatus in building caused by the Great Depression and World War II was just beginning to end in 1950. Second, the great social and technological innovations that allowed the suburbanization of population and industry in America were just being unleashed—the nationwide spread of limited- access highways, popularly priced and financed automobile consumption, and the acceptance of low- down- payment, de-clining- balance mortgages with the express purpose of promoting single-family home ownership—were just being unleashed. Third, 1960 predates three major political and legal events that changed the structure of urban America: the passage of the Civil Rights Act in 1964, the series of summer race riots that took place from 1964 to 1970, and the spread of busing to promote school desegregation outside of the American South during the early 1970s. White flight began in many cities with the escalation in racial tensions associated with the civil disturbances of the mid- to late-1960s and frequently accelerated with court-ordered busing and the integration of public schools.

4. The complete list of central cities and their assigned status are posted in a searchable database on the Levin College of Urban Affairs Web site: http://urban.csuohio.edu/research/. It is also available on the Web site of the George Washington Institute of Public Policy: http://www.gwu.edu/~gwipp/

5. The S-curve is derived from the product-cycle and incorporates the incubation, take-off, and maturation phases of the cycle. See Christensen (1992) and Skinner (1996).

6. This is a variation of the hypothesis posed by Benjamin Chinitz in his 1961 article, where he posited that industry organizational structure and market power of a region's dominant industries influences the path and composition of development.

7. Markusen (1985).

8. Cantwell (1995), pp. 155-174, and Vernon (1966, 1979), pp. 190-207, 255-267.

9. Hill and Brennan (2000), pp. 65-96.

10. Hill and Bier (1989), pp. 123-144

11. Baumol (1963, 1967) showed how residents who place a high value on city services may move as services are cut to match a declining tax base and others may move in response to higher tax payments for diminished service provision.

12. Beauregard (2006) and Hill and Brennan (2005), pp. 65-96

13. Push factors are at work on the regional level as well. Businesses can be attracted to locations with business-friendly operating environments. That is, those with low business taxes, responsive bureaucracies, cooperative labor-management relations systems, right-to-work legislation, and comparatively low operating costs (Blumenthal et al., 2009). Since the 1960s the U.S. population has also been showing signs of being attracted to metropolitan areas that are warmer in the winter.

14. This is a conclusion we reached in an earlier article (Hill, et al., 1995).

15. Reich (1991).

16. Hill and Wolman (1997), pp. 558-582.

17. The reservation wage is the lowest wage that a person is willing to accept to begin work.

18. Cortright (2002), pp. 3-16; Glaeser (2010); Florida (2002).

19. Hill and Lendel (2007), pp. 223-243.

20. Clarke and Gail (1998), and Glaeser (2010).

21. Porter (1995, 1997), pp. 55-71, 11-27.

22. Singer (2004).

23. Singer (2008).

24. Rusk (1995, 1999).

25. Berube and Kneebone (2008); Jargowsky (1997).

26. Collins and Margo (2004b); Massey and Denton (1993)

27. This is done by examining the size of the coefficient relative to the number of observations in the sample.

28. Cohen (1988).

29. Strictly speaking, the association between the two variables in the correlation analysis is not one of independence and dependence, because correlations determine only association—the degree to which the levels of the two variables move together. Despite this fact, the term dependent variable is used in the rest of the chapter as a shorthand way of identifying the percent change in central city population from 1960 to 2010, because that variable measures what is of interest in the public policy discussion about the viability of central cities. Similarly, we use the term independent variable to describe the variables in the left-most column of Table 2 because theory, observation, or policy intent identifies them as being part of a simultaneous set of social and economic forces that result in population change in central cities.

30. Critical values for levels of statistical significance are listed in Tables 2 and 3 rather than presented in the text.

31. The first year for which data are available by consistent metropolitan areas is 1980.

32. Collins and Margo (2004a, 2004b).

33. Wolman (2008), pp. 151-178.

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Appendix 1.

U.S. Bureau of the Census Regions and Divisions
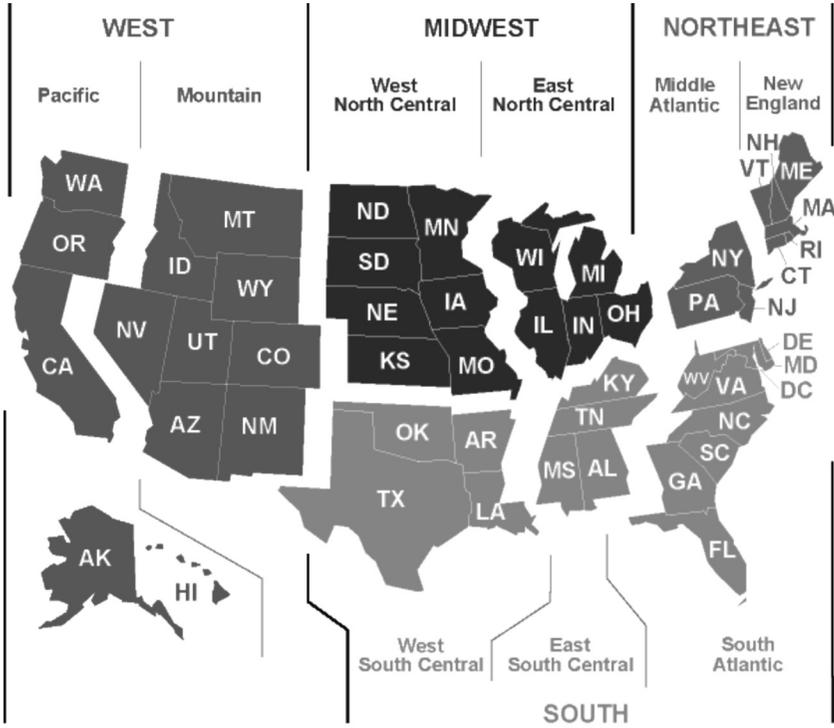
Source: U.S. Bureau of the Census

Appendix 2: Location Quotients for City Type by Census Division

The distribution of central cities in each of the nine Census Divisions by their population classification and the relevant Location Quotients (LQ) are displayed in Tables A-1 and A-2. The data in Table A-1 are sorted by Census Division and include the counts of central cities by type or subset; the population in 1960, 2000, and 2010; and the percent change in population from 1960 to 2000, 2000 to 2010, and 1960 to 2010. The data are rearranged in Table A-2 to make it easier to see whether the subsets of central cities are heavily concentrated in specific Census Divisions. The upper section of Table A-2 contains the data: counts of cities by type (or subset) and by Census Division, and the total population in each city type by Census Division. The percent distribution of each type of city and 2010 population by region are in the middle section of the table. This is the regional distribution of the counts of central cities and population for each city subset. The last section of Table A-2 displays the LQ for each division, reflecting the share of cities by type in each region. What does this data indicate about the geographic distribution of the various types of central cities?

The LQs are calculated by dividing a Census Division's share of the count of a particular subset of central cities by the same Census Division's share of all central cities in the nation. As an example, in the Middle Atlantic Division, the LQ for the number of shrinking cities is 2.90; 43.3 percent of the central cities in the region are shrinking, while shrinking cities constitute 14.9 percent of all major central cities in the nation. The LQ is calculated by dividing 43.3 percent by 14.9 percent, yielding an LQ of 2.90. The LQ indicates that the Middle Atlantic Division has 190 percent more shrinking central cities than expected if the composition, or percent distribution, of central cities in the region mirrored that of the nation as a whole. In terms of the number of central cities, the Middle Atlantic states could be thought of as specializing in shrinking cities and cities experiencing a positive-turnaround in population loss.

Similarly, the LQ for population among shrinking central cities in the Middle Atlantic Division is 0.89. The region's share of central city population living in shrinking cities is 11.2 percent, while the nation's share of the total central city population living in shrinking central cities is 12.6 percent. Therefore, the Middle Atlantic region has a smaller proportion of its central city residents living in shrinking central cities than expected compared with the percentage of central city residents living in shrinking central cities nationally. This means that the Middle Atlantic Division's central city population disproportionately lives in a different type of central city, and they do; they live in positive-turnaround cities.

Table A-1.

The Number of Central Cities and Their Population 1960, 2000, and 2010 by Census Division and Percent change from 2000 to 2010, and 1960 to 2010

Type of Central City	Number of Cities	Population			Percent Population Change		
		1960	2000	2010	1960 - 2000	2000 - 2010	1960 - 2010
United States							
Shrinking	59	16,966,942	12,255,618	11,116,367	-27.8%	-9.3%	-34.5%
Negative-turnaround	41	3,977,714	5,746,809	5,591,941	44.5%	-2.7%	40.6%
Growing	230	19,158,472	44,155,175	49,862,827	130.5%	12.9%	160.3%
Positive-turnaround	65	21,250,951	20,538,070	21,826,853	-3.4%	6.3%	2.7%
Total	395	61,354,079	82,695,672	88,397,988	34.8%	6.9%	44.1%
New England Division							
Shrinking	3	228,023	208,120	201,191	-8.7%	-3.3%	-12.1%
Negative-turnaround	4	242,795	330,306	326,244	36.0%	-1.2%	34.8%
Growing	7	376,254	525,968	546,983	39.8%	4.0%	43.8%
Positive-turnaround	14	2,306,654	2,047,066	2,120,183	-11.3%	3.6%	-7.7%
Total	28	3,153,726	3,111,460	3,194,601	-1.3%	2.7%	1.3%
Middle Atlantic Division							
Shrinking	13	2,433,486	1,523,656	1,436,217	-37.4%	-5.7%	-43.1%
Negative-turnaround	2	334,297	345,308	342,175	3.3%	-0.9%	2.4%
Growing	1	37,685	56,271	60,724	49.3%	7.9%	57.2%
Positive-turnaround	14	11,349,895	10,749,867	10,976,313	-5.3%	2.1%	-3.2%
Total	30	14,155,363	12,675,102	12,815,429	-10.5%	1.1%	-9.4%
East North Central Division							
Shrinking	22	9,782,110	7,108,720	6,369,293	-27.3%	-10.4%	-37.7%
Negative-turnaround	13	734,517	934,265	901,422	27.2%	-3.5%	23.7%
Growing	31	2,447,867	3,846,256	4,263,897	57.1%	10.9%	68.0%
Positive-turnaround	2	144,854	120,304	123,262	-16.9%	2.5%	-14.5%
Total	68	13,109,348	12,009,545	11,657,874	-8.4%	-2.9%	-11.3%
West North Central Division							
Shrinking	6	1,814,107	1,258,636	1,224,295	-30.6%	-2.7%	-33.3%
Negative-turnaround	1	56,606	57,686	57,637	1.9%	-0.1%	1.8%
Growing	16	1,342,519	2,068,189	2,299,755	54.1%	11.2%	65.2%
Positive-turnaround	4	883,678	836,594	867,473	-5.3%	3.7%	-1.6%
Total	27	4,096,910	4,221,105	4,449,160	3.0%	5.4%	8.4%
South Atlantic Division							
Shrinking	7	1,351,955	973,053	924,341	-28.0%	-5.0%	-33.0%
Negative-turnaround	7	393,066	810,602	792,893	106.2%	-2.2%	104.0%
Growing	45	2,228,462	6,396,226	7,599,169	187.0%	18.8%	205.8%
Positive-turnaround	13	2,757,776	2,601,227	2,765,087	-5.7%	6.3%	0.6%
Total	72	6,731,259	10,781,108	12,081,490	60.2%	12.1%	72.2%
East South Central Division							
Shrinking	2	543,666	441,735	407,348	-18.7%	-7.8%	-26.5%
Negative-turnaround	4	716,203	956,127	932,250	33.5%	-2.5%	31.0%
Growing	13	826,459	1,800,807	2,002,087	117.9%	11.2%	129.1%
Positive-turnaround	2	525,032	457,799	946,860	-12.8%	106.8%	94.0%
Total	21	2,611,360	3,656,468	4,288,545	40.0%	17.3%	57.3%
West South Central Division							
Shrinking	5	813,595	686,494	523,794	-15.6%	-23.7%	-39.3%
Negative-turnaround	3	470,094	648,279	640,300	37.9%	-1.2%	36.7%
Growing	36	4,766,900	10,042,174	11,420,814	110.7%	13.7%	124.4%
Positive-turnaround	7	690,007	807,285	866,499	17.0%	7.3%	24.3%
Total	51	6,740,596	12,184,232	13,451,407	80.8%	10.4%	91.2%
Mountain Division							
Growing	32	1,745,029	6,692,794	7,684,648	283.5%	14.8%	298.4%
Positive Turnaround	3	726,846	789,390	846,064	8.6%	7.2%	15.8%
Total	35	2,471,875	7,482,184	8,530,712	202.7%	14.0%	216.7%
Pacific Division							
Shrinking	1	0	55,204	29,888		-45.9%	-45.9%
Negative-turnaround	7	1,030,136	1,664,236	1,599,020	61.6%	-3.9%	57.6%
Growing	49	5,387,297	12,726,490	13,984,750	136.2%	9.9%	146.1%
Positive-turnaround	6	1,866,209	2,128,538	2,315,112	14.1%	8.8%	22.8%
Total	63	8,283,642	16,574,468	17,928,770	100.1%	8.2%	108.3%

Table A-2.

Distribution and the Location Quotients of the Number Central Cities and Population Living in Central Cities by Type and Census Division

	Number of Central Cities by Type					2010 Population by Type of Central City				
Census Division	Shrinking	Negative-turnaround	Growing	Positive turnaround	Total number of central cities	Shrinking	Negative-turnaround	Growing	Positive turnaround	Total central city population
Nation (total)	59	41	230	65	395	11116367	5,591,941	49862827	21826853	88,397,988
New England	3	4	7	14	28	201,191	326,244	546,983	2,120,183	3,194,601
Middle Atlantic	13	2	1	14	30	1,436,217	342,175	60,724	10976313	12,815,429
East North Central	22	13	31	2	68	6,369,293	901,422	4,263,897	123,262	11,657,874
West North Central	6	1	16	4	27	1,224,295	57,637	2,299,755	867,473	4,449,160
South Atlantic	7	7	45	13	72	924,341	792,893	7,599,169	2,765,087	12,081,490
East South Central	2	4	13	2	21	407,348	932,250	2,002,087	946,860	4,288,545
West South Central	5	3	36	7	51	523,794	640,300	11420814	866,499	13,451,407
Mountain			32	3	35			7,684,648	846,064	8,530,712
Pacific	1	7	49	6	63	29,888	1,599,020	13984750	2,315,112	17,928,770

	Percent Distribution of Central Cities by Type by Division					Percent Distribution of 2010 Population by Type of Central City				
Census Division	Shrinking	Negative-turnaround	Growing	Positive turnaround	Percent of US central cities	Shrinking	Negative-turnaround	Growing	Positive turnaround	Percent US central city population
Nation (total)	14.9%	10.4%	58.2%	16.5%	100.0%	12.6%	6.3%	56.4%	24.7%	100.0%
New England	10.7%	14.3%	25.0%	50.0%	7.1%	6.3%	10.2%	17.1%	66.4%	3.6%
Middle Atlantic	43.3%	6.7%	3.3%	46.7%	7.6%	11.2%	2.7%	0.5%	85.6%	14.5%
East North Central	32.4%	19.1%	45.6%	2.9%	17.2%	54.6%	7.7%	36.6%	1.1%	13.2%
West North Central	22.2%	3.7%	59.3%	14.8%	6.8%	27.5%	1.3%	51.7%	19.5%	5.0%
South Atlantic	9.7%	9.7%	62.5%	18.1%	18.2%	7.7%	6.6%	62.9%	22.9%	13.7%
East South Central	9.5%	19.0%	61.9%	9.5%	5.3%	9.5%	21.7%	46.7%	22.1%	4.9%
West South Central	9.8%	5.9%	70.6%	13.7%	12.9%	3.9%	4.8%	84.9%	6.4%	15.2%
Mountain	0.0%	0.0%	91.4%	8.6%	8.9%			90.1%	9.9%	9.7%
Pacific	1.6%	11.1%	77.8%	9.5%	15.9%	0.2%	8.9%	78.0%	12.9%	20.3%

	Location Quotient: Number of Central Cities by Type					Location Quotient: Population by Type of Central City				
Census Division	Shrinking	Negative-turnaround	Growing	Positive turnaround		Shrinking	Negative-turnaround	Growing	Positive turnaround	Percent US central city population
Nation (total)	0.72	**1.38**	0.43	**3.04**		0.50	**1.61**	0.30	**2.69**	
New England	**2.90**	0.64	0.06	**2.84**		0.89	0.42	0.01	**3.47**	
Middle Atlantic	**2.17**	**1.84**	0.78	0.18		**4.34**	**1.22**	0.65	0.04	
East North Central	**1.49**	0.36	*1.02*	0.90		**2.19**	0.20	0.92	0.79	
West North Central	0.65	0.94	*1.07*	*1.10*		0.61	*1.04*	*1.12*	0.93	
South Atlantic	0.64	**1.84**	*1.06*	0.58		0.76	**3.44**	0.83	0.89	
East South Central	0.66	0.57	**1.21**	0.83		0.31	0.75	**1.51**	0.26	
West South Central			**1.57**	0.52				**1.60**	0.40	
Mountain	0.11	*1.07*	**1.34**	0.58		0.01	**1.41**	**1.38**	0.52	
Pacific	1.6%	11.1%	77.8%	9.5%		0.2%	8.9%	78.0%	12.9%	

Notes:

Bold type indicates the LQ is greater than 1.20, meaning that the number of cities or population is at least 20% larger than expected based on the Division's proportionate share of population or the number of cities.

Italics type indicates that the LQ is between 1.00 and 1.20, meaning the number of cities or population in the category is above its proportionate share but less than 20 percent greater.

Appendix 3.

Multivariate Model of Central City Population Change from 1960 to 2010			
Dependent variable			
Percent change in central city population from 1960 to 2010			
Independent Variables	Coefficient	Significance Level	Standard Error
Percent change in MSA employment from 1970 to 2007	0.98	**	0.39
Average July temperature	8.70		8.11
Percentage of MSA population that is Hispanic in 2000	3.13		2.72
Right-to-work state in 1960	19.51		101.34
Annexation: percent change in land area 1990-2000	0.31		0.53
Percentage of MSA population age 25+ with bachelor's degree or higher in 2000	-0.36		7.09
Percentage of central city families with in-comes below $3,000 in 1960	-1.83		6.17
Number of Universities in MSA that are high or very high in research activity	36.09	*	21.74
Percent change in MSA GDP per capita from 1980 to 2000	0.02		1.59
Intensity of central city civil disturbances from 1964 to 1971	684.91		736.59
Percentage of central city population that was African-American in 1960	-1.58		4.70
Percentage of MSA jobs in the manufacturing sector in 2000	0.46		7.33
City age	0.77		1.09
Percentage of employed central city resi-dents working in manufacturing in 1960	-2.54		3.77
Central city robberies per 100,000 residents in 1992	-0.36	**	0.16
Central city population density in 1980	-20.47	*	12.06
Percentage of MSA jobs in health care sector in 2000	-30.73	**	13.40
Number of observations	357		
R2	0.18		

Notes:

Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Variables are defined in Tables 2 and 3.

Appendix 4: Within-Region Correlations

There were interesting regional variations in the pattern of associations, each of which provides insights on economic development strategies. The strongest correlates of central city population growth from five of the Census Divisions are presented below. We included all that were statistically significant at the 0.95 percent confidence interval.

Northeast Region

New England	Correlation Coefficient
Percent change in MSA GDP per capita from 1980 to 2000[2]	0.376
Percentage of MSA population age 25+ with bachelor's degree or higher in 2000	0.356
Percentage of central city families with incomes below $3,000 in 1960	-0.365
Central city robberies per 100,000 residents in 1992	-0.367
Percentage of MSA jobs in health care sector in 2000	-0.406
Central city population density in 1980	-0.512
Number of central cities: 28	
Middle Atlantic	
Percentage of MSA population that is Hispanic in 2000	0.685
Percentage of central city population that is Hispanic in 1970	0.654
Percent change in MSA population from 1980 to 2000[1]	0.620
Average July temperature	0.595
Number of central cities: 30	

Midwest Region

East North Central	Correlation Coefficient
Percent change in MSA population from 1980 to 2000[1]	0.496
Percent change in MSA GDP per capita from 1980 to 2000[2]	0.453
Percent change in MSA employment from 1970 to 2007[2]	0.434
Annexation: percent change in land area from 1990 to 2000	0.426
Percentage of central city population age 25+ with 4 or more years of college in 1960	0.377
Average July temperature	0.320
Percentage of MSA population age 25+ with bachelor's degree or higher in 2000	0.308
Percentage of central city populaiton that was foreign born in 1970	-0.218
Intensity of central city civil disturbances deom 1964 to 1971	-0.270
Central city population density in 1980[3]	-0.382
Percentage of MSA jobs in health care sector in 2000	-0.383
Percentage of central city families with incomes below $3,000 in 1960	-0.483
Central city robberies per 100,000 residents in 1992	-0.505
Percentage of central city population that was African-American in 1960	-0.527
Number of central cities: 68	

West North Central	Correlation Coefficient
Percent change in MSA employment from 1970 to 2007[2]	0.778
Percent city population (25+) with 4 or more years of college 1960	0.705
Percent change in MSA population from 1980 to 2000[1]	0.541
Percent MSA population (25+) with bachelor's degree or higher 2000	0.521
Annexation: percent change in land area from 1990 to 2000	0.484
Percentage of central city populaiton that was African-American in 1960	-0.385
Central city robberies per 100,000 residents in 1992	-0.491
Percent employed city residents working in manufacturing 1960	-0.635
City age[5]	-0.710
Number of central cities: 27	

South Region

South Atlantic	Correlation Coefficient
Percent change in MSA GDP per capita from 1980 to 2000[2]	-0.203
Percentage of employed central city residents working in manufacturing in 1960	-0.241
Central city population density in 1980[3]	-0.264
Central city robberies per 100,000 residents in 1992	-0.285
Percentage of central city population that was African-American in 1960	-0.363
Number of central cities: 72	
East South Central	
Percentage of MSA population that is Hispanic in 2000	0.764
Percent change in MSA population from 1980 to 2000[1]	0.616
Percentage of central city families with incomes below $3,000 in 1960	0.450
Central city robberies per 100,000 residents in 1992	-0.416
Average July temperature	-0.418
Central city population density in 1980[3]	-0.526
Right-to-work state in 1960	-0.646
Number of central cities: 21	
West South Central	
Number of Universities in MSA that are high or very high in research activity[4]	0.392
Percent change in MSA population from 1980 to 2000[1]	0.293
Percentage of MSA population age 25+ with bachelor's degree or higher in 2000	0.273
Percentage of employed central city residents working in manufacturing in 1960	0.235
Central city robberies per 100,000 residents in 1992	-0.256
Number of central cities: 51	

West Region

Mountain	Correlation Coefficient
Percent change in MSA employment from 1970 to 2007[2]	0.654
Percent change in MSA population from 1980 to 2000[1]	0.649
Average July temperature	0.644
Right-to-work state in 1960	0.379
Percentage of MSA jobs in health care sector in 2000	-0.369
Central city population density in 1980[3]	-0.468
Number of central cities: 28	
Pacific	
Percentage of central city population that was African-American in 1960	-0.219
Central city robberies per 100,000 residents in 1992	-0.264
Number of central cities: 63	

Notes:

1. A common Metropolitan Statistical Area (MSA) definition was used for all years based on the 2003 MSA definitions of the U.S. Office of Management and Budget. Data were provided by the Building Resilient Regions Network.

2. Data obtained from Moody's Analytics' Economy.com data service. MSAs were based on 2003 definitions and were constructed from Economy.com's county data files.

3. Population density: City data are primarily from 1980; 1990 data were substituted for 12 central cities where 1980 data were unavailable. Two cities were omitted because 1980 and 1990 data were unavailable.

4. Research university: Number of universities in the MSA classified by the Carnegie Foundation as having either "high" or "very high" research activity.

5. City age: Number of years from the Census decade in which the central city reached a population of 50,000 to 2010.

Case Study: Pittsburgh Goes High Tech

Sabina Deitrick, University of Pittsburgh

In August 2009, the White House announced Pittsburgh as the site for the next G20 meeting. For many, the Steel City was an odd choice, but the selection was not based on the smokestack view of Pittsburgh. A new picture of Pittsburgh had taken shape. In the twenty-five years since the steel industry had collapsed, the Rust Belt relic revealed impressive gains in advanced technology, health care, life sciences, education, financial services, green building, and, indeed, manufacturing, now of specialized production with tightly linked services and engineering. Pittsburgh's revitalization in the face of economic restructuring was the appeal of its location.

The Pittsburgh case provides an interesting comparison to Youngstown and Cleveland in understanding shrinking cities. It suggests a stock but probably accurate rhetorical question: Is the glass half-empty or half-full? Is Pittsburgh a model of a resilient city in the Rust Belt? Is Pittsburgh distinguished from other shrinking cities? And what can be learned about the changes taking place?

Pittsburgh stands with Cleveland and Youngstown on a number of indicators, starting at or near the top on the defining measure of shrinking cities—population loss. The number of residents today is less than half what it was in the city's peak period in the middle of the twentieth century, with another expected decline, though slower, with the 2010 population figures. The city's population was once 45 percent of the central county population (Allegheny County), down to 25 percent today, in a county that has also lost population over half a century.

Pittsburgh's decline preceded that of other industrial places. By the middle of the twentieth century, regional analysts already recognized the difference in population change in the Pittsburgh region compared to that in other cities in the country: "Pittsburgh's sluggish population growth stands out as almost unique among metropolitan areas."[1]

The built environment and urban landscape mirror the image of the shrinking city. Slow growth for the first half of the twentieth century, coupled

with depopulation over the latter half, means that Pittsburgh's housing stock is, on average, nearly a century old. Depopulation and aged housing have resulted in surplus land and buildings. A fifth of the city's taxable parcels, or over 25,000 parcels, were tax-delinquent in 2009, with delinquency in some neighborhoods at or above 50 percent. Eleven percent of residential properties were vacant or estimated to be vacant in 2009, with some neighborhoods experiencing over 20 percent vacancy rates. Impacts extend further. Since just 2005, twenty-two schools have been shuttered by the city's school district.

Largely African-American neighborhoods in what is still a racially segregated city have the oldest housing and highest levels of abandonment, conditions also mirrored in nearby former mills towns. The post-World War II pace toward "smaller, poorer, older populations dramatically quickened" in working-class communities and neighborhoods with the steel shutdowns of the 1980s.[2] Twenty-five years later, many of these neighborhoods have become even smaller, poorer, and older. Many have relatively high concentrations of elderly residents and little turnover of housing units, contributing to neighborhood housing falling further into decline. The problem is particularly acute in some African-American neighborhoods, where residents over sixty-five years old make up a third or more of the neighborhood population, property vacancy tops 40 percent, and owners have little prospect of marketing their properties.

There has been a fiscal toll from decline, as well. In 2003, Pittsburgh became an Act 47 community under the state's Financially Distressed Municipalities Act, one of twenty communities under a state oversight committee. The city remains in fiscal distress and faces a pension crisis. The current mayor has sought revenue from new sources—most recently proposing to tax college students and to sell parking garage assets. Though neither found support from city council, the city has yet to solve its fiscal woes, along with other older industrial cities in the state.

Another side of Pittsburgh, however, makes the glass half-full. Typically, population change and employment change are highly correlated, as in Pittsburgh's steel days, "[i]t [w]as no surprise that in jobs as well as in people Pittsburgh lagged behind the country and behind other large metropolitan areas."[3] In the twenty-first century, Pittsburgh strays from its former self. Not that employment growth in Pittsburgh surpassed the U.S. average over decades, but in recent years, the markers of downturn have not hit as hard in Pittsburgh as other places. Decades of economic restructuring place the region is a different position from that of many older industrial regions.

First, the number of jobs in the Pittsburgh region, although down slightly from 2000, at 1.1 million, is greater today than at any point during its heyday as an industrial center. Over the 2000s, the manufacturing sector has declined by one-third, to approximately 85,000 workers in 2010, representing just 8.4 percent of the regional economy (and the fewest number of manufacturing workers

since 1880). Because the economy is less concentrated in manufacturing, unlike most previous downturns, Pittsburgh's unemployment rate fell below the nation's. Nonetheless, not surprisingly over this recent recession, virtually no major manufacturing sector gained in employment over the 2000s. Most sectors employed fewer workers before the recession began in 2006 than in 1990, with an exception of the computer and electronics sector, which gained 9.2 percent workers between 1990 and 2006, a sector closely linked to the region's educational institutions and research base.

These totals, however, tend to understate the importance of manufacturing in the region, as knowledge and skill sets extend to technology-based clusters. For instance, the Steel Technology Cluster, comprising steel suppliers, research and educational institutions, equipment makers, machinery repair, engineering, raw materials, and support organizations, employs more workers than does the primary metals sector in the region; while Pittsburgh lost much of its steelmaking capacity, it has retained and expanded its steelmaking expertise.[4]

The city of Pittsburgh has also retained its share of the region's workers. Though the city's population made up just 13 percent of the region's population, the nearly 320,000 workers in the city represented almost 31 percent of total regional employment in 2001.[5] Despite shrinking city population loss, the city has retained its working population over the decades.

Women's labor force participation today is at or above U.S. average rates, except for the oldest working age cohort, another important post-industrial shift. In the region's steel days, women in Pittsburgh, whether white or black, exhibited significantly lower rates of labor force participation compared to other urban areas and put overall labor force participation at the bottom in the country.[6] Today, women make up nearly half the region's workers, marking one of the most significant changes in the post-steel era.

Finally, education has played a central role in the region's resilience. The education sector is vitally important to the regional economy, and higher-education institutions serve important anchor roles in the region. Students add to the fabric of the city and the employment base. More important, the level of educational attainment among young workers today in the Pittsburgh region marks a stark contrast to its steel days. In 2009, in the Pittsburgh region, workers between the ages of twenty-five and thirty-four were among the most educated in the country, with 48.1 percent with a bachelor's degree or higher, compared to the U.S. average of 34.7 percent for the cohort. Nearly 22 percent had a graduate or post-baccalaureate professional degree, also among the top percentage in the nation. Today's young workers are well-educated for the demands of a more diversified economy than former cohorts.

The regional economy has been buoyed by employment growth in the education sector, and, along with health services, employed nearly 233,000 workers

in 2009, marking an increase of 17.6 percent since 2000. Other sectors add-
ing employment over the recent decade include professional and business services
and leisure and hospitality activities. Along with financial services, the Pittsburgh
economy today reflects national and global growth.

In 2004, Governing magazine categorized the city's fiscal distress, coupled
with its economic vitality, as "the Pittsburgh Paradox."[7] In 2011, the paradox
stubbornly persists. Nonetheless, the half-full glass shows a place of remarkable
resilience in the face of regional restructuring. Though Pittsburgh retains many of
the challenges facing shrinking cities, its revitalization in the post-steel era and its
economic success in recent years mean that rebuilding regional economies, though
difficult and prolonged, is critical in regenerating shrinking cities as vibrant and
attractive urban centers.

Notes

1. Hoover (1963), pg. 2.
2. Lubove (1996), pg. 10.
3. Hoover, (1963), pg. 2.
4. Treado (2008).
5. U.S. Department of Housing and Urban Development (2005).
6. Hoover (1963).
7. Sostek (2004).

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