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# The Shared Fortunes of Cities and Suburbs

*By Jordan Rappaport*

For more than 50 years, suburbs throughout the United States have prospered, while many of the large cities they surround have stagnated. Hence, many people perceive that cities and suburbs tend to grow at each other's expense—and thus compete for residents and jobs.

While there is some truth in this perception, it misses the fact that a metro area's cities and suburbs also depend on each other for economic growth. Cities and their suburbs share a multitude of resources, such as airports, highways, mass transit, cultural amenities, entertainment venues, air quality, potential employers, and many more. These shared resources may be even more important than the differences between cities and suburbs in determining where people live and jobs locate.

This article examines the main forces that have influenced the growth of cities and suburbs over the past century. The article finds that, while cities and suburbs do sometimes grow at each other's expense, more often they grow or decline together. Thus, while it may make sense for cities and their suburbs to compete along some dimensions, there are also strong incentives for the two to cooperate to make their metro areas attractive and productive places to live and work.

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The first section reviews the shift of the U.S. population from cities to suburbs. This suburbanization arose for several reasons, the most important of which was the automobile. But even as suburban growth outpaced city growth, other population shifts were making some metro areas grow much faster than others. The second section describes the diverse growth trends among metro areas and discusses some of the reasons underlying this uneven growth. The third section shows how metro-area growth has tended to be a stronger force than suburbanization in determining the growth of both cities and suburbs. The fourth section argues that the resulting shared fortunes of a metro area's cities and suburbs gives local governments a strong incentive to cooperate in providing some public goods.

## I. SUBURBANIZATION

Throughout the United States during most of the 20th century, suburbs grew much faster than the cities they surrounded.<sup>1</sup> The main underlying cause was the introduction and spread of the automobile, along with huge federal outlays on highway construction. Other important factors included rapid population growth, large increases in wealth, and federal government policies that subsidized home ownership. In addition, the exodus of residents from some cities caused living conditions there to deteriorate, reinforcing the more fundamental forces driving suburbanization.

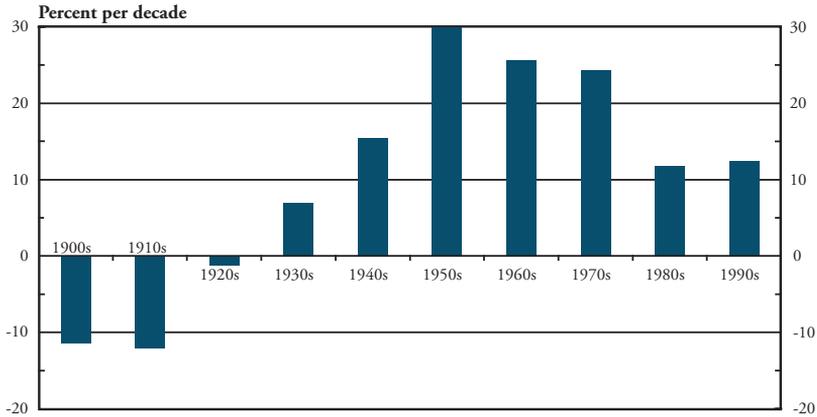
National statistics did not distinguish between cities and suburbs until mid-century, making it difficult to analyze suburbanization prior to 1950. To do so, it is helpful to define metro areas based on "large" cities—in other words, those with high populations—at each decennial census. The combination of a large city along with the counties that surround it can be considered a metro area. And the portion of this metro area outside the large city can be considered suburban. (The appendix describes this metro area definition in more detail.)

Although suburbanization is often regarded as a post-World War II phenomenon, it actually began during the 1920s. For each of the two decades prior to that, growth rates of the suburban portions of metro areas lagged growth rates of the city portions by a wide margin (Chart 1). Then, in the 1920s, the median difference between suburban and

Chart 1

## SUBURBANIZATION BY DECADE

(median suburb minus city growth rate)



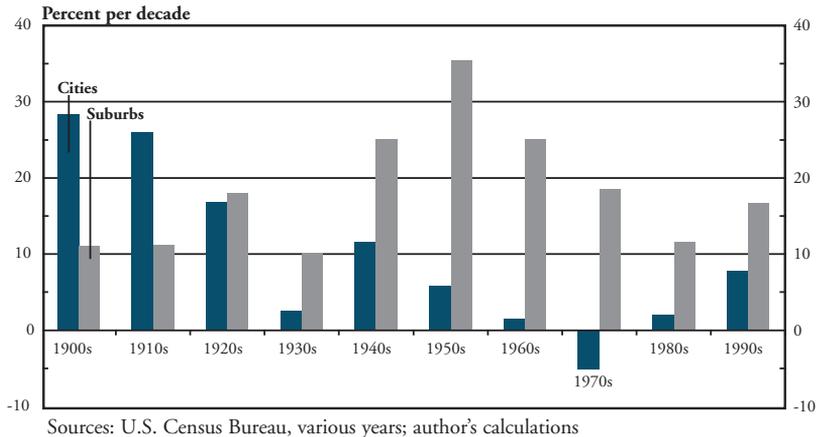
Sources: U.S. Census Bureau, various years; author's calculations

city growth rates fell to almost zero. Suburban growth first exceeded city growth in the 1930s. By the 1950s, the median difference between the two had risen to 30 percentage points. More recently, the pace of suburbanization has slowed to just above 10 percentage points per decade.

There is certainly some truth in the perception that suburbs have tended to grow at the expense of cities. Specifically, as suburban growth accelerated, city growth slowed (Chart 2). Median population growth of the city portions of metro areas fell from 28 percent per decade at the start of the century to 6 percent during the 1950s. Over the same period, median growth of the suburbs rose from 11 percent per decade to 35 percent. Thereafter, median city growth continued to deteriorate and, by the 1970s, more than half of large cities were suffering actual population declines. In contrast, suburban growth stayed relatively strong through the end of the century.

For many cities, population declines were severe. Between 1950 and 1980, St. Louis lost almost half its population. Buffalo, Pittsburgh, Cleveland, Providence, and Detroit each lost more than one-third. Abandoned city blocks fell into disrepair and, in many cases, became centers of drug use and other criminal activity. In sharp contrast, vigorous suburban growth was transforming vast swathes of agricultural and undeveloped land into subdivisions and shopping centers.

Chart 2  
MEDIAN POPULATION GROWTH BY DECADE



The automobile made possible this relative shift of population from cities to suburbs. Before the automobile, people had to live within walking distance of their workplace, or else within walking distance of a commuter rail or streetcar line within walking distance of their workplace. Similarly, they needed to live close to local schools, doctors, merchants, as well as friends and family. Densely settled cities solved this locational need. Radiating from such cities, modestly sized villages clustered around the stations of commuter rail lines.

The automobile relaxed these constraints. Suddenly, it became possible to live considerably farther from work. So, people began migrating outward from large cities, drawn by much lower housing prices. Settlement patterns within suburban neighborhoods were considerably more geographically dispersed than in cities, since it was now possible to drive to local sources of commerce and social interaction.

At first, the paucity of highways connecting suburbs to cities sharply limited this outward expansion. By the early 1930s, suburban commuters were already confronting daily traffic jams (Caro). A 1946 article in *Fortune* complained,

Everyone who drives into New York City knows what to expect. Morning and afternoon, cars from New Jersey, Westchester, and Long Island choke up some \$325 million worth of six-lane parkways and expressways that have been hailed as the world's finest...The struggle against too much traffic is very much the same in every other big U.S. city today.

But, in 1956, Congress authorized the construction of the interstate highway system. Approximately half of the expenditures were to be on highway segments connecting points within metro areas.<sup>2</sup> To ensure long-term funding of the interstate project, Congress established a trust fund to receive the proceeds of a number of motor-vehicle-related excise taxes, including those on gasoline and diesel fuel.

In addition to the automobile and federally-funded highway construction, three other broad-based forces contributed to suburbanization. First was rapid population growth. Massive international immigration, the movement of workers from farms to cities, and the baby boom combined to swell metro populations. To accommodate so many people, the geographic size of metro areas simply had to expand.

Second was Americans' increasing wealth. U.S. real per capita income rose more than sixfold during the century (Maddison). As people became wealthier, they naturally desired larger houses. The more affordable places to find these houses were in the suburbs (Margo).

Third was a federal government policy that encouraged homeownership. Examples include the GI Bill and the mortgage-interest tax deduction (Voith 1999). Owning rather than renting a home tends to favor stand-alone houses over multiple-unit dwellings (Glaeser and Shapiro). Owners of stand-alone houses have considerable freedom to maintain them as they choose. But owners of homes in multiple-unit dwellings must coordinate with neighbors on maintenance and numerous other issues. Stand-alone houses usually require much more land per unit than do multiple-unit dwellings. Hence the cost savings of building in the suburbs instead of the city tends to be larger for stand-alone houses.<sup>3</sup>

The automobile, federally funded highway construction, and the three additional suburbanization forces just described were all broad based in the sense that they mostly did not depend on local conditions. For example, Americans' rising wealth was driven primarily by technological progress rather than by the fortunes of any specific city or region. A more local force that contributed to suburbanization was the deterioration of living conditions in many specific cities that resulted from their large population declines. Such population declines and the eventual employment losses that accompanied them eroded city tax bases, thereby forcing cutbacks in city services. Moreover, the people who

chose to live in the suburbs tended to have higher income and education than those who chose to live in cities (Glaeser, Kahn, and Rappaport). The resulting geographic clustering of low-income, low-education individuals greatly contributed to rising city crime rates and failing city public schools (Glaeser, Sacerdote, and Scheinkman; Wilson). Service cutbacks, rising crime, and failing schools, in turn, drove more people to flee to the suburbs.

## II. DIVERSE GROWTH TRENDS ACROSS METROPOLITAN AREAS

Notwithstanding the powerful forces driving suburbanization, a number of cities were able to grow continually throughout the 20th century. They did so due to the especially vigorous growth of their metro areas. Long-run metro growth rates varied widely. Some metro areas boomed decade after decade, but others continually struggled. Underlying this diverse pattern of growth were several forces, including the high and increasing mobility of individuals and firms, the changing industrial structure of U.S. employment, the introduction and spread of air conditioning, and the increasing value of nice weather and other local amenities.

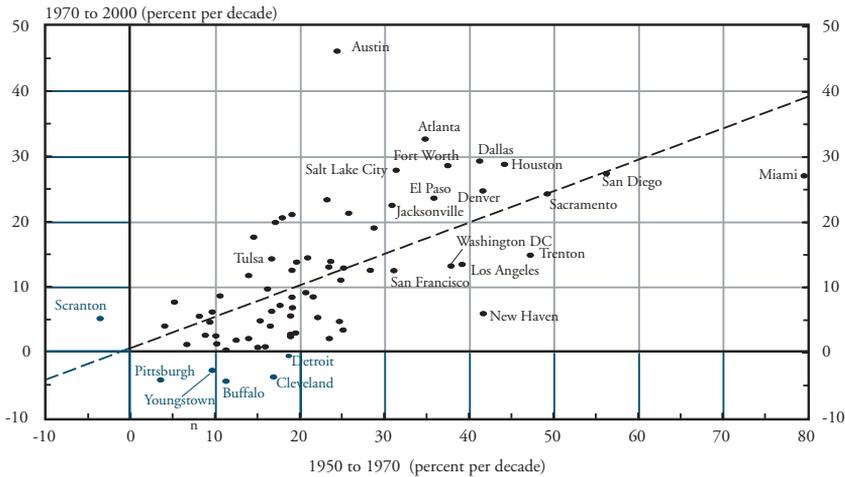
Chart 3 shows the uneven growth among metro areas during the second half of the century. Each point represents a different metro area. The horizontal axis measures average per decade growth from 1950 to 1970. The vertical axis measures the same from 1970 to 2000. The dashed line shows the best-fit statistical relationship between growth in the two periods.<sup>4</sup>

One key feature of the growth rates is the wide range. Growth per decade during the earlier period ranged from -4 percent in Scranton to 80 percent in Miami (versus median metro growth of 19 percent and total U.S. growth of 16 percent). In the latter period, growth per decade ranged from -4 percent in Buffalo to 46 percent in Austin (versus median metro growth of 9 percent and total U.S. growth of 11 percent).

A second key feature of the growth rates is their high persistence over time, which is captured by the positive slope of the dashed line. The faster a metro area grew during the first two decades, the faster it

Chart 3

## METRO AREA GROWTH RATES, 1950 TO 2000



Note: Blue type indicates metro areas with negative growth from 1950 to 1970 or from 1970 to 2000.

Sources: U.S. Census Bureau, various years; author's calculations

tended to grow during the latter three. So, for example, the growth rates of Scranton and Buffalo were well below average in both periods. Miami and Austin were well above average in both periods. Of course, there are certainly examples of metro areas that grew substantially faster than average during one period and substantially slower than average during the other. But such “reversals of fortune” were the exception rather than the rule.

While many factors contributed to the much faster growth of some metro areas than others, four forces stand out. First was the very *high mobility* of U.S. residents. Without a willingness by people to move to improve their welfare, differences in metro growth rates would essentially be limited to differences in birth and death rates. As early as 1834, Alexis de Tocqueville observed,

In the United States a man builds a house in which to spend his old age, and sells it before the roof is on; he plants a garden and lets it just as the trees are coming into bearing; he brings a field into tillage and leaves other men to gather the crops; he settles in a place, which he soon afterward leaves to carry his changeable longings elsewhere (Long, pp. 23-24).

Such mobility remained the norm in the 20th century. In 1900, more than one-fifth of U.S. born residents were living in a different state from where they were born. By 2000, almost one-third were doing so. During the second half of the century, about 3 percent of people per year moved to a different state (Long; U.S. Census Bureau Current Population Survey).<sup>5</sup>

As the century progressed, rapidly improving transportation and telecommunications technologies increased mobility by dramatically lowering the costs of long-distance moves. Just as the automobile made it easier to live far from work, it also made it easier to live far from where one grew up and still visit regularly. The airplane made visits possible over much longer distances. The telephone and eventually the Internet made it possible to stay in close contact between visits.

For firms, new transportation and telecommunications technologies cut the cost of coordinating activities across distances. Hence firms increasingly could take advantage of varying local conditions to site different operations where they would be most profitable. In particular, firms could expand in metro areas where workers wanted to live.

A second force underpinning the diverse growth trends of metro areas was the changing *industrial composition* of U.S. employment. Specifically, employment in some metro areas was concentrated in one or just a few industries. When such industries boomed or stagnated, their metro areas often did so as well. For example, rapidly increasing U.S. employment in high-tech fields has helped drive population growth in the Austin and San Jose metro areas. And, collapsing employment by integrated steel mills greatly contributed to the falling populations in the Pittsburgh, Cleveland, and Youngstown metro areas.

A third force driving uneven metro growth was air conditioning. Many of the “Sunbelt” metro areas in the South and Southwest grew rapidly throughout the second half of the century despite extremely hot summers. The July maximum daily heat index—a discomfort measure that combines heat and humidity—averages at least 115 degrees in Orlando, Houston, Austin, and San Antonio (Rappaport, 2004b). Air conditioning in the summers, coupled with mild weather in the winters, made living in such metro areas more popular.<sup>6</sup>

The draw of nice average weather exemplifies the fourth force that contributed to uneven metro-area growth: the increasing importance of *local amenities* in determining where people chose to live. Local amenities are characteristics of a place that people can enjoy simply by living there. In addition to nice weather, some other natural local amenities include nearby beaches, national parks, and mountains. Some other local amenities determined by history and planning rather than by nature include zoos, museums, performing arts, and sports teams.

Local amenities became increasingly important because of Americans' rapidly rising wealth. Just as such wealth fueled people's desire to live in larger houses, it also lured them to move to places with more amenities. For example, recent research estimates that the average amount a person would be willing to pay to live in a place with the climate of San Francisco, instead of Chicago, increased more than five-fold from 1970 to 1990 (Costa and Kahn).<sup>7</sup> Another reason for the increased importance of local amenities was the growing number of financially secure, healthy retirees. Since such retirees do not have to consider local job opportunities, they are especially likely to choose to live where amenities are high.<sup>8</sup>

Numerous other forces doubtlessly contributed to the diverse growth trends of metro areas. What is most important for this article is that such forces, like those just discussed, make entire metro areas more or less attractive places for people to live and for firms to locate.

### III. THE TENDENCY OF CITIES AND THEIR SUBURBS TO GROW TOGETHER

The forces underlying suburbanization and the forces driving varied metro growth have both exerted important influences on city and suburban growth. To be sure, the suburbanization forces caused much faster average growth by suburbs than by cities. But analysis of the interaction of the two sets of forces shows that the metrowide forces overwhelmed the suburbanization forces, causing cities and their suburbs to grow together rather than at each other's expense. In addition, the growth rates of both cities and their suburbs depended much more on metrowide forces than on suburbanization forces.

Chart 4 shows the city and suburban growth rates that resulted from the combination of suburbanization and metrowide forces. Each point represents a different metro area. The horizontal axis measures average per-decade growth from 1970 to 2000 for the city portion of each metro area. The vertical axis does the same for the suburban portion of each metro area. The dashed line shows the best-fit statistical relationship between the city and suburban growth rates.<sup>9</sup>

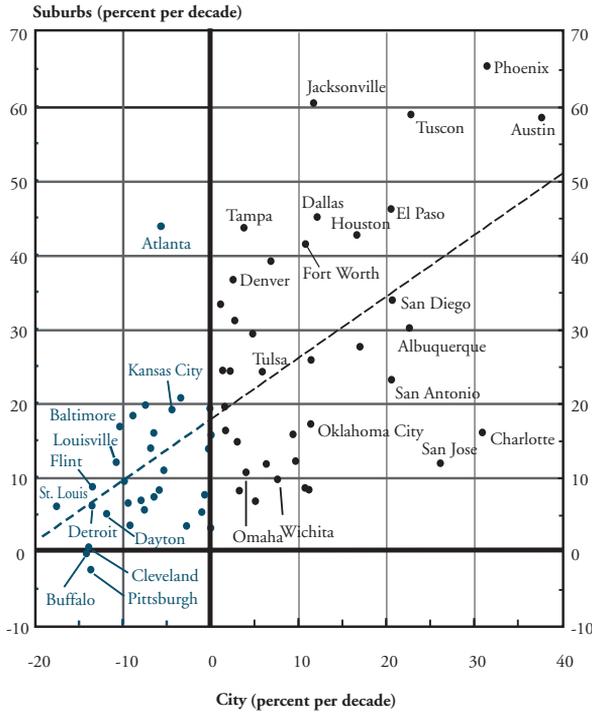
On their own, the suburbanization forces definitely caused suburbs to grow at the expense of cities. After all, the suburbanization forces were increasing the attractiveness of suburbs compared with cities. The resulting faster average growth by suburbs is reflected in the height of the dashed line in Chart 4. On average, suburban growth exceeded city growth by 18 percentage points per decade. Charts 1 and 2 showed similarly large average gaps between city and suburban growth. Note that the suburbanization forces were sufficiently strong that in only four metro areas—Charlotte, San Jose, Norfolk, and Corpus Christi—did city growth exceed suburban growth. The resulting divergence of city and suburban fortunes is especially evident for the 30 metro areas on the left side of the chart, whose cities experienced population declines. In only two of these metro areas—Pittsburgh and Buffalo—did the suburban population also contract. On the contrary, suburban growth averaged more than 10 percent per decade in 12 of these metros. The starkest contrast was in Atlanta, whose city portion shrank an average 6 percent per decade but whose suburban portion grew an average 44 percent per decade.

While the suburbanization forces were primary in determining the average difference between city and suburban growth rates, the metrowide forces proved to be primary in determining the distribution of city and suburban growth rates across metro areas. To see this, suppose there were no metrowide forces, so that all metro areas grew at the same rate. Faster growth by the suburbs of a metro area always would be associated with slower growth by its city portion. Hence the correlation between city and suburban growth would always be negative.

In fact, the correlation between city and suburban growth was strongly positive. This correlation is captured by the positive slope of the dashed line in the chart. The faster a metro area's city portion grew, the faster its suburbs tended to grow as well. The faster a metro area's city portion lost population, the slower its suburbs tended to grow. In

Chart 4

CITY AND SUBURBAN POPULATION GROWTH, 1970 TO 2000



Note: Blue type designates metro areas whose city or suburban portion experienced negative growth.

Sources: U.S. Census Bureau, various years; author's calculations

other words, cities and their suburbs tended to grow or decline together. For example, Austin and Phoenix each had city and suburban growth rates that were well above average. On the other hand, St. Louis and Pittsburgh each had city and suburban growth rates that were well below average.<sup>10</sup> This shared fortune of cities and suburbs held continuously throughout the 20th century.<sup>11</sup>

The positive correlation between city and suburban growth is extremely robust. It holds even after statistically controlling for numerous metro attributes. For example, city and suburban growth is positively correlated among metro areas in the same region of the country, among metro areas with similar industry compositions, and among those with similar weather. Indeed, the positive correlation between city and suburban growth remains even after statistically controlling for geographic region, industry structure, and weather simultaneously.<sup>12</sup>

The tendency of cities and suburbs to grow together, however, does not necessarily mean that high growth by one caused high growth of the other. For example, it certainly might be the case that vigorous city population growth tended to spill over into suburbs. Or vigorous city population growth might have made an entire metro area a more attractive place to live and thereby caused high population growth in its surrounding suburbs. Some preliminary evidence suggests that such a causal relationship did exist (Voith 1998; Haughwout and Inman). But until more research confirms and quantifies a causal link, the more cautious interpretation is that the positive correlation arises from the widely documented importance of metrowide forces (Glaeser, Scheinkman, and Shleifer; Rappaport 2004b).

A second way in which metrowide forces dominated suburbanization forces is that they were quantitatively more important. Knowing the metro area in which a locality was located was much more helpful in estimating its growth rate than knowing whether it was a city or a suburb.<sup>13</sup> The diverse pattern of metro growth in Chart 4 accounts for 59 percent of the variation of the city and suburban growth rates. Faster average suburban growth accounts for just 22 percent of this variation.<sup>14</sup> This greater quantitative importance of diverse metro growth held almost continuously throughout the 20th century. Only during the 1950s and 1960s did diverse metro growth account for less than half of the variation in the city and suburban growth rates. Only during the 1970s did faster suburban growth account for more than one-fifth of such variation. Moreover, the greater quantitative importance of diverse metro growth increased during the 1980s and 1990s. For the latter decade, diverse metro growth accounted for 79 percent of the variation in city and suburban growth. Faster suburban growth accounted for just 12 percent of the variation.

The dominance of metrowide forces over suburbanization forces underscores the importance of better understanding why some metro areas grow faster than others. In particular, the robustness of the positive statistical correlation between city and suburban growth to controls for the various metrowide forces discussed in the previous section implies that there are still other shared metro-area characteristics driving the diverse pattern of growth.

#### IV. COOPERATION AMONG METRO LOCAL GOVERNMENTS

The importance of shared characteristics in driving the growth of both cities and suburbs suggests that there may be considerable benefits to cooperation among a metropolitan area's many local governments.<sup>15</sup> After all, numerous metro characteristics are themselves shaped by collective local government policies. Some of these collective policies may affect the choices that both people and firms make when deciding on a metro area in which to locate.

Metrowide cooperation among local governments makes sense primarily for policies that affect residents or firms throughout an entire metro area. Pollution regulations are a good example. Applying them to just a single municipality will often be ineffective since local air and water quality are usually determined by conditions in a considerably larger geographic area. In contrast, many public policies have an impact that is much more limited in geographic scope. For example, a small public park usually benefits only nearby residents and workers.

More specifically, it makes sense for a metro area's governments to cooperate in providing or subsidizing three types of public goods. The first type is goods for which the average per-unit cost falls as the amount of the goods provided increases. Such goods are said to have *increasing returns to scale* in production and usually require large capital investments. One example is sewage treatment. As the amount of sewage treated increases, the cost per treated unit often falls. So, having just one or a handful of facilities for an entire metropolitan area can keep costs low for all residents. Another example of an increasing-returns-to-scale good is a commercial airport. The extremely high costs of airport design, construction, and operation are best spread across a large number of passengers.

A second type of public good for which cooperation can make sense is one in which the benefits to each user increase as the public good serves a larger population or geographic area. A commercial airport serves as an example of this as well. The larger the population it serves, the more frequent airline service it can attract. Pollution regulations are another example. The larger the area to which they apply, the more effective such regulations are likely to be. Still another

example of an increasing-benefits public good is a mass transit system. All else equal, as a mass transit system increases the area it serves, users can go to more places.<sup>16</sup> A well-designed metrowide transit system should benefit both city and suburban residents. Such a system can save time and commuting costs, lessen automobile traffic, and reduce parking needs. It can also facilitate “reverse commutes” to suburban jobs by low-income city residents for whom automobile ownership is prohibitively expensive.

The third type of public good for which cooperation among local governments can make sense is a *local amenity* that is located at a single site but that benefits residents throughout a metro area. Some examples are zoos, museums, performing arts centers, and sports stadiums. To the extent that public financing of such a single-site amenity is desirable, economic efficiency suggests that its burden should be shared across the same geographic area in which its benefits are enjoyed. Otherwise, individual municipalities that try to fund such public goods on their own will probably do so at less-than-optimal levels. In particular, they are unlikely to value benefits that accrue to individuals located outside their boundaries since those individuals will not be sharing the burden of costs.

To provide each of these three types of public goods, state and local governments can create *special districts* that span multiple municipalities. Such districts have their own administrative structure that is independent from general-purpose local governments. Special districts have been established to provide increasing returns-to-scale or increasing-benefits public goods since at least the late 19th century. In 1889, Massachusetts set up a special district to build and operate a sewage system throughout the Boston metro area. In 1895, it did the same to provide drinking water. In 1921, New York and New Jersey created a special district government to manage New York harbor and its surrounding waterways.<sup>17</sup> The resulting port authority eventually came to own and operate most of the New York City metro area’s seaports, airports, bridges, tunnels, and bus terminals, as well as a commuter rail line between the two states.

Today, significant portions of many metro areas rely on special districts to provide increasing-returns-to-scale or increasing-benefits public goods. For example, in the Denver metro area, a retail-tax-subsidized

mass transit system operates in all or portions of seven counties. In the Cleveland metro area, wastewater from the city and many of its suburbs is cleaned at water treatment plants owned by a single sewer district. In the Tampa Bay metro area, a single authority provides water to more than 80 percent of residents. And in the San Francisco metro area, a transportation commission plans, funds, and administers mass transit and road building in nine counties.<sup>18</sup>

In contrast to the many special districts that fund increasing-returns-to-scale or increasing-benefits public goods, metrowide special districts rarely provide or subsidize single-site local amenities. To be sure, one-third of metro areas have at least one special district that spans a significant part of their area to fund a local amenity.<sup>19</sup> But most of the special districts that do so operate multiple, small suburban parks and libraries that are geared more toward nearby residents than to an entire metro population. Analysis of the Census Bureau's 2002 Census of Governments suggests that only a handful of special districts exist to provide true metrowide funding of single-site local amenities (box).<sup>20</sup>

While it often makes sense for local governments to work together to provide public goods that affect residents throughout a metro area, it usually makes less sense to do so for public goods with a limited geographic scope. Without increasing returns to scale, increasing benefits, or a local amenity with geographically dispersed benefits, there is simply less rationale for cooperation. Instead, it may be more efficient for local governments to each provide similar services within their geographic boundaries. Such independence should allow local governments to better tailor tax and spending policies to match their residents' preferences (Tiebout; Cutler, Elmendorf, and Zeckhauser; Alesina, Baqir, and Hoxby). Moreover, because residents and firms might move to a neighboring municipality with better local amenities or lower taxes, local governments have an incentive to improve their quality of service while cutting its cost (Hoxby; Grossman, Mavros, and Wassmer).

Local governments' each providing their own services need not imply a zero-sum competition among metro areas. To be sure, metro residents and firms will continuously "vote with their feet" by moving to localities with government policies they prefer. But to the extent that such mobility within a metro area engenders a sense of competition, it may be that all local governments will improve their policies. This in

turn would make the metro area more attractive to individuals and firms elsewhere in the country and thereby accelerate growth. Even more important, existing metro residents would directly benefit from the improved local government services.

Indeed, just a single local government providing an excellent service may benefit its entire metro area. Such excellence contributes to the metro area's overall attractiveness to individuals and firms. Suppose, for example, that a suburban municipality has one of the best public school systems in the country. These excellent schools may attract highly skilled workers to the metro area since such workers often place a great value on their children receiving high-quality educations. In turn, the ability to hire highly skilled workers may attract firms to site new facilities in the metro area. Of course, these facilities might not locate in the municipality with the excellent schools, since all that is necessary is that they be within easy commuting distance. And regardless of the exact location, the new facilities are likely to employ workers living throughout the metro area, both in the city and suburban portions.

#### **IV. SUMMARY**

Throughout most of the 20th century, the suburban portion of the United States did indeed grow at the expense of the city portion. But the more important determinant of the growth of any specific city or suburb was the growth of the metropolitan area in which it was located. As a result, cities and their surrounding suburbs tended to grow or decline together as their metro areas prospered or struggled.

Because of their shared fortunes, both cities and their suburbs may benefit considerably by cooperating in providing some public goods. Such cooperation is already fairly common for goods that have increasing returns to scale in production and for goods whose benefits increase as they are provided to more people or throughout larger areas. Cooperation is extremely rare in providing local amenities that are located at a single site but that benefit residents throughout a metro area. For other types of public goods, it probably makes more sense for each local government to provide them independently.

## **METROWIDE FUNDING OF CONSUMPTION AMENITIES IN DENVER AND KANSAS CITY**

Only a handful of metrowide special districts exist to finance consumption amenities that are located at a single site but that benefit residents throughout the metro area. Several are in the Federal Reserve System's Tenth District.

In the Denver metro area, a Scientific and Cultural Facilities District (SCFD) spans all or parts of seven counties. It was created in 1988 when voters in the proposed district approved a tenth-of-a-cent retail sales tax and has twice been renewed by voters. Proceeds from the sales tax, \$35 million in 2003, are distributed to three groups of cultural and arts organizations. Four organizations—the Denver Art Museum, the Denver Botanic Gardens, the Denver Museum of Nature and Science, and the Denver Zoo—are guaranteed by the SCFD charter to collectively receive 59 percent of the tax proceeds. An additional 28 percent of revenues are annually allocated by the SCFD board of directors to regional organizations that can show evidence that they appeal to residents throughout the metro area. In 2004, SCFD contributed funds to 23 such organizations, with the largest grants going to the Denver Center for the Performing Arts, the Arvada Center for the Arts and Humanities, and the Colorado Symphony. The remaining 13 percent of tax proceeds are allocated annually by councils within each of the participating counties to more than 200 local organizations, such as small theaters, art centers, and community groups.

The Denver metro area also hosts a Metropolitan Major League Baseball Stadium District and a Metropolitan Football Stadium District. Each spans approximately the same seven-county area spanned by the Scientific and Cultural Facilities District. As their names suggest, these special stadium districts' primary purpose is to fund the construction of sport stadiums. The baseball district won voter

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approval in 1990 for a tenth-of-a-cent sales tax to retire public bonds that would be issued to construct Coors Field. The football district won voter approval in 1998 to extend this tenth-of-a-cent sales tax to retire public bonds issued to construct a replacement for the old Mile High Stadium.

In the Kansas City metro area, the Kansas and Missouri Metropolitan Culture District funded the restoration of the city's historic Union Station railway building, including the addition of a science museum. Specifically, in 1996 voters in one Kansas county and three Missouri counties approved a five-year, eighth-of-a-cent retail sales tax for this purpose. Voters in a second Kansas county declined to approve the sales tax.

In 2004, voters in the same five counties were asked to approve a 12-to-15 year, quarter-of-a-cent retail sales tax. Half of the proceeds would fund renovations of the metro area's professional football and baseball stadiums. The remaining half would fund arts and cultural organizations throughout the metro. From the arts and culture share of expenditures, \$50 million would be used to subsidize the construction of a performing arts center in downtown Kansas City. The remaining arts and culture expenditures were to be allocated by the district's governing commission, with half going to organizations thought to appeal to residents throughout the metro area and half going to more locally oriented organizations within each of the participating counties. For the measure to become law, voters in three of the counties had to approve it. But voters did so only in the county containing downtown Kansas City.

## APPENDIX: METROPOLITAN AREA DEFINITIONS

This appendix describes the geographic-proximity definitions of metropolitan areas used for the analysis in this article. It also describes the more commonly used definitions developed by the U.S. Office of Management and Budget and then compares the two sets of definitions. Lastly, it discusses the advantages of using the geographic-proximity definitions to analyze suburbanization.

For the article's analysis, metropolitan areas are defined based on geographic proximity to large cities. More specifically, large cities are municipalities with populations that exceed a given threshold for each decennial census year. The threshold is set at 125,000 in 1950. It is then adjusted downward for previous decades by the rate of continental U.S. population growth. Doing so implies a minimum large city population of 63,000 in 1900. The threshold is similarly adjusted upward for decades subsequent to 1950. Doing so implies a minimum large city population of 232,000 in 2000.

Metro areas, in turn, are defined as the combination of all counties within 40 miles of a large city. Distances are measured from the center of cities and counties rather than from their borders. When two or more large cities are within 30 miles of each other, they are considered to be in the same metro area. In these cases, metro areas are the combination of all counties within 40 miles of at least one large city. A few counties are within 40 miles of two large cities that are more than 30 miles apart. These counties are included in the metro area of the large city to which they are closer. Suburbs are defined as the portion of a metro area outside its large cities. In other words, each metro area is divided into a single city portion and a single suburb portion.

The actual delineation of metro areas changes with each decennial census. For example, the 1900 population threshold identifies 56 large cities within 44 metros. This increases to 88 large cities within 72 metros in 1950 and then falls to 71 large cities within 58 metros in 2000. The changes in delineation occur for a number of reasons. A city that was previously below the large city population threshold may experience sufficiently fast population growth to rise above it. This may lead to the delineation of a new metro area (for example, the Austin metro

area is first recognized in 1950). Rapid population growth may cause an enlargement in the delineation of an existing metro area (for example, Mesa first becomes a large city in 1990, thereby expanding the Phoenix metro area by an additional county). Finally, rapid population growth may cause the creation of a new metro area that, in turn, implies the shrinkage of an existing one (for example, the San Jose metro area is first recognized in 1960, thereby causing some counties to be included in it rather than in the San Francisco/Oakland metro area).

Conversely, a city that was previously above the large city population threshold may not experience sufficiently fast population growth to remain there. This may lead to the loss of a metro area (for example, the Des Moines metro area was no longer recognized in 1990). Insufficient population growth may cause the shrinking of an existing metro (for example, Kansas City, Kansas, was no longer considered a large city beginning in 1960, thereby causing an adjacent county to be excluded from the Kansas City, Missouri, metro area). Insufficient population growth may cause the loss of a metro area that, in turn, implies the enlargement of a different existing metro area (for example, the elimination of the Tacoma metro area in 1940 allowed additional counties to be included in the Seattle metro area).

All growth rates included in the article's analysis use delineations of metro areas based on decennial census data from the start of the period over which growth is measured. For example, the 1950-to-2000 growth rates shown in Chart 3 are for metro areas as delineated by the 1950 census. In other words, the set of metro areas in the chart are those that existed in 1950. The population of each of these metro areas is always constructed using the same constituent counties.

More typically, researchers use metro delineations established by the Office of Management and Budget (OMB) and its predecessor organization, the Bureau of the Budget. The Bureau of the Budget first established criteria for delineating metro areas in 1949. Except in New England, a metro area was defined to be a county or group of contiguous counties which contained at least one central city municipality of 50,000 inhabitants. According to certain additional criteria, the counties also had to be considered metropolitan in character, as well as

socially and economically integrated with a central city. For the New England states, metro areas were defined similarly, except that instead of whole counties, they consisted of combinations of cities and towns.

Major revisions to the Bureau of the Budget metro definitions were made in 1983 and again in 2003. Actual delineations were continually updated to recognize population growth and changing settlement patterns. Many of the updates to delineations were of the form of adding outlying counties to a metro area, which reflected the ongoing process of suburbanization.

Comparison of the geographic-proximity delineations of metro areas versus those based on the Bureau of the Budget/OMB definitions show that the former are frequently larger geographically. In other words, the geographic-proximity delineations often include more counties than do the Bureau of the Budget/OMB delineations. In other cases, the proximity delineations are geographically larger than Bureau of the Budget delineation circa 1950 but geographically smaller than more recent OMB delineations.

An additional difference between the geographic-proximity and Bureau of the Budget/OMB definitions is the much higher population thresholds of the former. Specifically, the geographic-proximity definition results in 72 metro areas in 1950, with the smallest having a population of 195,000. It results in 58 metro areas in 2000, with the smallest having a population of 435,000. The Bureau of the Budget recognized 168 continental U.S. metros in 1950, with the smallest having a population of 56,000. As of November 2004, OMB recognized 358 continental U.S. metros, with the smallest having a population of 53,000.

For the analysis of suburbanization, there are two main advantages to using the geographic-proximity metro definitions rather than one of the various Bureau of the Budget/OMB definitions. First, the geographic-proximity based definition allows the delineation of metro areas before 1950, including a breakdown into city and suburban portions. Second, the geographic-proximity definition delineates metro areas to include adjacent counties that have the potential for substantial future suburban development. In contrast, adjacent counties are delineated by the Bureau of the Budget/OMB to be within a metro area only after such suburban development actually occurs. Calculating growth rates

based on start-of-period Bureau of the Budget/OMB delineations often leads to an underestimate of the degree of suburbanization. But using their end-of-period delineations can lead to overestimates of suburbanization as well as other statistical problems.

An Excel worksheet enumerating the large city and metro names and populations for each decade is available for download from [www.kansascityfed.org/Econres/staff/jmr.htm](http://www.kansascityfed.org/Econres/staff/jmr.htm).

## ENDNOTES

<sup>1</sup>The few cities that were able to outpace their suburbs tended to do so only by annexing huge amounts of formerly suburban land.

<sup>2</sup>Recent research suggests that the construction of these intra-metropolitan interstate segments speeded suburban growth by an average of at least 3 percent per decade and likely by much more (Baum-Snow).

<sup>3</sup>Conversely, developers of residential rental properties have an incentive to build multiple-unit dwellings as these allow them to benefit from economies of scale in managing the properties. For example, the costs of laundry facilities, security systems, trash pickup, and numerous other expenses can be spread over many units. Since multiple-unit dwellings tend to use less land per housing unit, the incentive to build them relative to the incentive to build single-family houses is higher as land prices increase. Hence they are relatively more attractive to build in cities rather than in suburbs. Suburban residential zoning laws may also restrict the development of high-density buildings.

<sup>4</sup>The dashed line shows the fitted result from regressing per-decade metro growth from 1970 to 2000 on per-decade growth from 1950 to 1970 and a constant. The slope coefficient less than one reflects that average metro population growth—as well as total U.S. population growth—was much lower during the latter period. The regression's  $R^2$  value is 0.41. Rappaport (2004a) documents that the persistence of population growth was relatively absent prior to the 1930s.

<sup>5</sup>An additional source of mobility between 1900 and 1929 was the massive waves of European immigration that poured into the U.S. Such immigrants tended to settle disproportionately in some cities rather than others. Following the imposition of strict quotas in 1929, legal immigration became a much smaller determinant of relative metro-area growth rates (Taeuber and Taeuber).

<sup>6</sup>In addition, research shows that workers' productivity is much lower in extremely hot weather (Oi). Hence firms also became less adverse to locating in metro areas with extreme summer heat.

<sup>7</sup>Rappaport (2004c) shows that for the increasing valuation of amenities to actually induce migration—rather than to just cause a change in relative wages and house prices—requires a less than unitary elasticity of substitution between the consumption of goods and the consumption of amenities.

<sup>8</sup>Rappaport (2004b) argues that an increasing valuation of nice weather by working-age individuals was at least as important as the advent of air conditioning and elderly retirement in accounting for weather-related migration. The movement toward places with nice weather began in the 1920s, well before the spread of air conditioning and the establishment of Social Security. Partial correlations with county population growth rates are positive both for warm winter weather and for cooler, less humid summer weather. The latter of these partial correlations is the opposite of what is expected if air conditioning were the main driving force.

<sup>9</sup>The dashed line shows the fitted values from the regression of average per-decade growth of the suburban portions of metro areas on average per-decade growth of the city portions of metro areas and a constant. The coefficient on city growth is 0.83 with a standard error of 0.12. The coefficient on the constant is 17.8 with a standard error of 1.55. The regression's  $R^2$  is 0.41.

<sup>10</sup>Similarly strong, statistically significant positive correlations between the city and suburban portions of metropolitan areas hold for per capita income growth and for house price growth.

<sup>11</sup>A statistically significant positive correlation between population growth of the city and suburban portions of metropolitan areas holds for each decade of the 20th century with the exception of the 1950s and the 1960s. During both of these immediate postwar decades, many large cities annexed significant land from their surrounding suburbs. The total land area of the large cities in 1950 grew by 36 percent over the subsequent decade. The total land area of the large cities in 1960 collectively grew by 46 percent over the subsequent decade. The respective aggregate increases in city land area for the 1970s, 1980s, and 1990s were 9 percent, 7 percent, and 5 percent. Land transfers reclassify people as living in the city rather than in the suburbs despite their not having moved and so induce a misleading negative correlation between city and suburban growth. Excluding metro areas with cities that annexed land equivalent to 20 percent or more of their geographic area, the positive correlation between city and suburban population growth also holds for the 1950s and 1960s.

<sup>12</sup>The positive correlations between city and suburban growth discussed in this paragraph are based on regressions of suburban growth on city growth along with a constant and other right-hand side variables. Weather is controlled for by including 10 variables measuring winter temperature, summer temperature, summer humidity, and annual precipitation (Rappaport 2004b). Industrial structure is controlled for by the share of aggregate wage and salary income received by workers in each of 11 industries at the start of the period over which growth is measured. Region of the country is controlled for by including separate dummies for each of the nine Census Bureau geographic divisions. The regressions that use growth from 1970 to 2000 as their dependent variable have 68 observations. For each of the three sets of controls, the coefficient on city growth is positive and statistically differs from zero at the 0.05 level. Including all three sets of controls the same coefficient remains positive, but only differs from zero with a P-value of 0.23. But given that this latter regression includes 30 right-hand side variables, the lower statistical significance is not surprising. If dummies for the four Census regions are used instead of for the nine Census divisions, the P-value of the coefficient on city growth falls to 0.13. Regressions for each of the three component decades show the positive correlation between city and suburban growth to be gaining strength. For growth from 1970 to 1980, the statistical significance no longer holds if any of the three sets of controls is included. For growth from 1980 to 1990, it holds if the Census division or industry controls are included but not if the weather controls are included. For growth from 1990 to 2000, it holds for each of the three sets of controls, even when they are all included simultaneously.

<sup>13</sup>The greater quantitative importance of the suburbanization forces is distinct from the positive correlation between city and suburban growth. Even with the positive correlation, suburbanization might still have been the quantitatively more important process. For example, suppose that the scatter of city and suburban growth rates in Chart 4 were closely clustered along a small segment of the dashed line. If that were the case, knowing whether a metro portion was a city or a suburb would be much more helpful in estimating its growth rate than knowing the metro area to which it belonged.

<sup>14</sup>The share of variation of metro portion growth rates are based on the  $R^2$  values from two regressions. Both include two observations for each metro area: one each for the city and the suburban portion. In other words, the first observation is the city portion of metro A. The second observation is the suburban portion of metro A. The third observation is the city portion of metro B. The fourth observation is the suburban portion of metro B... For both regressions, the dependent variable is average per-decade growth from 1970 to 2000. The right-hand side variables for the share of variation accounted for by the diverse pattern of metro growth are dummies for each metro area. In other words, both the city and suburban observations for metro A get a one for the metro A dummy, a zero for the metro B dummy, and a zero for each of the remaining metro dummies. Both the city and suburban observations for metro B get a zero for the metro A dummy, a one for the metro B dummy, and zeros for each of the remaining metro dummies. The right-hand side variables for the share of variation accounted for by suburbanization are a suburban-portion dummy and a city-portion dummy. All suburban-portion observations get a one for the suburban-portion dummy and a zero for the city-portion dummy. All city-portion observations get a one for the city-portion dummy and a zero for the suburban-portion dummy. The  $R^2$  values compare the sum of squared residuals from these regressions with the sum of squared residuals from regressions of population growth on a constant only.

Analogous regressions for each 20th century decade always result in the metro dummies accounting for a much higher share of variation. Except for the 1950s, 1960s, and 1970s, they always account for at least 60 percent of the variation in metro portion growth. For the 1990s, they account for almost 80 percent of this variation. In contrast, the city-suburb dummies account for less than 20 percent of the metro portion growth variation in every decade except for the 1970s, when they account for 30 percent of this variation.

In one sense, it is not surprising that the inclusion of the many more metro dummies produces a higher  $R^2$ . Yet the relatively low  $R^2$  values from the 1950s and 1960s regressions (0.34 and 0.28) establish that the high  $R^2$  values in the remaining regressions are meaningful. For the 1950s and 1960s, the low  $R^2$  values are partly attributable to the large annexations by cities of suburban land (see note 11 above).

<sup>15</sup>A typical metropolitan area encompasses a large number of separately governed municipalities. The 58 metropolitan areas defined herein for 2000 contain an average of 76 municipalities each. Additionally, including township and county governments brings the average number of general purpose governments per metro area to 118. Some metropolitan areas have considerably more. For example, metro Pittsburgh includes 263 municipalities and 474 general purpose governments.

The positive correlation discussed in the previous section was between population growth of the city and suburban portions of metropolitan areas. But a similar positive correlation also holds among different parts of only the suburban portions. Specifically, city portions tend to be located in a metro area's largest county (measured by population). And so excluding the largest county from a metro area usually excludes most, if not all, of its city portion. For all 20th century decades, a positive correlation of population growth across metro areas also holds between the second and third largest counties of metro areas and between the third and fourth largest counties of metro areas.

<sup>16</sup>Of course, people may not be able to go to more places if a mass transit system expands its geographic service area at the expense of lowering service quality, raising fares, or serving its original area less intensively.

<sup>17</sup>Special districts that span multiple U.S. states require enabling legislation by Congress.

<sup>18</sup>There were 58 metropolitan areas in 2000 based on the metro definitions used herein. The 2002 Census of Governments lists 8,159 special district governments whose primary mailing address was in one of these metro areas. Most cover geographic areas smaller than a county; some are considerably smaller. The main purpose of many of these special districts is to issue bonds to help finance local real estate development (Burns). Special districts are assumed to provide increasing-returns-to-scale or increasing-benefit public goods if they are classified by the Census Bureau with one of the following function categories: airports, highways, ports, mass transit, sewerage, irrigation, drainage, flood control, natural resource conservation, water utility, electric utility, gas utility, dual-purpose fire protection and water supply, dual-purpose natural resources and water supply, dual-purpose sewerage and water supply, and multipurpose. Among the 58 metro areas, 13 were made up of just one or two counties. Among the remaining 45, only four did not contain at least one increasing-returns-to-scale or increasing-benefit special district government with borders in three or more counties. The median number of such special districts per metro area was six. Having borders within at least three counties seems a reasonable criterion for describing a special district as serving a significant portion of its metro area. Nevertheless, some special districts that do so appear to be relatively small. For example, metro Kansas City has six such special districts that provide drinking water.

<sup>19</sup>Special districts are assumed to fund an amenity if they are classified by the Census Bureau with either the library or the parks and recreation function categories. As discussed in the previous endnote, they are assumed to provide services throughout a significant portion of their metropolitan area if their borders fall in at least three counties. Only 15 of the 45 metro areas with three or more counties have at least one such special district.

<sup>20</sup>Metrowide funding for single-site local amenities is probably so scarce because of the false perception that the benefits of such amenities are especially concentrated in their immediate vicinity. Hence municipalities other than where a proposed amenity is to be located see little reason to help fund it. To be sure, there are probably some geographically concentrated benefits of single-site amenities. For example, they may generate pedestrian traffic that benefits nearby restaurants and retailers, in turn, generating increased sales tax revenue. But any such increased tax revenue often pales in comparison with the combined benefits to all metro residents (Rappaport and Wilkerson). Moreover, single-site local amenities definitely impose costs in their immediate vicinity. For example, they may generate significant traffic congestion and require expansive parking lots that usually lie empty.

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