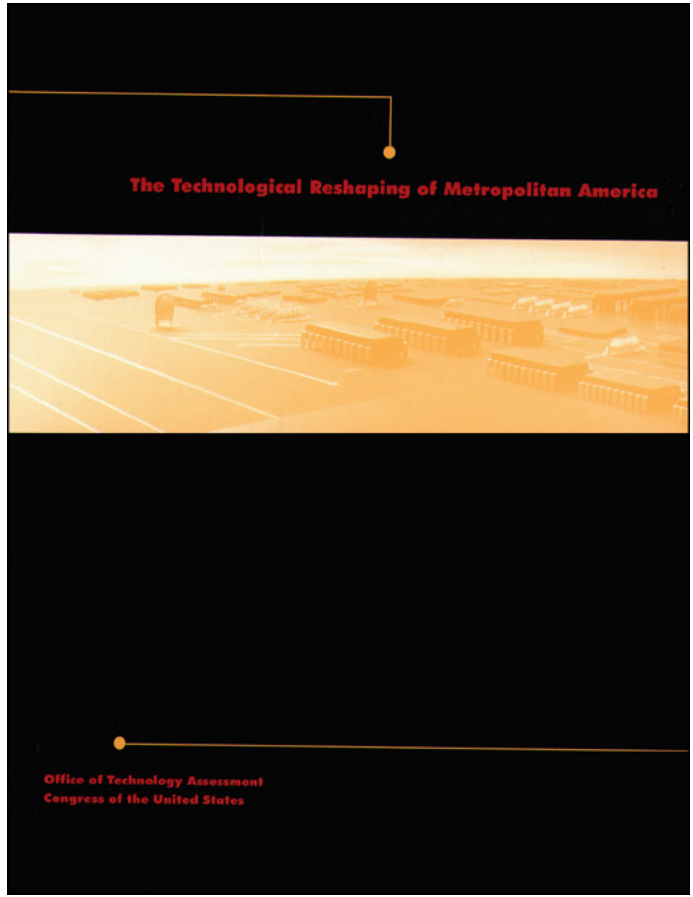
The Technological Reshaping of Metropolitan America

September 1995

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Foreword

Advanced industrial economies are in the midst of a technological revolution, driven in large part by rapid advances in microelectronics technologies. These digital electronic technologies permit information in a myriad of forms to be generated, routed, and transmitted cheaply, instantaneously, and at high volumes virtually anywhere. There has been much speculation about the impacts of the "information superhighway," "digital society," and emerging "cyberspace" on society in general, but surprisingly little is known about the potential effects of this technology revolution on industrial and residential location patterns broadly, or on urban conditions in the United States specifically. In fact, these technologies underpin the transformation of metropolitan areas.

These technologies are facilitating an ever more spatially dispersed economy, which in turn is causing metropolitan areas to become larger, more dispersed, and less densely populated. Moreover, though some places benefit from these changes, the economies of many older, higher cost metropolitan areas and many central cities and older inner suburbs are likely to face further job loss and disinvestment, leading to underutilization of the built environment, potentially reduced central city benefits for industry, increased poverty and ghettoization, and fiscal problems for local governments.

The OTA Report examines new policy approaches that would focus on development of innovative strategies for economic revitalization of urban core areas (including central cities and inner suburbs); creation of partnerships between urban cores and industry, state governments, and suburban jurisdictions; and movement toward full pricing of development and infrastructure to reduce or eliminate price subsidies now encouraging dispersed development.

This Report was prepared in response to requests from the Senate Committee on Banking, Housing and Urban Affairs; the House Committee on Banking, Finance, and Urban Affairs and its Subcommittee on Economic Growth and Credit Formation; and the House Committee on Public Works and Transportation and its Subcommittee on Investigations and Oversight.

In the course of this study, OTA drew on the experience of many organizations and individuals. In particular, we appreciate the invaluable assistance of the advisory panel, as well as the efforts of the project's contractors. We would also like to acknowledge the help of the many reviewers who gave their time to ensure the accuracy of this study. To all of them goes the gratitude of OTA and the personal thanks of the staff.



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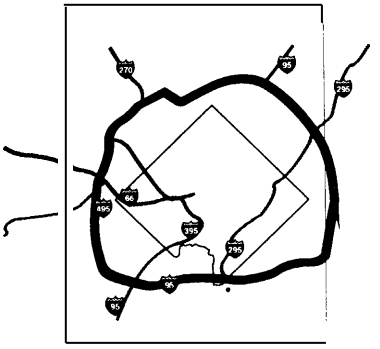
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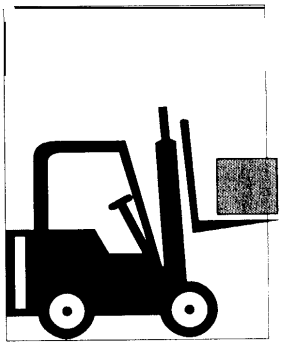
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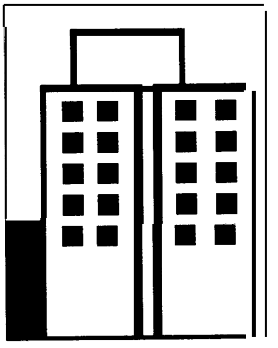
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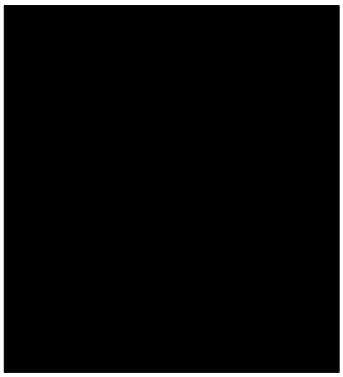
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Summary 1

The United States is in the midst of a technological revolution, driven in large part by rapid advances in microelectronics. Digital electronic technologies permit information in a myriad of forms to be generated, routed, and transmitted cheaply, nearly instantaneously, and at high volumes virtually anywhere. There has been much speculation about the impacts of the "information superhighway," "digital society," and emerging "cyberspace" on society as a whole, but surprisingly little is known about the potential effects of this technology revolution on the spatial distribution of jobs and people broadly, or on urban conditions in the United States specifically. Today, urban life is increasingly shaped through the continuous and real-time interactions facilitated by information technologies (computing and telecommunications technology). Because these interactions differ so markedly from past interactions that were more burdened by space and time constraints, they have, through their impact on industries and jobs, the potential to significantly reshape America's metropolitan areas, leading to growth for some places and decline for others. **These technologies will form the basis of a new technology system that is giving shape to the next wave in urbanization, one OTA calls the post-industrial metropolis.**

The new technology system is creating an ever more spatially dispersed and footloose economy, which in turn is causing metropolitan areas to be larger, more dispersed and less densely populated. There are a number of important benefits from such development patterns. Some metropolitan areas will grow, as will many outer suburbs. Businesses and people will be freer to choose where they will locate, and many will choose to locate in lower-cost, higher-amenity areas. And as technology facilitates



the dispersion of businesses to the outer suburbs, workers can live closer to their jobs.

However, the changes will also create problems because of inadequate transportation, added infrastructure costs, and negative environmental consequences. Moreover, some places will have trouble adapting, and will face disinvestment, job loss, and fiscal difficulties. The economies of many older, higher-cost metropolitan areas, as well as central cities and older inner suburbs of many metros, are likely to face increasing job loss and disinvestment, leading to underutilization of the built environment, potentially reduced central city agglomeration benefits for industry, increased poverty and ghettoization for residents, particularly minorities, and fiscal problems for local governments. Moreover, the mismatch between the location of the new economy (in the suburbs and in post-industrial metros) and the skills it demands, and the large and rapidly growing population of lower-skilled and often minority residents in urban cores is likely to exacerbate current economic and social problems in the urban core.

The new development patterns pose a number of challenges that have important public policy implications. **OTA concludes that a new and reinvented federal urban economic development policy is needed to respond to the fundamental changes that America's metropolitan areas are undergoing.** The new policy would work to build up the productive capacity of distressed places, in partnership with state and local governments and the private sector. It embraces three kinds of policies: first, economic development policies that focus on economic revitalization of urban core areas (including central cities and inner suburbs); second, policies to create partnerships between urban cores and industry, state governments, and suburban jurisdictions, including facilitating the mobility of urban core workers into suburban labor markets; and third, policies to move toward full pricing of development and infrastructure, to reduce or eliminate price subsidies now encouraging sprawl development.

In May 1994, three congressional committees asked OTA to undertake a study on how new technologies are reshaping America's metropolitan areas: The Senate Committee on Banking, Housing, and Urban Affairs; the House Committee on Banking, Finance and Urban Affairs and its Subcommittee on Economic Growth and Credit Formation; and the House Committee on Public Works and Transportation and its Subcommittee on Investigations and Oversight. Because the form of cities and metropolitan areas is largely shaped by patterns of commerce and industry, this report examines the likely impact of the information technology revolution on industry and commerce in America's metropolitan areas, including cities and suburbs. This chapter summarizes the findings of the report.

Chapter 2 analyzes policy options Congress could consider in addressing the problems and opportunities stemming from the technologically driven economic reshaping of metropolitan areas. Chapter 3 first presents an overview of how technological change has affected the historical development of U.S. metropolitan areas. It then examines the trends over the last 15 years in regional and urban economies and describes the nature of the post-industrial metropolis. The next four chapters focus on how technology is affecting and is likely to affect the spatial location and character of industry and residences. Chapter 4 provides an overview of the major technologies, discusses how they affect metros and cities, and presents a summary of the likely impacts. Chapters 5 and 6 focus on how technology is reshaping the locational patterns in two specific sets of industries: 1) information-based service industries (e.g., banking, insurance, securities trading, telecommunications, and professional services); and 2) goods-related industries (freight transportation, wholesale trade, and manufacturing). Chapter 7 examines three important crosscutting technology applications that could change the nature of human and economic settlement patterns: 1) telecommuting; 2) Intelligent Transportation Systems, and 3) advanced telecommunications infrastructure. Finally, chapters 8 and 9 concentrate on the impacts of these changes and discuss strategies for addressing the problems they are likely to cause. Chapter 8 analyzes impacts on the

outer suburbs and the exurbs, particularly the impact of urban sprawl, and documents how dispersed development appears to be subsidized. Chapter 9 considers the prospects of the core (central cities and inner suburbs), and examines a number of approaches for increasing development and economic activity in the core, including addressing the impact of the spatial mismatch between the location of jobs and urban residents, and the reuse of urban brownfields (contaminated lands).

EVOLUTION AND CURRENT CONDITIONS OF THE U.S. METROPOLITAN SYSTEM

Because technological change in the United States has not been continuous, but rather has occurred in waves, with clusters of technological innovations emerging in relatively short periods of time, many believe that the development of cities and metros of the United States has not been a smooth evolution to the conditions of the present, but has been marked by major transformations from one kind of city to another.[1] Technology transitions have driven urbanization, redefining urban hierarchies and bringing new types of specialization to the urban economic base.

The current and emerging phase of urban development, beginning in the 1970s, is best understood as post-industrial metropolitan development, where business spreads throughout the metropolis; residential growth spreads to the outer suburbs and to exurban areas; some parts of some central cities, especially central business districts (CBDs) revive (at least in the 1980s); and many parts of older central cities and inner suburbs, particularly those formerly dependent on mass production manufacturing, stagnate or decline (see chapter 3). Goods-related employment declines as a share of metro jobs, and services, particularly information-based services (e.g., banking, insurance), increase.

During the 1970s, after decades of relative decline, population and employment rose faster in rural areas than in metropolitan. Moreover, in the 1980s, both the population and civilian workforce of large metros (over 1 million population) grew slightly faster than that of smaller metros. However, all that workforce growth was in fringe, as opposed to core, counties of metro areas.

Not all metropolitan areas grew, however. About half of the largest 25 metros suffered decline or little to no growth between 1970 and 1990, while the other half grew vigorously. Five (13 percent) of the largest 40 metropolitan areas lost population between 1980 and 1990 (Detroit, Pittsburgh, Cleveland, Buffalo, and New Orleans), and 49 (22 percent) of the 228 next largest metros also shrank. For example, the city of Pittsburgh's population declined by 30 percent between 1970 and 1990, while the metropolitan population fell by 4 percent. Most declining metros depended on older industries that lost many jobs in the last 15 years, including tires, automobiles, and steel, or were centers for the excavation and refining of copper, coal, aluminum, and oil. In short, the fortunes of metropolitan areas have diverged sharply; some have grown as they increased linkages to global markets and/or assumed new roles and functions; others have stagnated or declined.

The 1980s growth of large metropolitan areas is not synonymous with, but is related to, the fate of historic core cities. Whereas most of the 40 largest metropolitan areas grew (on average 1.9 percent), half of the central cities continued to decline in population. Central cities that grew in the 1980s tended to be those that had managed a successful transition from an older industrial economy to an advanced service economy via specialization as locations for corporate headquarters; finance, banking, insurance, commercial real estate (FIRE); and related producer services (e.g., law, advertising, tourism and hotels). This was especially the case for so-called global cities (New York, Los Angeles, San Francisco, Chicago) that served as command and control centers for global

[1] John Borchert, "American Metropolitan Evolution," *Geographical Review*, vol. 57, 1967, pp. 301-32.

corporations and for operations of global financial institutions and related businesses, but also cities such as Boston, Dallas, Minneapolis, Seattle, and San Jose, whose regions specialized in high-tech manufacturing.

While not all central city economies lost population and jobs, virtually all are losing blue collar jobs and becoming more specialized in services, particularly advanced services. Manufacturing used to be, but is no longer, identified with the central city. Decline of manufacturing employment in high-cost urban areas, particularly in the Midwest and Northeast, is not new. However, its severity and speed is new. In the 1980s, the 28 largest central counties of the Northeast and Midwest regions lost a total of nearly 1 million manufacturing jobs.[2] A large share of manufacturing is now located in the outer suburbs and exurbs of major metropolitan areas.

Wholesaling, retailing, construction, and consumer services also were once predominantly urban, but now are primarily suburban. In part, retailing and consumer services followed the market—when people moved to the suburbs, so did they, although it was probably not until the 1980s that some large department stores, for example, closed their city flagship stores. Most of the growth in warehousing and distribution has occurred on the periphery of America's metropolitan areas, rather than in the urban core, in part to be near beltways and interstate highways and to gain access to larger parcels of low-cost land.

As center cities lost industries like manufacturing, retail, wholesale, construction, and consumer services, producer services (e.g., financial services, advertising, accounting, law) in many places filled the gap. Many of these industries rely upon face-to-face contact and need to be near each other and other industries. A major reason for the growth of central county economies since the 1970s is that they already had specialized in industries, particularly financial services and business services, that grew faster than the national economy. In addition to producer services, three other major industries help support many central city economies: 1) cultural and educational institutions, including museums, zoos, universities, teaching hospitals, and medical centers; 2) industries that reflect the role of the central city as a center of tourism and conventions, i.e., hotels and airports; 3) government services, for state capitals or cities with federal or state installations or courts.

Even as central city economies have lost blue collar jobs and gained producer services jobs, which employ a higher percentage of college-educated workers, their populations have become poorer and disproportionately minority. Of the 40 largest cities, 29 had poverty rates in 1990 above the national average and 11 of the 29 have rates 1.5 times greater. The poverty rate in the largest 71 cities increased from 16.1 percent to 18.2 percent between 1980 and 1990.[3] Moreover, the poor are (not surprisingly) more concentrated in central cities than in suburbs. In 1990, the central city poverty rate (18 percent) was approximately 10 percentage points higher than that in the suburbs. In addition, the number of poverty census tracts in America's largest 100 cities increased 63 percent between 1970 and 1990, while the number of extreme poverty tracts increased 160 percent.[4] Thus, by 1990, two in five urban tracts had at least 20 percent of their population in poverty, and one in seven had at least 40 percent in poverty.

While many central cities and inner suburban economies have been struggling and losing population, both population and jobs in most outer suburban and exurban locations have increased. The spatial form of U.S. metropolitan areas has evolved significantly in the last 20 years. The ac-

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[2] John D. Kasarda, "Industrial Restructuring and the Changing Location of Jobs," in Reynolds Farley (ed.), *State of the Union* (New York: Russell Sage Foundation, 1995).

[3] Sue G. Neal and Harold L. Bunce, "Socioeconomic Change in Distressed Cities During the 1980s," *Cityscape*, vol. 1, No. 1, August 1994.

[4] Ibid.

cepted picture of the metropolitan area as a place with one economy, located in downtown skyscrapers and inner ring factories, is no longer valid. Now, 57 percent of office stock is in the suburbs, up from 25 percent in 1970 (see also figure 3-8 in chapter 3).[5] Today the bedroom suburb, little more than a home to workers commuting to the central city, is rare.

Bedroom suburbs have been replaced by an increasingly urbanized metropolitan area outside the central city, which, like the core, is a place not only for houses but for businesses and jobs. Many people both live and work in the suburbs and rarely visit the central city; others still commute to the core for work, but patronize the retail, personal, business, consumer, and social services in the suburbs. Suburban job growth has led some to argue that "downtown," by which they mean a diversified center of economic activity that includes offices and retail, has relocated to the suburbs or, specifically, to business and commercial centers in the suburbs known as "edge cities," which in some cases are larger than the central business district.[6]

Today, approximately 55 percent of Americans live in the suburbs. In the largest 25 metros, 75 percent of the population live in the suburbs. Moreover, exurbs and satellite cities are growing, as low-density development spreads beyond the outer suburbs. The fastest-growing sections of many metropolises are now furthest from the central city, in low-density exurban areas.

IMPACTS OF NEW TECHNOLOGY ON RURAL, URBAN, AND SUBURBAN ECONOMIES

Predicting the future is difficult. New and powerful information and telecommunications technologies continue to be developed and their impacts on industrial and residential location are still evolving. However, based on the analysis of individual industries (chapters 5 and 6), telecommuting and technology-based infrastructure (telecommunications infrastructure and Intelligent Transportation Systems—chapter 7), it is possible to see how advanced technologies are changing the locational patterns of individuals and industries and, on the basis of this, to predict how these changes are likely to affect metropolitan economies in the United States over the next 10 to 20 years.

Historically, cities have arisen and grown as centers of transactions and commerce, largely because of the need for physical proximity among firms, suppliers, and customers. Agglomerations of people, infrastructure, and industry allowed efficient production, transport, and distribution of goods and services. By letting activity be physically farther apart, yet functionally still as close, technology, particularly new transportation modes (e.g., trains, electric trolleys, cars and trucks), helped shape the first industrial city (1870-1920) and the mass production metropolis (1920-1970).

Today, new technologies, particularly information technologies, are playing a similar role. To better understand how the next wave of technologies is likely to recast industrial and residential locational patterns, it is important to understand the key technologies being adopted by industry. Many of the early applications of information technology improved internal operations (e.g., mainframe and desk top computing) and often created "islands of automation" with little interconnection between components. It is only recently that technologies that facilitate real-time and widespread linkages and communication among operations have begun to be widely adopted. These technologies are getting cheaper and more powerful, and will become pervasive. This report puts these technologies into three groups: 1) technologies to transform information into electronic form (e.g., fax, video

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[5] Gary Pivo, "The Net of Mixed Beads," also, Neil Pierce, *Citistates: How Urban America Can Prosper in a Competitive World* (Washington, DC: Seven Locks Press, 1993).

[6] Joel Garreau, *Edge City: Life on the New Frontier* (New York, NY: Doubleday, 1991).

phones, computers, optical scanners, and bar code readers); 2) switching and routing technologies (Internet communications and e-mail, call forwarding systems, local and wide area networks, and wireless communications and computing); and 3) transmission (e.g., fiberoptics, digital switching systems, and satellites).

Digitized and electronic processes have the potential to replace many paper transactions, some face-to-face functions, and some physical transport of goods. Because a rapidly growing share of the economy consists of information transactions—be they stock trades, insurance forms, or point-of-sale data—the potential of information technologies to shape spatial patterns of employment is greater than ever before (see chapters 4, 5, and 6). For example, industries that in the past had to be close to customers and other firms because they constantly transmitted information are now more free of the need for proximity because of electronic digital transactions. Within goods industries, information technology is transforming the logistics chain, making it possible for goods distribution and transportation to consolidate operations and locate farther from the customer. Similarly, industries requiring frequent face-to-face contact (for example, architects in design teams) will be able to adequately meet many communication needs electronically through e-mail, video telephones, and easy-to-use data transfer protocols. **In sum, technology is connecting economic activities, enabling them to be physically farther apart, reducing the competitive advantage of high-cost, congested urban locations, and allowing people and businesses more (but not total) freedom to choose where they will live and work.**

Urban/Rural Growth

Because information technology is making an increasing share of the economy less dependent upon face-to-face contact and close proximity with customers, suppliers, and competitors, many speculate that it will lead to a radical deconcentration of economic activity and population to lower-cost rural areas and to developing nations. A number of noteworthy examples fuel such speculation: New York Life's life insurance processing operations in Ireland; Citibank's back office credit card operations in Sioux Falls, South Dakota; telecommuters living in Telluride, Colorado. Visions of life spent conducting business through the Internet, hooked up by video phone, and receiving and sending faxes, all the while living in bucolic and isolated bliss, are likely to be a dream that only a few can fulfill. **OTA concludes that the new wave of information technologies will not prove to be the salvation of a rural U.S. economy that has undergone decades of population and job loss as its natural resource-based economy has shrunk.**[7] At least in the foreseeable future, most of the economy will be locating in metropolitan areas, perhaps not the largest, highest-cost metros, but the next tier of mid-sized metros.

There are several reasons for this. First, much of the work that goes overseas and to rural areas (e.g., data entry and processing) is routine and low-skilled and is most amenable to elimination by automation.[8] Second, although technology enables an increased share of work to be done anywhere, large and medium-sized metros continue to provide advantages for industry (see below). One important advantage is that metropolitan

[7] However, a limited number of high-amenity rural areas and rural areas at the periphery of metropolitan areas may experience significant growth. To the extent that information technologies enable growth in some rural areas, it is likely to be in those areas that are already doing well.

[8] Some work, such as computer programming, that is higher skilled and amenable to being done at distance, is being done overseas, but it is not clear that other higher skilled work can be performed in such remote locations.

areas offer an environment conducive to innovation and learning, which, as technology increases the importance of continual product and service development, is an advantage to many more firms.

Finally, the information technology (IT) revolution allows many service functions to gain economies of scale through consolidation. This is true in part because sectors such as freight transportation and wholesale trade are buying ever larger and more complex equipment, and also because information technology lets businesses serve more places and customers from a single location. In the past, many service companies had branch facilitates distributed throughout the country, many in smaller towns. Now more and more firms are using IT to consolidate operations, closing smaller offices in smaller cities and towns, and building up larger offices in metropolitan areas.

Inter-Metropolitan Differences

Consistent with historical patterns, new information technologies are making it easier for business to locate many operations in any region of the country. These technological changes are likely to lead to increasing factor price equalization among regions. Historically, some regions, such as the Northeast, had historic advantages stemming from agglomeration economies, location near large markets, transportation, and more recently, an advanced telecommunications infrastructure. However, as information technology allows more functions to be performed at a distance or to be consolidated, and as advanced telecommunications infrastructure diffuses down the urban hierarchy, these competitive advantages are likely to lessen. Lower-cost regions, providing they have sufficient external economies (e.g., air travel, transportation, labor force, quality of life, and telecom infrastructure) are likely to grow.

With technology enabling more locational freedom, the search by firms for lower-cost locations is likely to continue to reshape regional employment patterns, leading to higher rates of growth for many smaller and mid-size metros, many of them in the middle of the country. Geographic centrality aids operations, by reducing average air travel distance, and because of central time zones. Geographic wage and other cost differentials will encourage relocations to low-cost regions until an equilibrium is established or approached.

Finally, as the need for proximity is weakened by information technologies, urbanization economies and diseconomies may become more important. Metropolitan areas continue to provide important advantages for industry, including a large and diverse labor supply, large and more prosperous consumer markets, frequent and cheap air transportation, prompt regular mail service, and availability of repair and technical services. Advantages for people include high-quality medical care, cultural and educational institutions, and a large and diverse labor market.[9] At the same time, diseconomies of urbanization, including high costs of living and doing business, crime, pollution, traffic congestion and lack of access to open spaces, are high in many metros, particularly larger ones. The interplay between economies and diseconomies of large metros will play an important role in shaping the future of metropolitan areas.

As, or perhaps because, technologies allow more locational freedom, development may be becoming more uneven, with places that made the transition to the post-industrial metropolis (see chapter 3) doing well, while places that have not, continuing to decline. Places with the advantages described above, including a skilled, moderately priced labor force; low diseconomies (e.g., crime, congestion, and environmental pollution); an industrial base of advanced innovative companies, and high quality of life, will continue to do well. In contrast, places without these advantages are like-

[9] However, it is important to note that information technology and telecommunications have the potential to allow some formerly urban advantages to be accessible to rural households. These include, for example, access through the Internet to top-quality libraries and other information, distance learning, telemedicine, and satellite television receivers.

ly to continue to lose out, and risk a continuing cycle of decline as reduced advantages (both public and private) lead to reduced economic growth, which in turn reduces advantages even more.

Intra-Metropolitan Differences: Central City Prospects

As discussed in chapter 3, much of the revival of central cities in the 1980s was because of dramatic growth in producer services on the one hand, and increased foreign immigration on the other. In addition, some central cities have remained viable by successfully integrating themselves into the metropolitan-wide economy.[10] Yet, the perception has grown that American cities, particularly the urban cores of many large metropolitan regions, are in trouble, and may not be sustainable over the long term, caught in a downward spiral of joblessness and business failure, revenue shortfalls and declining services, crime, racial strife, and ungovernability, with middle-income families leaving while the wealthy wall themselves off in protected enclaves.

Technological change is likely to continue to impact urban cores by letting more of the economy be operated at a distance; it threatens the economic well being of many central and inner cities, and older suburbs of metropolitan areas. Many of these places may have trouble adapting, and will face disinvestment, job loss, and fiscal crisis. A number of important changes facilitated by technology are discussed below.

The New Metropolitan-Wide Economy

First, it is clear from urban settlement patterns in the late 20th century that reference to cities is anachronistic, a holdover from a period when the core city was home to most of the productive capacity in the metropolitan area. **Today, as industry spreads throughout the metro region, it is the metropolitan areas as a whole, not just the core, that is the functioning economic unit.**

Technology, by enhancing the locational freedom of firms within metropolitan areas, is causing the rise of metropolitan-wide economies. At one time, core cities had advantages of agglomeration and proximity that outweighed their high costs. However, now the core is in some sense just one of several "edge cities" within the metropolis. By making firms more footloose, technology lets jobs follow people. Quality of life for people and cost for business become more important. Thus, central cities will increasingly have to compete on cost, niche markets (such as tourism), and amenities.

Weakened Central City and Inner-Suburb Economies

There are a number of technological factors that put the economies of central cities (particularly outside the central business district) and inner suburbs at risk. First, technology is reducing the importance of distance for many functions, particularly more routine functions, giving businesses more freedom to locate in places with cheaper land, buildings, and labor. These places are often in the outer suburbs or the exurbs, or in mid- and smaller-size metros. Moreover, these places typically have less crime, traffic congestion, and air pollution than most urban cores.

Second, in some sectors, information technology and other advanced technologies are reshaping physical infrastructure needs, and in a number of industries this has led to (in some cases **required**) new, larger, and differently designed facilities. This is particularly true in goods production and handling. For example, in wholesale trade, the move to flow-through practices like cross-docking requires buildings configured quite differently from older urban warehouses. In shipping, access to intermodal facilities with good road access is increasingly important. In some service sectors, buildings with large floor plates that can easily be reconfigured, especially for fiberoptics and other wiring, is increasingly important. These factors

[10] For example, Indianapolis is both politically and economically tightly integrated with its surrounding suburbs.

lead many routine goods and services industries to locate at the edge of metros where larger and cheaper parcels of land on which to build are available.

Overall, the technological and economic trends suggest that the non-central business district portions of many central cities and their inner suburbs will continue to be the weakest part of metropolitan economies for at least the next two decades, and that without economic development policies they will find it harder to compete.

Specialization of Core Economies

Technological change is also contributing to a restructuring of urban core economies, particularly the central business district, which is becoming a place requiring more highly skilled and educated people. As technology enables lower skill routinized work to be moved out of high-cost central cities, the economic base of the central business district is increasingly shaped by complex, higher-end office work, including managerial and professional functions. There are several reasons for this. Though technology allows work to be routinized, and hence moved, it also supports, especially in the services, the continuous creation of new products, a process which tends to be located in urban areas. The rise of globalization means that a larger share of the U.S. economy is devoted to command and control functions, which are naturally attracted to a small number of global cities, including New York, San Francisco, and Los Angles. Finally, much managerial and professional office work needs face-to-face communication, and so remains in central cities.

Yet, as discussed above, new technologies can reduce the importance of spatial proximity in communication. For example, portable computing and phones, e-mail and Internet connections, fax, and easy-to-use data transfer protocols all make communication over distance easier. Coming technologies such as ubiquitous computing, high-definition displays, video phones, and high-speed and high-capacity communications will accelerate this trend. However, there are at least two reasons why technology will not substitute for all face-to-face needs. First, it is not clear how well technology can substitute for face-to-face communication. The latter has not only richness and contextual advantages, but also includes informal, "water cooler" conversations and meetings out of the office over lunch. Second, some industries and functions may be more willing to use these systems and decentralize than others, depending upon the extent, nature, and importance of face-to-face communications and the extent of cost competition in the industry.

Similarly, while the predominant effect of technological change is toward dispersion of activities, particularly the more routinized ones, technologies may create specialized niche functions, which, if they do not give urban core areas an edge, at least may help compensate for their disadvantages of cost, congestion, etc. Many of these niche functions are related to innovation, flexibility, speed of delivery and response, and other factors, and are often described as flexible specialization. These include opportunities in smaller-scale flexible manufacturing, just-in-time goods distribution activities, and some intermodal freight transportation activities (see chapter 6).

However, notwithstanding some niche functions, technology will likely continue to decentralize routine work and goods-related work, while at the same time leading to core economies becoming more highly skilled, with many professional and managerial jobs. In addition, technology is requiring higher skills for many more jobs, regardless of location. **A**s a result, there is likely to be a growing mismatch between the location of the new economy and the skills it demands, and the large and rapidly growing population of lower-skilled and often minority residents in urban cores. The mismatch contributes to unemployment and underemployment in the urban core. **Cities face a challenge in how to bridge what appears to be a growing gap between the skills required for employment in advanced services concentrated in urban cores, and the limited**

skills that many young big-city residents bring to the job market.

Finally, in an era of rapid technological change, cities (and metropolitan areas) that succeed—grow in population, jobs and incomes—will be places that have successfully managed to adapt to the new technology system. In contrast, metros, cities, or parts of cities that will not or cannot adapt run the risk of being left behind to face stagnation or decline. Adaptation of people, institutions, and the built environment will be important to urban core survival (see chapter 9).

Intra-Metropolitan Differences: Outer Suburban and Exurban Prospects

Over the next two decades, many outer suburbs of metropolitan areas will be the healthiest part of the metropolitan economy and the strongest parts of the national economy. Job growth is likely to continue, in part driven by relocations out of the central city and inner suburbs, but also because of faster rates of expansion. Suburban jurisdictions housing growth will by and large enjoy fiscal health, although they may be hard pressed to pay for the expansion if they do not require new development to pay the total public costs of new development (e.g., roads, schools) (see chapter 8). These places will need little or no assistance from state or federal governments to promote development. Residential development is likely to continue to expand at the peripheries of most metropolitan areas, leading to increased urban sprawl and lower population densities. These trends in business and residential location are likely to exacerbate a number of problems, including outer suburban traffic congestion, consumption of open space, and increased gasoline consumption.

Business Suburbanization

The locational freedom gained by advances in intrafirm communications will likely cause continued dispersal of firm activities, with an increasing share of routine, and even non-routine back office work moving to the suburbs. Industry will move in part to save on rent and taxes, which are usually lower in the suburbs, and to be closer to a higher-quality workforce.

Residential Dispersion

Residential dispersion to the outer suburbs and exurban areas is also likely to continue, if not accelerate. The driving forces include lower-cost land, which means more affordable and larger houses and the desire of many Americans for space. Technological change is facilitating this.

Because technology is enabling increased business suburbanization, greater numbers of workers can live even further out in exurban locations and still commute to jobs at the edge of metropolitan areas. Moreover, as the number of workers telecommuting increases, residential dispersion is likely to increase even more (see chapter 7). Because most of these will be telecommuting perhaps two to three days a week from home, or from telecommuting centers at the edge of metropolitan areas, they will still have to live near metropolitan areas. Thus, while reduced work time in central offices is not likely to lead to significant deconcentration of population to rural areas far from metropolitan areas, it does allow workers to live farther from urban cores.

Finally, intelligent transportation systems (ITS, the application of information technology to the surface transportation system) should reduce congestion and commuting times, allowing even more residential mobility (see chapter 7). ITS will have marginal, though possibly critical, impact on land use by increasing the average, and in some cases the maximum, vehicle throughput capacity at some bottlenecks and routes through speeded-up toll collection, optimized flow through and across signalized routes, and quick detection and resolution by road officials of accident-causing delays. These technologies are likely to encourage urban dispersion. Almost all theoretical formulations of the impact of transportation investment assert that better transportation will attract people and business, and spread them out over a wider area, because commuters and others can travel a greater distance in the same amount of time.

UNEVEN DEVELOPMENT: OUTER SUBURBS AND EXURBS

The characteristic pattern of American metropolitan development toward the end of the millennium is one of a vast, low-density, and fragmented urban region with sprawling, isolated suburbs surrounding an older, often decaying inner core. For example, while the Chicago metropolitan population has grown hardly at all over the last decade, the urbanized area has increased by over 20 percent as population has declined in the core and grown on the fringe. OTA concludes that the technological revolution in computer technologies, telecommunications, and industrial organization will exacerbate industrial and residential dispersion within metropolitan areas.

Sprawling growth on the fringe, however, is not just an outcome of unimpeded market forces, implementation of technological advances, and social factors (e.g., crime and racial segregation), but is also influenced by public policy forces (see chapter 8). Though there is no definitive analysis on the effect of government policies on the spatial form of metropolitan areas, there is evidence that public policies at many levels encourage sprawl and thus, indirectly, abandonment of the central city and inner suburbs. Unfortunately, there have been few careful studies of the marginal costs of infrastructure and services in metropolitan areas. But the evidence suggests that fringe suburban and exurban development does not pay the marginal costs of its development, and that the costs are sometimes borne by the central cities and inner suburbs.

For example, the federal mortgage interest tax deduction disproportionately benefits the well-housed (a greater share of whom are in the suburbs) and appears to encourage large building lots, leading to residential dispersion. State governments subsidize suburban sprawl largely through road building on the fringe, a cost not fully borne by users. Indeed, automobile users, especially heavy users in the automobile-dependent suburbs, exurbs, and rural areas, are heavily subsidized. Local government, too, distorts development by subsidizing residential infrastructural investment on the fringe. Moreover, both state governments and suburban jurisdictions provide large financial incentives for industry to locate in outer suburban and exurban locations, often to firms relocating from urban core areas. The pricing of public and private utilities also understates the costs of providing services to suburban and exurban residents. There are good reasons for providing such things as telephones, mail, electricity, and gas at an average cost throughout a metropolitan region (for health and safety and the prevention of social and economic isolation); however, these pricing policies appear to subsidize suburban and exurban development.

Moreover, in addition to direct subsidies, there may be a number of indirect costs (externalities) borne by others because of dispersed development. These include environmental quality, traffic congestion, and access to open space. These direct and indirect subsidies appear to raise the cost of development in the core (central cities and inner suburbs), while making development on the edge cheaper. However, it should be noted that the extent of such subsidies and their impact on development patterns is largely unknown.

UNEVEN DEVELOPMENT: NEW CHALLENGES FOR THE URBAN CORE

In some respects, the technological revolution reshaping many economic sectors has produced mixed results for America's cities, but there are two areas in which its effects have been clearer: it has reduced the ability of urban core residents, particularly lower-skilled minorities, to gain good jobs; and it has led to the increasing abandonment and underutilization of urban land, buildings, and infrastructure (see chapter 9).

Technological change and industrial restructuring has steadily ratcheted upward the skill levels required for employment, while at the same time spatially separating routine jobs (many of which have moved to the fringe) from complex jobs (many of which are concentrated in the core). Jobs for people with high-school-level skills are fewer in number, and in many cases they no longer offer a route to better jobs. Jobs for people without even

high-school-level skills are even fewer. One major problem for many urban core residents is a skills mismatch between their skills and the skills demanded by the new economy. Moreover, jobs that do exist for high school graduates are increasingly in the suburbs and hard for central city residents to get to, or even find. Economic and spatial change and skills and spatial mismatch have contributed to more and longer unemployment among central city residents and increased poverty in many neighborhoods outside of the central business district

Moreover, changes in technology, business organization, and residential patterns are causing increasingly uneven development, including greater misuse and under-use of urban land, buildings, and infrastructure in central cities and older suburbs. Where industry has closed or moved, land and buildings are left behind, idled, or underutilized, jobs vanish, and local tax revenues drop. In spite of the absence of hard evidence, there is general agreement that the underutilization of land and buildings in cities is growing. The most visible evidence is the vacant land and the derelict and abandoned buildings in the inner cities, much of it referred to as brownfields, contaminated with chemical wastes. In addition, there is a growing number of poor and very poor neighborhoods which are becoming more sparsely populated.

Recently, a great deal of attention has focused on brownfields and their cleanup and reuse. Cleanup difficulties, particularly uncertainties related to federal and state environmental regulations, present a barrier to reuse of these sites and associated job creation. Barriers to brownfield reuse include: technical remediation issues; liability concerns associated with contamination; the cost of cleanup and reuse; community concerns; and prospects for redevelopment. Developers and business will be wary of brownfield sites until there is progress on these issues.

POLICY OPTIONS

OTA concludes that, given the technological and economic trends toward decentralization, America's central and inner cities are unlikely to regain their earlier dominance. However, renewal and development does appear possible, particularly if new and effective federal, state, and local public policy approaches are instituted.

There are at least three reasons why policy makers at the national level should care about metropolitan development patterns. First, uneven development reduces the efficiency of the national economy and imposes costs on non-urban core residents, taxpayers, and consumers. The premature writedown or less than full use of public and private resources in distressed or declining areas imposes costs and reduces the efficiency not only of the declining area, but also of the U.S. economy as a whole. In addition, uneven urban development imposes economic and social hardships on some people in some urban economies. Finally, the nature of the federalist system means that some states and cities will not adequately address urban decline, especially poverty. In many cases city or state governments would like to do more to help distressed local economies or parts of economies but can't justify these actions politically.

Federal urban policy has built on a number of assumptions since World War II, including a strong federal role, the idea of a mass production metropolis with most employment concentrated in the core, a focus on remedying market imperfections through direct government action, and an emphasis on housing, social services, and physical redevelopment. These assumptions are no longer as valid, and therefore there is a need to reevaluate policy in light of changing conditions.

This report discusses the federal role in addressing the problems of the post-industrial metropolis. **In the era of the post-industrial metropolis, federal urban policy needs to become smarter and more strategic, focusing on shaping the institutional, regulatory, and fiscal environment influencing uneven growth patterns.** Especially in an era of reduced federal resources, increased capacities at the state, local, and private (non-profit and profit) levels, and increased variation and diversity between places, federal policy needs to focus less on simply providing funding to a large number of places through grant and other

programs, and more on intervening strategically in the metropolitan development system. Federal funding is still needed, in part because it can provide important levers to shape the behavior of other institutions. The federal role, however, needs to encompass several critical functions not now being performed: 1) providing incentives for other players (e.g., states, suburban governments, core city governments, non-profits, and business) to strategically devote their own resources to solving problems of uneven development between and within metropolitan areas; 2) assessing how other non-urban federal policies (e.g., environmental regulation, tax policies, telecommunications policies) contribute to uneven development and, if feasible, working to minimize their negative impacts; 3) assessing how non-urban federal programs (e.g., manufacturing modernization programs, business finance programs) could be better targeted to support more even development; and 4) supporting new innovative institutions, including in the private sector, that promote urban economic development, and 5) increasing efforts devoted to evaluation, demonstration, and technical assistance so that state-of-the art federal, state, and local urban economic and community development efforts are continually advanced.

Chapter 2 discusses three new approaches to federal urban policy: 1) improving the effectiveness of urban and community economic development efforts; 2) developing partnerships and metropolitan linkages; and 3) reducing subsidies to peripheral development (see table 1-1).

Federal Economic and Community Development Policies

There is a common perception that since the 1960s federal urban policies have concentrated on economic development, particularly of distressed communities within cities, and that the policies have failed.[11] Yet, few if any urban development programs since the 1960s have targeted economic development, and overall, policy has made only limited efforts to implement economic development in the urban core. If this current wave of technological change were leading to increased centralization of economic activities, there would be little need to try to stimulate economic growth in these areas. However, because technology is leading in the opposite direction, it may be an appropriate federal role to assist affected cities and suburban communities to give them time to adjust to these changes and reduce the transition costs (for people, industries and governments) of moving from the old industrial metropolis to the post-industrial metropolis (see chapter 3). One important avenue toward this goal is to ensure that a broad range of federal economic development policies focus on these areas. Moreover, it will be important that federal policies recognize the latest and most innovative economic development approaches and not only encourage communities to adopt these, but also modify their rules and regulations to allow communities to do so.

Today, four departments or agencies provide assistance for urban economic development: the Department of Housing and Urban Development, the Economic Development Administration (EDA) in the Department of Commerce, the Small Business Administration, and the Treasury Department.

HUD operates two major programs for urban economic and community development, the Community Development Block Grant program (CDBG), and the Empowerment Zone and Enterprise Communities Program. In addition, it operates several smaller programs. The CDBG program is the major federal community development program. It allocates grants on a formula basis to entitlement communities (cities with more than 50,000 population and selected urban counties) and to states for distribution to non-entitlement communities on a discretionary basis. Funds can be used for a variety of purposes including

[11] Nicholas Lemann, "The Myth of Community Development," *New York Times Magazine*, Jan. 9, 1994: 26-31; 50; 54; 60.

TABLE 1-1: Policy Options

		Impact on federal $	Change in federal role	Change in state/local role
	IMPROVING ECONOMIC AND COMMUNITY DEVELOPMENT EFFORTS			
1	Increase funding for economic and community development	M-L	N	N
2	Target more funds to distressed cities and suburbs.			
	▪require that EDA spend more of its funds in urban areas	N	M	N
	•tighten CDBG funding formulas	N	M	M
3	Increase targeting of SBA loan programs to minority-owned businesses and businesses in distressed urban core areas.	N	s	s
4	Require cities to spend an increased share of federal funds in distressed neighborhoods	N	s	M
5	Provide incentives for cities and states to focus programs on distressed places and disadvantaged persons.	N	s	M
6	Base state and local funding on performance			
	▪allocate a share of block grant funds based on selected performance measures of the grantee	N	M	M
	▪create a competitive, challenge-grant program combining all federal economic and community development funds.	N	L	M
7	Encourage EDA or HUD to do more to support innovative efforts, perhaps funding an office of strategic economic development	s	M	s
8	Consolidate existing urban economic and community development programs into one program into one agency or institution.			
	= move more toward consolidated block grants.	N	L	M
	•create a competitive, challenge-grant program combining all federal economic and community development funds.	N	L	M
9	Target a greater share of federal funding to more comprehensive, innovative economic development organizations.			
	•encourage HUD to fund more innovative economic development institutions, perhaps through funds distributed on a performance basis.	N	s	M
	▪broaden the applicability of activities under Title 1 in EDA to allow funding for innovative economic development programs or activities.	N	s	M
10	Increase support for Community Development Corporations (CDCs) and other similar comprehensive, locally-based development organizations.			
	▪increase funding for HUD's National Community Development Initiative	M	s	M
	▪establish a quasi-public corporation to fund community-based development organizations.	M	L	M
11	Target a greater share of NIST's manufacturing outreach efforts urban areas	N	M	s
	DEVELOPING PARTNERSHIPS AND METROPOLITAN LINKAGES			
12	Encourage federal policymakers to work with trade associations, large corporations, and other business organizations to catalyze efforts to revitalize distressed urban economies	s	M	M
13	Provide incentives for local governments in a metropolitan area to cooperate.			
	▪encourage the Administration to review existing federal programs as to the extent to which they hinder or encourage regional cooperation at the metropolitan level.	N	s	M
	▪require that states and cities receiving federal funds in areas such as transportation, economic development, and housing establish metropolitan-wide development councils that work to minimize uneven development	N	M	L

(continued)

TABLE 1-1: Policy Options (Cont'd.)

		Impact on federal $	Change in federal role	Change state/lo role
14	Encourage the formation of metropolitan-wide organizations to manage federally-funded efforts.	N	M	L
15	Increase support for mobility to work programs.			
	▪ fund the "Bridges to Work" program, and based on its findings, expand the program to more cities and more participants.	M	s	M
	▪ provide tax incentives to suburban employers who provide van pools or other transportation for disadvantaged urban core residents.	M	s	s
	REDUCING SUBSIDIES TO PERIPHERAL DEVELOPMENT			
16	Require that HUD assess the extent to which public policies subsidize suburban and exurban development, particularly at low densities.	L	N	N
17	Develop policies to reduce state and local industrial incentive bidding wars.			
	▪ prohibit executive branch agencies from entering incentive bidding contests for the attraction of federal facilities.	s	s	N
	▪ apply anti-pirating provisions to all federal economic development programs.	N	s	M
	▪ encourage the Secretary of Commerce to convene a meeting of state economic development directors to try to reach an agreement to stop, or at least significantly curb the practice.	N	s	M
	▪ require city and state recipients of federal economic and community development funds to report all subsidies given to relocating firms	N	M	L
	▪ reduce federal funds to states and communities for economic development in proportion to recruitment incentives offered	N	M	L
	▪ subject state and local incentives to federal taxation.	+	s	M
18	Foster cleanup and redevelopment of urban brownfields:			
	▪ establish programs to fund brownfield assessment and cleanup.	M	M	S
	▪ establish a "Brownfield IRA" that would allow small and medium-sized companies to put aside tax free money that must be spent for cleanup	M	s	S

1= none; S= small; M= moderate; L= large; + = increased revenue flow.

housing rehabilitation, energy conservation, public services and facilities, infrastructure, business financing, and commercial revitalization. In 1995, funding was approximately $4.6 billion.

In addition, Congress established the Empowerment Zone/Enterprise Communities program in 1993, targeted to pervasive poverty, unemployment, and general distress. Six cities (Atlanta, Baltimore, Chicago, Detroit, New York, Philadelphia/Camden) were designated as EZs (with Los Angeles and Cleveland being designated as supplemental EZs), and 60 urban ECs were selected. Each urban EZ is slated to receive $100 million, and each EC is to receive $2.95 million through the Social Services Block Grants administered by the Department of Health and Human Services. These grants can be used to fund a variety of economic, social, and community development activities as determined by community residents. In addition, the Treasury Department will administer $2.5 billion in tax credits to EZs.

The Economic Development Administration (EDA) in the Department of Commerce principally funds local public works construction projects (e.g., industrial parks, access roads, sewer lines), in large part to enable communities to attract new industry. EDA also provides grants to communities facing sudden economic distress, increasingly to respond to military base closures, and funds technical assistance and economic research. Current grant funding of $379 million is down from $900 million (1995 dollars) in 1980.

The Small Business Administration (SBA) provides financing and technical assistance to small businesses, some of them minority-owned, and some located in urban core areas. The agency's primary financing program, the 7(a) loan guarantee program, guaranteed more than 36,000 loans in FY 1994 for a total of more than $8.1 billion. SBA's 504 program is a fixed asset financing program for existing businesses. In FY 1995, it will have made approximately 4,000 loans, for $1.5 billion.

Administered by the Treasury Department, the Community Development Finance Initiative (CDFI) was established in 1994 to provide capital to either existing financial institutions that specialize in community development lending, or to seed new organizations proposing to do this type of work. The program plans to announce its first round of funding availability ($50 million) in mid-October, 1995.

Improving Economic and Community Development

Federal support for economic and community development helps local communities design and carry out strategies to address poverty, abandonment, and economic distress. However, there are several limitations to current federally supported economic and community development initiatives. First, while the number of distressed places has increased in the last 15 years, federal funding has decreased. Second, the reduced funds could be better targeted to distressed areas. A not insignificant share of CDBG and other economic development funds are spent on places with relatively low levels of distress and need (such as well-off suburbs) and projects that have a low level of benefit for low- and moderate-income people. For example, between 1975 and 1989 the share of CDBG funds going to the most distressed cities declined from about 50 percent to about 36 percent, while the share going to cities that were best off doubled (to about 11 percent).[12]

Third, funding formulas for many programs provide few incentives for improving local grantee performance. Many federal urban programs (including job training, housing, and economic development) provide formula-based block grants to city or state governments, regardless of the performance of the grantee. In most cases, performance varies significantly between cities or states, with some cities using federal funds to craft and implement effective, strategic, and efficient

[12] Michael J. Rich, "Targeting Federal Grants: The Community Development Experience" in *Community and Economic Development: Rethinking the Federal Role*, Congressional Research Service, May 6, 1992.

actions, and others failing to plan, or operating mediocre programs. Yet, for both the best performers and the worst, block grants provide the same amount of money.

Fourth, although there is considerable agreement that comprehensive and strategic approaches to community development are more effective than piecemeal ones, current efforts are piecemeal and uncoordinated, with federal urban policy being the province of a number of different agencies and within each, a large number of individual programs. According to the General Accounting Office the federal government assists distressed urban communities and their residents through at least 12 federal departments and agencies.[13] This proliferation of programs causes a number of problems. Because these agencies rarely work together, their programs cannot reinforce one another. Also, organizations at the local level must deal with a plethora of programs and agencies, making it difficult for localities to obtain assistance. This also makes the crafting of strategic, comprehensive, and integrated solutions at the local level difficult, as each federally funded program has its own rules, eligibility requirements, and boundaries.

Fifth, new institutions and approaches are needed at the local level. Efforts to improve the economic prospects of distressed urban areas and the lives of disadvantaged people in cities are an amalgam of separate subsystems, usually with very little overlap, cooperation, or coordination. Moreover, many economic and community development programs do not work closely with industry and, as a result, have limited effectiveness. Moreover, business development programs are often bureaucratic, content with supplying general information rather than real services (e.g., training, access to technology, management assistance), passive in orientation, and uncertain how to develop working relationships with firms. The best programs are customer-oriented, focused on ongoing interaction with the business client, provide customized services and are flexible. Non-governmental (private or quasi-public) organizations often do this best.

Sixth, most EDA and HUD economic and community development funds are either for physical revitalization projects (e.g., housing and infrastructure) or for loans and other financial assistance to individual firms. In part because of the potential of new information technologies to weaken and restructure the economy of the urban core, a new kind of urban policy effort may be needed, one that is focused sharply on economic development in general, and on business development in particular. As a result, a major thrust of the new urban economic development should be building up the capacity and competitiveness of business in the central city and inner suburbs. Moreover, urban economic development should rely less on tax incentives, low interest loans, and provision of buildings and infrastructure, and more on helping small- and medium-sized business owners and managers improve their management and financial skills, access to technology, and workforce training levels. There are a number of urban economic development initiatives that will be important, including promoting urban manufacturing, developing minority entrepreneurship, and using technology proactively.

Though the particular limitations of federally supported economic and community development efforts can be addressed individually (e.g., institute new procedures for targeting, develop performance standards as part of block grants), Congress could undertake a major overhaul of these efforts and create a new approach that addresses all the limitations simultaneously. One option would be to create a consolidated urban development initiative (see box 2-1 in chapter 2). This could be in one department, such as HUD or Commerce. Or, to give the initiative more flexibility and a fresh new start, it could be housed in a

[13] The General Accounting Office, "*Community Development: Comprehensive Approaches Address Multiple Needs but Are Challenging to Implement*," GAO/RCED/HEHS-95-69 (Gaithersburg, MD: February 1995).

newly created, quasi-public National Urban Economic Development Corporation. Either entity would operate as a comprehensive, performance-based, flexible urban development program and would house all current federal urban economic and community development programs, including EDA and CDBG. The organization's main role would be to make competitive challenge grants to states and cities, perhaps with a share of the funds going to states and a share directly to cities. In addition, it could play a catalytic role to stimulate the development of other urban initiatives, particularly in partnership with foundations and the private sector, and to help develop partnerships between states, suburban jurisdictions and cities.

States and cities would compete for grants for a multi-year period, with funding being renewed each year based on performance. Initial funding could be based in part on need and level of distress, and in part on the degree to which proposals were strategic as opposed to ad hoc; comprehensive instead of piece-meal; regional in nature rather than local; and based on partnerships rather than going it alone. Funding could be for a wide array of projects, activities, or organizations. Moreover, a portion of the city funds could be allocated on a metropolitan basis in order to promote regional cooperation and develop regional solutions. By basing allocations in part on performance, the federal government could provide flexibility at the state and local level, yet use market forces to drive performance improvement among grantees, and also create incentives for state and local grantees to meet federal objectives. Because more disadvantaged communities may not have the resources to design as effective programs or craft as effective proposals, such a system could have provisions built into it that reward performance in part on the level of improvement shown by a jurisdiction.

Developing Partnerships and Metropolitan Linkages

In an era of reduced federal resources; increased capacities at the state, local, and private (non-profit and profit) levels; and greater variation and diversity between places, federal policy needs to focus less on simply providing funding to a large number of places through grant and other programs, and more on intervening strategically in the metropolitan development system. As a result, it will be important to encourage state governments and industry to proactively be a part of the solution to urban problems. Moreover, though economic development will be important in urban cores, both to provide breathing room during this transition and to capitalize on the opportunities provided by technological change, relying on economic revitalization of the core alone is unlikely to be successful. Stronger linkages between all parts of the metropolitan economy are needed now that one of the defining features of the post-industrial metropolis is that it is not a collection of small, nearly self-sufficient economies, but is a truly metropolitan-wide economy (see chapter 3). As a result, federal policy should encourage efforts that use region-wide resources and efforts to solve urban core problems.

One important role for the federal government is to catalyze partnership efforts between the private sector and firms and communities in distressed parts of metropolitan areas, partly by documenting what is going on and then publicizing what can be learned from them.[14] Even with adequate federal funds, urban policy efforts would be less than fully successful if they did not tap into the expertise and creativity of the private sector. Federal policymakers need to consider working with trade associations, large corporations, and other business organizations to explore the extent

[14] Michael E. Porter, "The Competitive Advantage of the Inner City," *Harvard Business Review,* May-June 1995, pp. 55-71.

to which efforts that firms find profitable also help revitalize urban economies, and to help catalyze such efforts.

In addition, the design of federal policies has not adequately recognized that the defining feature of the post-industrial metropolis is that it is a metropolitan-wide economy. It is important that federal policy promotes efforts that link the opportunities in the growing outer suburbs with the needs of the urban core, especially jobs. There are several ways to do this.

First, the federal government can provide incentives for municipalities in metro areas to work together to promote growth in core areas. The Intermodal Surface Transportation Efficiency Act (ISTEA) and the Clean Air Act Amendments, which require regional solutions to metropolitan problems, are precedents for this approach. Effective regional planning will also help to overcome the fragmentation of land use planning in American metropolitan areas. As a result, Congress may want to encourage the Administration to review, perhaps through the National Economic Council, the extent to which existing federal programs hinder or encourage regional cooperation at the metropolitan level. In addition, it could require that states and cities receiving federal funds for activities such as transportation, economic development, and housing establish metropolitan-wide development councils to work to minimize uneven development.

Second, many federal and state-funded programs are operated by separate organizations in suburban and central city areas. For example, the Job Training Partnership Act (JTPA), the major source of federal training funds, is usually organized into multiple Service Delivery Areas (SDAs) with the central city SDA separate from suburban ones. The lack of a regional structure makes it difficult to craft metropolitan-wide training, placement, and transportation solutions for employment. Instead of providing services through federally funded organizations now set up at the county or city level, Congress could encourage the formation of metropolitan-wide organizations to manage, or at least coordinate efforts. For example, Congress could provide incentives under the JTPA program for Service Delivery Areas (SDAs) to cooperate across SDA boundaries. More proactively, Congress could consider requiring that Service Delivery Areas be consolidated to the metropolitan level.

Finally, even though economic development in the core appears able to provide some jobs in the core, dispersion of jobs will nonetheless continue because of the technological changes described in this report. As a result, urban core residents need access to jobs throughout the metropolitan economy. This was not a problem when the poor and unemployed lived near large concentrations of jobs, either in the downtown or in core city industrial areas, and the metropolitan labor market was by and large synonymous with the central city. However, as jobs decentralize, particularly jobs that provide opportunity for people with less education, policies that recognize the metropolitan nature of the economy are needed. Thus, one strategy for economic development is to overcome isolation by developing and maintaining connections to growing suburban labor markets. There are three main components of a metropolitan-wide employment accessibility policy. First, people in central city areas may need job training to prepare them for suburban jobs in back office operations, light manufacturing, or retail. Second, effective job information systems are needed to match city workers with job openings in the suburbs. Finally, central city workers need transportation to suburban jobs and they are often dependent upon car pooling or public transportation.

HUD has begun a pilot program, "Bridges to Work," to link unemployed and under employed in central cities to jobs in the suburbs. Six cities have been chosen for a four-year demonstration project to begin at the end of 1995. Total funding will be $25 million over four years. To further these efforts, Congress could fund the "Bridges to Work" program, and based on its findings, expand the program to more cities and more participants. In addition, it could provide tax incentives to suburban employers who provide van pools or other transportation for disadvantaged urban core resi-

dents. Possible forms of incentives could include tax credits for van service to existing transit or bus lines, and accelerated depreciation of the vehicles.

Reducing Subsidies to Peripheral Development

Even though urban economic development policies can be improved, their full effect will be hindered because outlying and core jurisdictions often do not compete for investments on equal terms. In a number of respects, including infrastructure and transportation, new development in places with lower densities is often more expensive, yet pricing policies often do not reflect these differences. Federal tax policy also appears to favor suburban as opposed to core areas. In many ways, the actions of the public sector, including the federal government, distort the locational decisions of the market. The failure of market prices to reflect full costs, including externalities, means that price signals are being given that further stimulate urban sprawl and dispersed development. Dispersed development is cheaper than it would be if it paid its full costs, and core development is more expensive. Moreover, such development patterns appear to systematically weaken the development prospects of the urban core.

Though only preliminary empirical research has been done, it does appear that development on the edge of metropolitan areas, particularly sprawl development, does not pay for itself, and is instead subsidized by others (e.g., local taxpayers in the core, consumers in a region, and state and federal governments). Several important subsidies include the provision of incentives by local and state governments to businesses locating in prosperous suburbs, the costs imposed on urban core brownfield redevelopment, and the underpricing of physical development (e.g., roads, sewers, etc.) in low-density, peripheral development. Moving to reduce or eliminate these subsidies and instituting full-cost pricing policies for peripheral development appears to be a step in the right direction, although the magnitude of these subsidies or the impact of their elimination on metropolitan growth patterns is not known.

Although dispersed development weakens the economic prospects of the core, unduly restricting development in the outer suburbs or exurban locations through such mechanisms as growth controls may be economically inefficient. However, an array of mechanisms, including marginal cost pricing, development levies, and full-cost recovery regulations, use the market's own signal mechanism—price—to encourage a more cost-effective urban development pattern. However, these mechanisms are in themselves incomplete because they address only localized and direct costs, not the region-wide social, economic, and environmental costs of excessive suburbanization and inner city decline. For that to occur, mechanisms that internalize external costs onto development are also needed.

A number of policies could move in this direction. First, options to encourage pricing of services to reflect marginal differences in the cost of providing services (such as telecommunications, cable TV, electric power) depending upon location, could increase costs in outer locations and reduce costs in the central city. Second, policies to internalize externalities could help reduce the unfair cost advantage outer suburb and exurban sites currently enjoy. For example, enforcing the Clean Air Act provisions regarding trip reduction in nonattainment metropolitan areas is likely to benefit urban core locations because transit access is greater there. Similarly, congestion pricing for driving would require automobile drivers to pay for the costs of increased traffic congestion that they impose on other drivers. Third, reforming tax treatment of home ownership could be beneficial to core areas. The homeowner mortgage interest tax deduction currently favors the well-housed and encourages large building lots, both of which favor outer suburbs where home ownership rates are higher and lots are larger.

However, without further and more definitive information, it is not clear how important subsidies are to encouraging peripheral development. Therefore, one option would be to task HUD to undertake a major study to assess the nature and extent to which public policies at all levels of gov-

ernment inadvertently subsidize suburban and exurban development, particularly at low densities, and what policy steps could be taken to reduce or eliminate these subsidies.

Second, curbing industrial recruitment incentives, particularly by fast-growing and prosperous areas, is an important urban policy. It is one thing for companies to leave the center city to move to the outer suburbs because land costs or rents are cheaper. Market forces are operating well here. However, it is quite another thing when financially well-off suburban jurisdictions provide financial incentives (free land, reduced taxes) to induce companies to move out of the city; financially strapped urban core jurisdictions cannot afford to counter such incentives. Though most federal economic development programs contain prohibitions against funding firms to move from another community, the CDBG program does not. As a result, one option would be to apply anti-pirating provisions to all federal economic development programs. More fundamentally, Congress could link federal funding for economic and community development inversely to the amount of incentives jurisdictions offer. States and cities (particularly growing ones) that spend money on incentives for relocating firms might have the amount of federal economic development funding reduced by some proportion, depending on the degree to which they provide more incentives than other states.

Finally, more so than outer suburbs, inner suburbs and central cities (or new firms locating there) are burdened with the costs of cleaning up contaminated lands because, in many cases, those responsible for the contamination cannot pay. Brownfields pose a number of problems, including cost, liability, delays, and uncertainty, all of which discourage their development. While removal of these impediments would not solve all redevelopment problems for these sites, it would help. There are a number of federal policies that could improve the prospects for brownfield redevelopment, including modification or clarification of liability issues, and EPA delegation of authority to states.[15] In addition, the federal government could provide funds to communities for assessment and cleanup of sites with strong prospects for development.

[15] U.S. Congress, Office of Technology Assessment, *The State of the State of Brownfields* (Washington, DC: OTA, June 1995).

Issues and Policy Options 2

The United States is in the midst of a technological revolution that is leading to an ever more spatially dispersed and locationally footloose economy and, as a consequence, is reshaping America's metropolitan areas (see chapters 4 through 8). Under these conditions, many older, higher-cost metropolitan areas, central cities and inner suburbs are experiencing job loss and disinvestment. Moreover, the existing skills mix of urban, suburban and rural economies is changing. Goods production, transportation and distribution jobs, and routinized service jobs are decentralizing to metropolitan peripheries and to middle-size and smaller metros. In contrast, higher-skill professional and managerial jobs are more likely to remain in urban cores and suburbs of larger metropolitan areas.

These changes create benefits and opportunities, including greater efficiency (as industry locates in the lowest-cost locations), increased opportunities for people to live in the suburbs, and potentially decreased commuting times.[1] However, the new development patterns pose challenges that have important public policy implications. First, the changes are likely to bring about ever-larger, more sprawling, and less densely populated metropolitan areas, creating problems of inadequate transportation, added infrastructure costs, and poor environmental quality. Second, some places will not successfully adapt, and will continue to suffer disinvestment and job loss leading to underutilization of the built environment, reduced central city agglomeration benefits for industry, and increased poverty, ghettoization, and fiscal

[1] Moreover, this wave of information technologies has the potential to lead to significant improvements in productivity, particularly in the services sector.

problems for local governments. Moreover, the combination of the higher skills needed in the new economy in the suburbs, and the large, growing population of lower-skilled and often minority residents in urban cores is likely to exacerbate economic and social problems. Overall, rapid technological change reinforces uneven development patterns, both between and within metropolitan areas.

Federal urban policy has been built on a number of assumptions since World War II, including a strong federal role, the idea of a mass-production metropolis with most employment concentrated in the core, a focus on remedying market imperfections through direct government action, and an emphasis on housing, social services, and physical redevelopment. Based on these assumptions, the federal role in addressing the problems of the industrial metropolis has largely been devoted to operating programs to provide funds.

In the era of the post-industrial metropolis, federal urban policy needs to become smarter and more strategic, focusing on shaping the institutional, regulatory, and fiscal environment influencing uneven growth patterns. Especially in an era of reduced federal resources, increased capacities at the state, local, and private (non-profit and profit) levels, and increased variation and diversity between places, federal policy needs to focus less on simply providing funding to a large number of places through grant and other programs, and more on intervening strategically in the metropolitan development system. Federal funding is still needed, in part because it can provide important levers to shape the behavior of other institutions. The federal role, however, needs to encompass several critical functions not now being performed:

- providing incentives for other players (e.g., states, suburban governments, core city governments, non-profits, and business) to strategically devote their own resources to solving problems of uneven development between and within metropolitan areas;
- assessing how other non-urban federal policies (e.g., environmental regulation, tax policies, telecommunications policies) contribute to uneven development and, if feasible, working to minimize their negative impacts;
- assessing how non-urban federal programs (e.g., manufacturing modernization programs, business finance programs) could be better targeted to support more even development;
- supporting new innovative institutions, including in the private sector, that promote urban economic development; and
- increasing efforts devoted to evaluation, demonstration, and technical assistance so that the state-of-the art of federal, state, and local urban economic and community development efforts is continually advanced.

The chapter discusses three new approaches to federal urban policy (see table 2-1). The first emphasizes new approaches to economic development in urban core areas (including central cities and inner suburbs). As discussed below, past federal policy has not emphasized job creation and enterprise development in urban areas as a solution to disinvestment, poverty, and the fiscal problems of urban governments. If this current wave of technological change were leading to increased centralization of economic activities, there would be little need to try to stimulate economic growth in these areas. However, because technology is leading in the opposite direction, it may be an appropriate federal role to assist affected cities and suburban communities, in large part to give them the time to adjust to these changes and reduce the transition costs (for people, industries and governments) of moving from the old mass production metropolis to the post-industrial metropolis (see chapter 3). One important avenue toward this is to ensure that a broad range of federal economic development policies focus on these areas. Moreover, it will be important that federal policies recognize the latest and most innovative economic development approaches and not only encourage communities to adopt these, but also modify their rules and regulations to allow communities to do so.

Second, while economic development will be important in urban cores, both to provide breath-

TABLE 2–1: Policy C

		Impact on federal $	Change in federal role	Change in state/ local role
	IMPROVING ECONOMIC AND COMMUNITY DEVELOPMENT EFFORTS			
1	Increase funding for economic and community development	M-L	N	N
2	Target more funds to distressed cities and suburbs.			
	▪require that EDA spend more of its funds in urban areas	N	M	N
	▪tighten CDBG funding formulas	N	M	M
3	Increase targeting of SBA loan programs to minority-owned businesses and businesses in distressed urban core areas.	N	s	s
4	Require cities to spend an increased share of federal funds in distressed neighborhoods	N	s	M
5	Provide incentives for cities and states to focus programs on distressed places and disadvantaged persons.	N	s	M
6	Base state and local funding on performance:			
	▪allocate a share of block grant funds based on selected performance measures of the grantee	N	M	M
	▪create a competitive, challenge-grant program combining all federal economic and community development funds.	N	L	M
7	Encourage EDA or HUD to do more to support innovative efforts, perhaps funding an office of strategic economic development	S	M	s
8	Consolidate existing urban economic and community development programs into one program into one agency or institution.			
	▪move more toward consolidated block grants.	N	L	M
	▪create a competitive, challenge-grant program combining all federal economic and community development funds.	N	L	M
9	Target a greater share of federal funding to more comprehensive, innovative economic development organizations.			
	▪encourage HUD to fund more innovative economic development institutions, perhaps through funds distributed on a performance basis.	N	s	M
	▪broaden the applicability of activities under Title 1 in EDA to allow funding for innovative economic development programs or activities.	N	s	M
10	Increase support for Community Development Corporations (CDCs) and other similar comprehensive, locally-based development organizations.			
	▪Increase funding for HUD's National Community Development Initiative	M	s	M
	▪establish a quasi-public corporation to fund community-based development Organizations.	M	L	M
11	Target a greater share of NIST's manufacturing outreach efforts urban areas.	N	M	s

(continued)

TABLE 2–1: Poli[illegible]

		Impact federal $	Change in federal role	Change in state/ local role
	DEVELOPING PARTNERSHIPS AND METROPOLITAN LINKAGES			
12	**Encourage federal policymakers to work with trade associations, large corporations, and other business organizations** to catalyze efforts to revitalize distressed urban economies	S	M	M
13	Provide incentives for local governments in a metropolitan area to cooperate.			
	▪encourage the Administration to review existing federal programs as to the extent to which they hinder or encourage regional cooperation at the metropolitan level.	N	S	M
	▪require that states and cities receiving federal funds in areas such as transportation, economic development, and housing establish metropolitan-wide development councils that work to minimize uneven development .	N	M	L
14	Encourage the formation of metropolitan-wide organizations to manage federally-funded efforts.	N	M	L
15	Increase support for mobility to work programs.			
	▪fund the “Bridges to Work” program, and based on its findings, expand the program to more cities and more participants.	M	S	M
	▪provide tax incentives to suburban employers who provide van pools or other transportation for disadvantaged urban core residents.	M	S	S
	REDUCING SUBSIDIES TO PERIPHERAL DEVELOPMENT			
16	**Require that HUD assess the extent** to which public policies subsidize suburban and exurban development, particularly at low densities.	L	N	N
17	Develop policies to reduce state and local industrial incentive bidding wars.			
	▪prohibit executive branch agencies from entering incentive bidding contests for the attraction of federal facilities.	S	S	N
	▪apply anti-pirating provisions to all federal economic development programs.	N	S	M
	▪encourage the Secretary of Commerce to convene a meeting of state economic development directors to try to reach an agreement to stop, or at least significantly curb the practice.	N	S	M
	▪require city and state recipients of federal economic and community development funds to report all subsidies given to relocating firms	N	M	L
	▪reduce federal funds to states and communities for economic development in proportion to recruitment incentives offered	N	M	L
	▪subject state and local incentives to federal taxation.	+	S	M
18	Foster cleanup and redevelopment of urban brown fields:			
	▪establish programs to fund brownfield assessment and cleanup.	M	M	S
	▪establish a “Brown field IRA” that would allow small and medium-sized companies to put aside tax free money that must be spent for cleanup	M	S	S

N= none; S= small; M= moderate; L= large; + = increased revenue flow

ing room during this transition and to capitalize on the opportunities provided by technological change, relying only on economic revitalization of the core is unlikely to be successful. In most places the strongest parts of the post-industrial metropolis are selected outer suburbs, and even exurban areas. Linking these growing and buoyant economies with urban core economies will be particularly important. One avenue involves increasing regional planning, cooperation, and linkages in metropolitan areas. One critical strategy will be to increase the ability of urban core residents, particularly disadvantaged residents, to get jobs in the growing suburbs.

Finally, while the first two policy approaches work to provide additional assistance to places where market forces may not be producing socially desirable outcomes, it is important that market prices themselves give the right signals for development, so that they do not lead to a bias against development in more dense inner suburbs and central cities. Though only preliminary empirical research has been done, it does appear that development on the edge of metropolitan areas, particularly sprawl development, does not fully pay for itself, and is instead subsidized by others (e.g., local taxpayers in cores of large, sprawling cities; consumers in the region; and state and federal governments). Several important subsidies include the provision of incentives by local and state governments to businesses locating in prosperous suburbs, the cleanup costs borne by developers of contaminated lands in urban cores (brownfields), and the underpricing of physical development (e.g., roads, sewers, etc.) in low-density, peripheral development. Although the magnitude of these subsidies or the impact of their elimination on metropolitan growth patterns is not known, moving to reduce or eliminate these subsidies and institute full-cost pricing policies for peripheral development appears to be a step in the right direction.

This chapter first discusses the rationale for why federal policymakers should be concerned with metropolitan areas, and in particular, uneven development patterns within and between them. It then discusses a range of broad guiding principles or approaches that could guide federal urban policy. Next, it examines urban economic development policies and offers a number of options for improvement, including increased targeting, greater incentives for better performance, more effective coordination at both the federal and local level, and increased efforts at business development. Policies to link urban core economics with growing suburbs are then discussed. Finally, the last section examines policies to reduce or eliminate subsidies to suburban and exurban growth, particularly low-density growth.

THE BASIS OF CONCERN WITH UNEVEN DEVELOPMENT

Before examining policy options for metropolitan areas, we ask why policymakers at the national level should care about metropolitan development patterns. There are at least three reasons for concern: 1) the efficiency of the national economy; 2) the economic and social hardships experienced by some people in some urban economies; and 3) the nature of the federalist system, which results in some cities and states not adequately addressing urban decline, especially poverty.

Uneven development at the regional level means some metropolitan areas (metros) grow very fast while others stagnate or lose jobs and population. Uneven development at the metropolitan level means growth, prosperity, and congestion in some parts of the metropolitan area, and decline, poverty, and underutilization in other parts. For many metropolitan economies, particularly those that have not successfully made the transformation to the dispersed city, their growth is characterized by uneven development. Technological change is likely to further exacerbate uneven development patterns.

Uneven development can reduce the efficiency of the national economy because some places are declining and have excess capacity, while others are growing and spending to add new capacity. When some metropolitan areas or parts of a metropolitan area suffer dislocation and decline, some factors of production are moved and can be used elsewhere. Some firms may relocate, either to oth-

er metros, or to other parts of the metropolitan area, taking their capital, expertise, and even their machinery with them. Some workers may do the same. However, firms cannot move their buildings, nor can workers move their homes. Public and quasi-public infrastructure, such as hospitals, utility networks, schools, roads, sewers, and bridges, is likewise immobile. As a result, when all or part of a metropolitan area undergoes economic dislocation leading to out-migration, many houses, factories, and offices and land remain vacant or underused, and public infrastructure is underused. This premature writedown or less than full use of public and private resources imposes costs and reduces the efficiency not only of the declining area, but also of the U.S. economy as a whole. No one argues that all inefficiencies can be squeezed out of a dynamic economy. However, some inefficiencies are self-correcting, or easily corrected, and others are not. Metropolitan economic decline may lead to inefficiencies of the latter kind, even at the national level.

With urban decline, local spending on social services usually increases and, because of a smaller tax base, tax rates often increase, leading to fiscal difficulties that are today evident in many central city and inner suburban governments. A reduced tax base in the medium term means that less is spent on city services, including infrastructure, transportation, police protection, and education. This can in turn lead to increases in congestion, crime, and other negative externalities, while reducing educational levels and some of the benefits to firms of agglomeration economies. As a result, further rounds of outmigration occur, threatening to create a downward cycle, one Myrdal has characterized as cumulative causation.[2]

If the departing industries or workers move to areas that are growing—either outer suburbs or other metropolitan areas—the growing community either has to incur costs to pay for new infrastructure (e.g., bigger hospitals, widened roads), or put further strains on already overextended resources, thereby causing increased transportation congestion and delays, overcrowded schools, and other inadequacies in public services. Private resources are strained as well, increasing the price of land, housing, labor, and offices.[3] Businesses competing in international markets bear some of these increased costs. Moreover, uneven utilization of resources limits the ability of the Federal Reserve Board to lower interest rates and otherwise stimulate the economy as much as it might, because growing places threaten to overheat the economy. The less uneven development, the faster the U.S. economy as a whole can grow.

Urban economic decline imposes social, psychological, and physical distress as well as economic costs. Such stress can weaken the community fabric so that redevelopment becomes more difficult. Moreover, urban decline has led in many places to expanded ghettoes and increased poverty, making advancement even harder for those living in these areas[4] (see chapter 3). The health of the residents can suffer, and crime and other social disorders can increase. Moreover, increased costs (e.g., health insurance, prisons) can be borne by all consumers and taxpayers.

Finally, assuming that public policy action to respond to urban economic distress is desirable, the question remains as to whether this is necessarily a federal responsibility rather than solely a state or local one. One byproduct of the federalist system in the United States is that states and cities

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[2] The theory of cumulative causation, first proposed by Gunnar Myrdal, suggests that economic decline is not always self-correcting. *Rich Lands and Poor* (New York, NY: Harper and Row, 1957).

[3] One study of 103 Massachusetts communities found that local per-capita expenditures were highest in both rapidly declining cities and rapidly growing cities. One reason local public expenditures increase with growth is that the cost of providing services for new households is often higher than the revenues they provide. Helen Ladd, "Municipal Expenditures and the Rate of Population Change," in R. Burchell and D. Listokin, (eds.), *Cities Under Stress* (Rutgers, NJ: Center for Urban Policy Research, 1981) pp. 351-68.

[4] William J. Wilson, *The Truly Disadvantaged* (Chicago, IL: University of Chicago Press, 1987).

compete for jobs and residents, and so must keep taxes low, especially when revenues are targeted for redistribution to distressed cities or parts of cities. As a result, many states are reluctant to spend much money to address urban problems, because doing so runs the risk of raising taxes. Cities and suburban communities that want to address problems of uneven development within their borders may not have the revenue to do so, since increasing taxes for this purpose runs the risk of exacerbating business and middle-class flight. Even states and cities that have the fiscal capacity to help rebuild urban economies may not have the political will to do so. In many state legislatures, the power of urban constituencies is weak, making it difficult for states to help cities.[5] In addition, Governors often respond to more influential suburban or rural constituencies. Similarly, many mayors and local elected officials emphasize services and economic development assistance for prospering areas of the city, particularly the downtown, in part because the political costs of not helping distressed areas are low, and in part because they perceive this as the most effective strategy for improving the tax base.[6]

A federal role appears to be appropriate on two grounds. First, there is inter-state and inter-city competition to keep expenditures low. Second, in many cases city or state governments would like to do more to help distressed local economies or parts of economies but cannot justify these actions politically. Being able to point to the federal government as requiring these actions or providing matching funds for them can establish needed, and sometimes welcome, political cover. An appropriate federal urban policy provides incentives and motivation for states and localities to address these issues and provide a framework for viable partnerships, not only between all levels of government, but most importantly involving the private sector, non-profit organizations, and citizens.

URBAN POLICY APPROACHES

People or Places

There is an historical debate about whether urban and regional policy should target people directly or instead target distressed places.[7] People policies focus on helping people regardless of where they live, and include, for example, welfare reform, helping people move to get jobs, and portable housing vouchers. In contrast, place policies focus on helping people in particular places, and include, for example, enterprise zones, health clinics in poor areas, and publicly assisted housing. The people vs. place choice has, unfortunately, usually been stated in stark terms, with policymakers expected to choose one or the other. A more effective approach appears to be to combine the best elements of place- and people-oriented policies into a coherent approach to address the problems of distressed urban places and their residents.

There are at least three broadly defined ways to address the problem of economically disadvantaged places and persons in urban areas, with the first focusing on people, the second on both, and the last on place: 1) assist people in moving out of depressed local urban economies; 2) help local residents gain access to jobs in suburbs; and 3) revitalize depressed local urban economies. All three approaches are premised on the notion that geography matters in terms of economic opportunity.

Clearly some people move from declining metros to growing ones, and from declining neighborhoods to more prosperous ones, and early evidence suggests that these strategies can in-

[5] For example, in the small-city Community Development Block Grant (CDBG) program administered by states, there was significant variation among states in terms of degree of targeting on the most distressed places, and a majority of states did less well at targeting CDBG funds than did the federal government. Michael Rich, *Federal Policymaking and the Poor* (Princeton, NJ: Princeton University Press, 1993).

[6] Phyllis A. Furdell, "Poverty and Economic Development: Views from City Hall" (Washington, DC: National League of Cities, July 1994).

[7] Robert Wood, "People Versus Places: The Dream Will Never Die," *Economic Development Quarterly*, vol 5, No. 2, May 1991, pp. 99-103.

crease the economic and social well-being of the movers.[8] However, not all people can or will avail themselves of this option. The poor may not be able to afford housing in the suburbs and they face other barriers. Even for people who can afford to move, many long-time residents are committed to their neighborhoods and communities and do not want to move.

The second approach focuses on helping people in distressed areas get jobs in the growing suburbs. Usually, mobility-for-work programs train residents of disadvantaged areas for jobs in the suburbs, help them become aware of job openings, and facilitate transportation to the jobs. The major advantage of this approach is that it focuses on where most of the new jobs are. (They are usually growing fastest in the suburbs.) A limitation is that it is not clear that urban residents will be able to get enough of these jobs. Moreover, commuting long distances to the suburbs can be costly and time consuming.

The third approach is place-based and focuses on revitalizing depressed local urban core economies through, for example, empowerment zones, business development programs, and provision of infrastructure to urban core areas. The pros and cons of this approach form the subject of the first half of this chapter.

Any discussion of revitalizing urban core economies must acknowledge there are many factors that contribute to the problems of the urban poor, including a lack of good jobs, discrimination, a culture of poverty, drug abuse, crime, and low education levels and poor schools. As technology restructures urban core economies to become more service oriented and more highly skilled, increasing the skills and education levels of urban residents will be increasingly important. To compete and continue to provide jobs for residents, cities will have to do a better job of preparing their young people for employment. Thus, one important public policy for central city areas is improving central city public schools.

Although these social factors are important elements of the economic and social decline in some of these places, there is widespread agreement that factors related to economic decline and restructuring also play a significant role.[9] Since this report concentrates on how technologies are reshaping the geography of metropolitan economies, the emphasis is on place-based economic development policies.

Moreover, any attempt to formulate urban policy options must recognize that it is not reasonable to expect any one option to be the complete solution. In many cases, advocates tout their own particular policy solution (e.g., moving to opportunity, enterprise zones) as **the** solution to the problem and criticize all other options. A more realistic view is that no one policy option will provide the answer. Rather, a wide range of policy options and approaches, each contributing something to making cities better and their residents better off, has a better chance of success. This does not mean that some approaches don't work better than others, but rather that the solution to a multifaceted problem must itself be multifaceted.

Major Approaches to Urban Policy

Place-specific policies offer Congress a number of overlapping choices on how to address uneven development between and within metropolitan areas.

Reduce Funding and Ensure That Accurate Price Signals Are Sent

Congress could significantly reduce funding of current programs and hope that existing market

[8] For example, the Gautreaux project in Chicago, where a random sample of public housing residents was relocated to suburban locations, is cited as having led to economic and social advancement for the participants. Mary Lou Gallagher, "HUD's Geography of Opportunity," *Planning*, July 1994, p. 12.

[9] Wilson, op. cit., footnote 4.

forces will send the right price signals at the right strength. Such a course has several advantages. First, it minimizes federal expenditures. Second, it is consistent with market forces that may by themselves yield solutions. As urban areas decline and suburban and exurban growth increase, cost differentials between the core and the edge will decline. Land costs will decline in the core and increase on the edge. Commuting will become more difficult on the edge and easier in the core. Densities will decline in the core, perhaps with some abandoned areas of cities devoted to open space, while densities on the edge will increase.

However, for three reasons, market adjustments alone are not likely to produce economic recovery in all metros or parts of metros in the near future. First, it can take a long time for prices to fall far enough to put adjustment into motion. Moreover, unlike consumers who may readily shift to lower-priced items, most firms will not necessarily move to declining areas to take advantage of lower costs, not only because the costs of relocating are substantial, but because other non-economic factors (e.g., crime, blighted environment) reduce the attractiveness of the area. In addition, workers have non-economic ties to neighborhoods and localities that make it hard for them to move when local economies decline. Other factors may make it difficult for urban residents, particularly minorities, to move to suburban locations.

Second, economic decline may never be self-correcting. When it is sustained and significant it can create a vicious circle that makes a city progressively less competitive. As financial, human, and civic resources shrink, investment in public and private infrastructure falls. Reduced spending on education and training, transportation, and other public infrastructure makes the city less attractive to new investment, in turn causing further economic decline. Caught in a downward spiral, it may be impossible for a community ever to regain its former level of prosperity and quality of life unless it gets help.

Third, there are many tax, regulatory, and policy factors that hinder accurate price signals from being sent. These distortions appear to systematically tilt development toward suburban and rural areas (see chapter 8). Part of the problem arises from the conventional practices of subsidizing (directly and indirectly) new development in lower-density outer suburban and exurban areas. For example, the cost of providing phone service to fringe, low-density suburban development is higher than providing phone service to the central business district, yet monthly rates are set the same by regulation. In addition, part of the problem is that there is no effective system for allocating the external costs to the people and businesses that generate them. These externalities, including increased expenditures on infrastructure, increased traffic congestion, pollution, reduced open space, and abandonment of property in central cities and older suburbs, are not usually borne by those who choose dispersed development.

Policies that reduce subsidies (e.g., changes in telecommunications pricing policies) or internalize externalities (e.g., Clean Air Act Trip Reduction Programs) to greenfield development might be profitably employed. Prices would rise if low-density areas were forced to pay the real marginal costs of these services.[10] Similarly, limiting the ability of suburban and state governments to provide subsidies to attract industry from urban core areas would not only help retain industry in cities, it would save cities money. These policies have the advantage of not costing the federal government much.

Economic Incentives

Congress could rely on economic incentives to encourage residents and businesses to locate in weaker inner suburbs and central cities. For exam-

[10] United States Congress, Office of Technology Assessment, *Technology and the American Economic Transition: Choices for the Future* (Washington, DC: U.S. Government Printing Office, 1988).

ple, some have proposed significantly reducing federal income taxes on residents of central cities. Similarly, empowerment zone and enterprise community programs rely in part on tax exemptions and credits to make distressed parts of cities more attractive. Such mechanisms have several advantages. First, they can pump significant resources into older central cities and inner suburbs; moreover, as residents or industries prosper, they will spend more, multiplying the jobs and investment in the city. Second, these mechanisms let individuals and businesses make decisions on how, where, and when they will relocate.

However, these approaches suffer from three principal drawbacks. First, they can be expensive and difficult to target. For example, reducing federal income taxes on the residents of central cities by 10 percent would cost the Treasury tens of billions of dollars. Likewise, the empowerment zone program has made $2.5 billion in tax incentives available to firms locating in the six zones. Moreover, in many central cities, particularly more prosperous ones and ones that have grown significantly through annexation (many Sunbelt cities, and some northern cities such as Indianapolis and Columbus), the portion of the city or its residents who are distressed can be quite small, leading to a diffusion of benefits to areas or people that do not need it. Moreover, the benefits go not only to residents or industries that move to the area because of the incentives, but also to those already there or who would have moved there without the benefits.

Second, in many places incentives may not be enough to overcome problems in the business and residential environment, including crime, inadequate infrastructure, poor education, minimal urban services, and regulatory barriers (including Superfund regulations regarding reuse of contaminated land; see chapter 9). It is likely that firms or individuals will locate in distressed places with a large enough incentive, but that amount may be very high in some places. In fact, the amount may be larger than the firm's or resident's entire tax bill, so that forgiving all the taxes may not be sufficient to induce location in the targeted places.

Third, even if incentives attract residents and industry, it does not necessarily follow that disadvantaged people will be helped. For example, though empowerment zone job creation tax credits are tied to zone residents, disadvantaged residents of the zone may not be hired in them, especially if they lack skills or other qualifications.

Continue the Status Quo

Congress could continue current programs, either at current or reduced levels. However, many of these programs were built up and designed to respond to problems of the mass production metropolis, when most of the jobs in the metro were in the core. Technology is transforming this pattern, and as a result, new policies should reflect this new reality. Moreover, urban policy has focused on providing adequate housing, social services, and in some cases community infrastructure. However, if information technology is weakening core economies, responding to the needs of people in these places will require either widespread outmigration to more economically healthy places, or increased economic development. Moreover, while current programs do help cities and their residents, the problems of poor housing, poor neighborhoods, and poor urban services stem in part from the low incomes of disadvantaged urban residents.

Sharpen the Focus on Economic and Community Development

Congress could sharpen the focus on community and economic development as a way to revitalize lagging metros and parts of metropolitan areas and provide jobs for low- and moderate-income residents. Urban economic development refers to the attraction, creation, or expansion of businesses within metropolitan areas. As discussed in chapter 4, technological change is reducing some of the competitive advantage central cities once held. In addition, it appears to be moving blue collar jobs away from urban cores and contributing to the increase in skills required by many urban jobs. Reduced economic activity is leading to under-

utilization of the built environment in many cities and to increased local government fiscal stress. Moreover, many low- and moderate-income residents without the education needed for many urban jobs are finding it difficult to advance economically.

Economic development in urban core areas could lead to several benefits. First, as more industry is attracted, created, or expanded in core areas, land and building use will rise. Second, increased industry and commerce will help urban residents advance economically. Finally, economic development can improve the tax base and fiscal health of urban governments, which in turn could improve services, including schools, public safety, and public housing.

The place-oriented, economic development policy approach has been criticized on a number of grounds. The first criticism is that as jobs are decentralizing to the suburbs, a policy of job creation in urban core areas swims against an inexorable tide. Similarly, people are moving out to the suburbs in search of opportunity. Expanding urban policy to include access by central city residents to suburban jobs is an important component of any effective policy effort. (However, not all residents or businesses can leave core areas, nor do they want to.) But many core areas are losing jobs, particularly lower skilled jobs, and this is often occurring for reasons that are amenable to public policy, such as labor force skills, tax rates, regulatory structure, and land availability. Moreover, as the current of decentralization of people and jobs flows on, there are hundreds of efforts to foster economic development in America's cities that are based on a strategic look at the new environment and the strengths and weaknesses of the community to determine the best role it can play in the new metropolitan economy.

Second, many believe the federal government has tried to promote urban economic development in the past and has failed, and therefore current efforts are doomed to fail. However, historically, the dominant focus of U.S. urban policy has been on redistributive measures to provide economically disadvantaged urban residents with services (e.g., income support, social services) or to provide housing and build infrastructure. Much less was spent on economic development. Moreover, that spending has declined over the last 15 years.

Third, much criticism is based on the view that government does not create jobs or know how to promote economic development effectively. In fact, it does appear that many efforts at economic development have been poorly conceived or targeted. However, the field of economic development has evolved significantly in the last decade, largely through innovative efforts at the local and state level. These efforts have developed and tested a wide range of new approaches on a limited basis, but they are not yet widely deployed.[11] Many of the approaches rely on private organizations and industry to carry out economic development, with the public sector playing a catalytic and supportive role.

Fourth, some argue that helping distressed core economies is a zero sum game that does little to help the overall economy, because jobs are simply shifted from one area to another. For example, many criticize empowerment zones for generating jobs at the expense of other areas. This criticism is valid when economically strong communities (either growing metropolitan areas or healthy suburbs) use inducements to recruit industry, particularly from distressed areas. In these cases not only are no new jobs created, but congested places get more congested and costs go up, and distressed places suffer even more. In contrast, as Bartik has shown, when distressed places attract industry, it helps the U.S. economy by evening out differences in regional economic capacities and allowing the national economy to grow at a faster rate with less fear of inflation.[12] The national un-

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[11] Robert D. Atkinson, "The Next Wave in Economic Development," *Economic Development Commentary,* Spring 1993.

[12] Tim Bartik, *Who Benefits From State and Local Economic Development Policies* (Kalamazoo, MI: Upjohn Institute for Employment Research, 1993).

employment rate of 5.5 percent (March 1995) masks significant regional differences with rates of 2.7 percent in Raleigh-Durham, and 8.5 percent in New York City.[13] Such differences in regional capacity utilization mean that national economic policymakers are constrained in boosting U.S. growth for fear of inflation in places with low unemployment. Moreover, creation of jobs in depressed areas generates increased demand for goods and services produced outside the areas, creating new jobs throughout the economy.

Federal Economic and Community Development Initiatives

There is a common perception that, since the 1960s, federal urban development policies have focused largely on economic development, particularly of distressed communities within cities, and that these efforts have failed.[14] Yet, few if any urban development programs since the 1960s have explicitly targeted economic development, and overall, policy has made only limited efforts to implement economic development in the inner city.[15] Yet, urban core areas of many metropolitan areas are increasingly at risk of economic decline as information technologies allow an increasing share of the economy to operate at distance and become more footloose. As a result, urban policy may need to take economic factors more into consideration and build up the productive component of the inner city. A key to this strategy would be to focus on developing the locational advantages of the inner city for businesses and enable the private sector to play a more active role.

Historically, the nature, perception, and response to urban problems has differed. From 1948 to the early 1960s, the federal response to urban problems was primarily to provide housing and to clear and assemble land through the Urban Renewal Program. In the late 1960s to early 1970s, HUD's Model Cities program focused on distressed places within metropolitan areas. But funding was limited (in 1972 it was equivalent to approximately $1.5 billion in 1995 dollars), widely dispersed (to 150 cities) and mostly spent on education, housing, health, social services, and infrastructure in poverty neighborhoods, with only a small share going for economic development.[16] In 1974, the Community Development Block Grant program (CDBG) was created to consolidate a number of housing and community development grant programs. Today, it is the major federal community development program. Outlays peaked in 1981 at $4.042 billion and in 1994 were $3.651 billion.

The Urban Development Action Grant program was established in 1977 to make direct grants to cities, in part because of the difficulty in using CDBG funds for economic development, particularly large-scale physical development projects. During its 12 years of operation (1978-1989) it awarded $4.6 billion to assist about 3,000 economic development projects in more than 1,200 cities.[17] UDAG mostly provided financial incentives (usually loans) for larger-scale projects, usually involving development or redevelopment of offices or retail stores; most communities did not (or could not) fund such projects with CDBG funds, which were used more for neighborhood renewal. Funding peaked at $675 million in FY 1981. Over 90 percent of UDAG funds went to central cities (with half of that going

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[13] Unemployment rates are even higher in some small metropolitan areas such as Fresno, CA (15.4 percent) and McAllen, Texas (17.1 percent). U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings*, vol. 42, No. 5, May 1995.

[14] Nicholas Lemann, "The Myth of Community Development," *New York Times Magazine*, Jan. 9, 1994, pp. 26-31; 50; 54; 60.

[15] Michael Porter, "The Competitive Advantage of the Inner City," *Harvard Business Review*, May/June 1995, pp. 55-71.

[16] Morton Schussheim, *The Modest Commitment to Cities* (Lexington, MA: Lexington Books, 1974).

[17] Michael J. Rich, "UDAG, Economic Development and the Death and Life of American Cities," *Economic Development Quarterly*, vol. 6, No. 2, May 1992, pp. 150-172.

to downtown projects), and most went to places with high levels of economic distress.[18] UDAG was praised for its ability to target money to distressed places, to strengthen public-private partnerships, and for contributing to a large number of development projects. Critics of UDAG believed that the program subsidized large developers and firms, such as large hotel chains, who did not need the subsidy. In addition, some criticized the program for building large-scale real estate development projects, often in the central business district. These projects provided economic activity, but they may not have directly addressed the economic needs of urban core residents.[19]

Today, four departments or agencies provide assistance for urban economic development: HUD, the Economic Development Administration (EDA) in the Department of Commerce, the Small Business Administration, and the Treasury Department.

HUD

HUD operates two major programs for urban economic and community development, the Community Development Block Grant program (CDBG), and the Empowerment Zone and Enterprise Communities Program. In addition, they operate several smaller programs.[20]

- The CDBG program allocates grants on a formula basis to entitlement communities (cities with more than 50,000 population and selected urban counties) and to states for distribution to non-entitlement communities on a discretionary basis. Funds can be used for a variety of purposes, including housing rehabilitation, energy conservation, public services and facilities, infrastructure, business financing, and commercial revitalization. In 1995, funding was approximately $4.6 billion.

  CDBG has long been criticized by local and state government officials for being difficult to use for economic development because of overly restrictive rules and regulations governing use of funds. CDBG rules have recently been relaxed, making it somewhat easier to use for economic development.[21] However, funding is still tied to job creation and retention, which can make it hard to fund activities such as industrial service organizations, because establishing a direct link to job creation is difficult. Moreover, according to some city officials, the new rules have not gone nearly far enough in removing the impediments to putting in place flexible and innovative economic development efforts.

  In 1994, HUD established its Economic Development Initiative (EDI) to encourage CDBG recipient cities to undertake more economic development activities. The program provides grants that can be used as a match for the Section 108 Loan Guarantee program. Under Section 108, communities can obtain loan guarantees from HUD to finance economic development and large-scale physical development projects that create jobs for low- and moderate-income people. Communities can

[18] Ibid.

[19] Bernard Friedan, "Who Gets the Jobs in the New Downtown," *The Future of National Urban Policy*, Marshall Kaplan and Franklin James (eds). (Durham, NC: Duke University Press, 1990).

[20] Two smaller HUD programs also target community development. In 1994, HUD committed $20 million to the National Community Development Initiative to leverage $120 million from a consortium of foundations and a private insurance company, with the funds going to community-based nonprofit groups working to revitalize distressed communities, largely through provision of housing. The John Heinz Neighborhood Development Program provides grants to community organizations to create jobs; develop, rehabilitate or manage housing; and deliver services. In 1994, HUD awarded $4.8 million to 75 organizations, an average of $64, 000 per organization.

[21] On January 5, 1995, HUD published new rules in the Federal Register detailing these changes. For example, a worker a company hires is now presumed to qualify as having a low or moderate income if he or she lived in a census tract in which at least 70 percent of the residents have low or moderate incomes. Moreover, upon development of a neighborhood revitalization strategy through the consolidated Plan, communities gain further flexibility in use of CDBG funds for economic development.

borrow up to five times their annual CDBG allocation. However, because many communities are hesitant to pledge CDBG funds as collateral, partly because of the risk involved, but also because of the regulatory difficulties in using CDBG for economic development, HUD created EDI. Under the EDI program the Department awards grants to communities to use as collateral for loans. In FY94, HUD awarded 70 grants for just under $50 million dollars (an average of $714,000 per grant), and in conjunction with these grants HUD will provide these communities with nearly $413 million in loan guarantees. In FY1995, approximately $300 million was allocated, with most of it going to the supplemental empowerment zones (Los Angeles—$125 million; Cleveland—$87 million). So far, there have been no defaults to banks through use of the 108 program, largely because the communities' CDBG funds are used as collateral. However, HUD does not know the rate of project default. To date, funds are used largely for capitalizing revolving loan funds or for financing commercial and industrial rehabilitation projects. HUD also recently proposed a "Leveraging Investments for Tomorrow" (LIFT) program, which would have been targeted as project gap financing for community-based economic development real estate projects. However, the program was not funded.

- Empowerment zones, borrowed from an earlier British initiative and similar state government programs, assist local governments in attracting new business and investment to inner cities by providing tax incentives to firms locating in a designated zone and by providing funds for employment and other social programs within the zone.[22]

The Omnibus Budget Reconciliation Act of 1993 (Title XIII, Chapter 1) established the Empowerment Zone/Enterprise Communities program. The zone area or combination of areas meeting certain population, size, and poverty criteria required joint nomination by the local government and state(s) in which it is located. These areas can be characterized as having pervasive poverty, unemployment, and general distress. The legislation allowed the Administration to designate six urban and three rural communities as empowerment zones (EZs), and up to 100 as smaller enterprise communities (ECs). From over 500 rural and urban applications, the Administration selected 105 awardees in 1994. Six cities (Atlanta, Baltimore, Chicago, Detroit, New York, Philadelphia/Camden) were designated as EZs (with Los Angeles and Cleveland being designated as supplemental EZs) and 60 urban ECs were selected. Each urban EZ is slated to receive $100 million, and each EC is to receive $2.95 million through the Social Services Block Grants administered by the Department of Health and Human Services. These grants can be used to fund a variety of economic, social, and community development activities as determined by community residents. In addition, the Treasury Department will administer $2.5 billion in tax credits to EZs. Businesses that qualify and operate in EZs will be eligible for employer wage credits of up to 20 percent on the first $15,000 of wages paid to certain zone employees, increased deductions for plant and equipment (section 179), and new tax-exempt bond financing.[23] Businesses that qualify and operate in ECs will be eligible only for the tax-exempt bond financing incentive. Because programs have only recently been established, it is

[22] Barry M. Rubin and Craig M. Richards, "A Transatlantic Comparison of Enterprise Zone Impacts: The British and American Experience," *Economic Development Quarterly*, vol. 6, No. 4, November 1992, pp. 431-443. See also Stuart Butler, *Enterprise Zones: Greenlining the Inner Cities* (New York: Universe Books, 1981).

[23] Bruce K. Mulock, "Empowerment Zone/Enterprise Communities Program: Background and Analysis of Economic Issues," Congressional Research Service, Apr. 12, 1995.

too early to evaluate results. However, many of the principles underlying the EZ/EC program, including thinking strategically, developing integrated solutions across programs, crafting regional partnerships, and connecting planning with implementation, are consistent with what many experts believe are the foundations of solid urban economic development efforts.

Economic Development Administration

The Economic Development Administration (EDA) in the Department of Commerce was established in 1965 to aid economically distressed regions, and soon became the flagship federal agency for regional economic development. EDA principally funds local public works construction projects (e.g., industrial parks, access roads, sewer lines), in large part to enable communities to attract new industry. EDA also provides grants to communities facing sudden economic distress, increasingly to respond to military base closures, and funds technical assistance and economic research. Current grant funding of $379 million is down from $900 million (1995 dollars) in 1980.[24] Historically, about 70 percent of EDA funds have been spent in rural areas and small cities, while 30 percent has been spent in larger metropolitan areas; even less has been spent in distressed central cities or inner suburbs. In 1994 EDA did propose, but did not implement, a Competitive Communities program to support high-growth industries in distressed urban communities.

The Small Business Administration

SBA provides financing and technical assistance to small businesses, some of them minority-owned, and some located in urban core areas. The agency's primary financing program, the 7(a) loan guarantee program, guaranteed more than 36,000 loans in FY94 for a total of more than $8.1 billion. However, the program is generally targeted neither to urban areas nor to minority businesses in distressed areas.[25] Moreover, SBA programs have focused on small-scale "mom and pop" retail and personal service industries, which do little to revitalize urban economies as a whole or to create significant numbers of jobs.[26]

SBA's 504 program is a fixed-asset financing program for existing businesses, providing long-term, fixed, below-market rates. SBA will fund up to 40 percent of a loan, with a bank or other financial institution providing 50 percent, and the borrower 10 percent. SBA requires that one job be created or retained for every $35,000 of SBA funds. The loans are packaged and administered by approximately 280 SBA-certified Certified Development Companies around the country. In FY95, approximately 4,000 loans, for a total of $1.5 billion, will have been made.

The Community Development Finance Initiative

Administered by the Treasury Department, CDFI was established by Congress in September 1994 to provide capital to either existing financial institutions that specialize in community development lending, or to seed new organizations that are proposing to do this type of work. In contrast to traditional lenders, the express purpose of community-oriented financial institutions is to make loans and other investments to individuals and businesses located in economically distressed places, usually, but not exclusively, in cities. CDFI was modeled in part on the successful experience of the South Shore Bank in Chicago, a community development bank and development organization that has worked for over 20 years to help revitalize the South Side of Chicago. While South Shore was seen as a successful model, it has not been widely duplicated across the country, in

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[24] Fiscal Year 1995 funds include $194 million for public works, $37 million for planning and technical assistance, and $105 million for defense conversion activities.

[25] Daniel Immergluck, "Moving to Economic Development: A New Goal for SBA Loan Programs" (Chicago: Woodstock Institute, 1995).

[26] Porter, op. cit., footnote 15.

part because though it does not lose money, its rate of return is not high enough to attract money from traditional equity capital markets. Yet, because the activities involved (community development in distressed places) provide benefits beyond those accruing to the borrower or bank alone, there may be some economic justification for government support of these activities. As a result, CDFI was created to help stimulate more community development lending organizations.

In addition to South Shore, there are a number of other models of community-oriented lending. For example, the Community Capital Bank in New York City is an insured bank that is oriented to making loans in low-income communities in New York. Community Development Credit Unions, of which there are several hundred, serve low-income neighborhoods. In addition, there are also community development loan funds focused on business development, micro-enterprise loan funds, and community development venture capital funds. Finally, for-profit and not-for-profit multi-bank CDCs are usually formed and invested in by a number of conventional banks as part of their Community Reinvestment Act (CRA) obligations.[27]

CDFI is a competitive program authorized to provide a variety of assistance, including grants, equity investments, loans, deposits (to insured institutions), and technical assistance to community-oriented financial institutions. Though the program received funding in FY 1995 of $125 million, $75 million was rescinded. The program plans to announce its first round of funding availability in mid-October 1995. Of the $50 million, two-thirds will go to CDFI. Recognizing that all communities have different needs, the program will fund a variety of different types of institutions. However, given the proclivity of community development finance institutions, including South Shore, to focus largely on housing and personal finance, it is not clear that these organizations will focus extensively on business development financing.

The other one-third of the funds will go to the Bank Enterprise Award program that provides incentives to traditional banks and lenders to invest in community development finance activities. Banks propose a set of activities during an assessment period, and if this exceeds their similar lending during a prior baseline period, they may be eligible for grants. One advantage of this program is that it may get banks more oriented and used to community development lending, encouraging this practice after the grant period is over. However, the program also runs the risk of providing subsidies for activities the banks would have done through their Community Reinvestment Act (CRA) obligations. Moreover, because the grants are likely to be small, they may simply reinforce what banks were already doing, as opposed to encouraging them to engage in new types of activities.

IMPROVING ECONOMIC AND COMMUNITY DEVELOPMENT EFFORTS

Federal support for economic and community development appears to play an important role in helping urban communities design and carry out strategies to address poverty, abandonment, and economic distress. However, there is considerable room for improvement. There are several problems with current federally supported economic and community development initiatives:

- Though the number of distressed places has increased in the last 15 years, federal funding has decreased.
- Reduced funds could be better targeted to distressed areas.
- Funding formulas for many programs provide few incentives for improving local grantee performance.
- Efforts are piecemeal and uncoordinated.

[27] John Sower and Beverly L. Milkman, "The Bank Community Development Corporation: An Economic Development Tool for the Nineties," *Economic Development Quarterly,* vol. 5, No. 1, February 1991, pp. 3-8.

- Most economic and community development funds are either for physical revitalization projects (e.g., housing and infrastructure), or for financial assistance to individual firms. There is no strategy to build up private and non-profit institutions to promote economic and community development in distressed inner suburbs and central cities.
- Even when business and managerial assistance is provided to firms, many organizations are not well suited to operate programs that provide services to industry.

To address these shortcomings, a number of policy options are listed in the following sections of this chapter.

Federal Funding Levels for Economic and Community Development

Federal funds for economic development have declined in real dollars over the last 15 years. For example, HUD outlays for community development (including Urban Development Action Grants) fell from $4.13 billion in 1980 to $3.68 billion in 1994, a decline of over 45 percent in inflation-adjusted dollars.[28] At the same time, the needs of cities and inner suburban communities grew. For example, between 1969 and 1989, the poverty rate of CDBG grantees in a sample that accounted for 80 percent of funds allocated in 1989, increased from 14.1 to 17.8 percent.[29] Moreover, the current wave of technological change is likely to further reduce the competitive advantage of many of these places over the next 20 years.

OPTION 1: *Congress could increase funding for economic and community development targeted to distressed urban places.*

Targeting Federal Economic Development Funds

Given the reduced federal resources for economic and community development, it becomes even more important that the remaining resources be targeted to areas that are actually distressed. Though increased targeting to a fewer number of more distressed places risks losing widespread political support for programs, shotgun approaches to federal economic and community development not only diffuse the resources too broadly, but also risk subsidizing development in prosperous places at the expense of distressed places.

Targeting to the Most Distressed Places

A not insignificant share of CDBG and other economic development funds is spent on places with relatively low levels of distress and need (such as relatively well-off suburbs) and projects that have few benefits for low- and moderate-income people. For example, between 1975 and 1989 the share of CDBG funds going to the most distressed cities declined from about 50 percent to about 36 percent, while the share going to cities that were best off doubled (to about 11 percent) .30

Similarly, SBA programs appear to be poorly targeted to firms in distressed places or to minority-owned firms. For example, the SBA 504 program provides some extra benefits to firms in distressed areas. Firms located in labor surplus areas (as defined by the Department of Labor), redevelopment areas (usually rural or small metropolitan areas defined by the Economic Development Administration), or state or federal enterprise/empowerment zones must create one job for every $43,000 (instead of $35,000) of SBA

[28] Budget of the United States Government: Fiscal Year 1996 (Washington, DC: U.S. Government Printing Office, 1995), table 12.3.

[29] The Urban Institute, "Federal Funds, Local choices: An Evaluation of The Community Development Block Grant program'" (Washington, DC: HUD Office of Policy Development and Research, 1995).

[30] Michael J. Rich, "Targeting Federal Grants: The Community Development Experience," in Community and Economic Development: Rethinking the Federal Role, Congressional Research Service, May 6, 1992.

funds, and the SBA loan limit of $750,000 can be increased by 25 percent. Yet, these bonuses appear to do little to actually target funds to firms located in more distressed areas.

The SBA 7(a) program appears to be even less targeted. For example, a recent study of the program conducted in San Antonio, Texas, found that lending was generally neither targeted to minorities businesses or to businesses located in distressed areas.[31] According to the study, non-manufacturing firms in lower-income zip code areas received 43 percent of the 7(a) funds, despite these zip codes having 54 percent of the metro area sales and receipts. Moreover, according to the study, after the recent introduction of the SBA Low Documentation program (LowDoc) that allowed an increased number of loans to be made for under $100,000, lending patterns favored firms in well-off areas even more. For example, while lending to firms in lower income areas increased 44 percent after the introduction of the LowDoc program, it increased by 110 percent in upper income areas.[32]

It is difficult to justify the public purpose of SBA loans that are not targeted sectorally, spatially, or demographically. SBA and other publicly assisted business finance programs are often justified for their job creation benefit. However, it is not clear that providing funds to any and all business serves that goal. For example, providing funds to a local serving business (e.g., restaurant, retail store) located in an economically growing community may result in the firm creating jobs, but the net job creation in the community and the nation is likely to be zero, as the expansion will simply take business away from firms that would have expanded after receiving private financing at less favorable rates. Moreover, with an unemployment rate of below 6 percent in 1995, and Federal Reserve Bank policies that appear to resist letting this rate decline any further, such job creation policies appear to be a poor use of public funds. A more effective use would be to target these funds for explicit public purposes. Though there appear to be several possible public purposes for SBA loans, including boosting productivity, increasing international competitiveness of firms, and assisting disadvantaged individuals or distressed places, the current system of simply providing loans to any and all firms that apply (provided they create jobs and are financially viable), diffuses the effectiveness of the program.

Targeting Distressed Neighborhoods and Disadvantaged Persons

Targeting needy communities is important to make federal economic and community development expenditures more effective, but results will be diminished if the money is not spent on the poor areas of the community and the poor residents. Some cities have been able to target their efforts at relatively distressed neighborhoods and disadvantaged areas. However, many city governments appear to spread federal funding, including CDBG funds, out to a wider range of neighborhoods, including those with low levels of distress. Moreover, cities are pressured to spend federal grants on regular functions of local government, including those in higher-income areas.[33] For example, Michael Rich, in a study of Chicago, documented that when restrictions on neighborhood targeting of CDBG funds were relaxed in the early 1980s, most of the increased CDBG funds went to middle and high income neighborhoods.[34] In contrast, targeting to the most distressed areas did increase significantly when Harold Washington

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[31] Daniel Immergluck, op. cit., footnote 25.

[32] Because this study focused on just one metropolitan area, further research is needed to analyze lending patterns in other areas.

[33] Peggy L. Cuciti, "A Nonurban Policy: Recent Public Policy Shifts Affecting Cities," *The Future of National Urban Policy,* Marshall Kaplan and Franklin James, (eds.) (Durham, NC: Duke University Press, 1990).

[34] Rich, op. cit., footnote 5.

became mayor, suggesting that local politics can affect significantly the degree of targeting.[35] Community development officials from several large cities that OTA visited discussed the political pressures that led them to disperse funds throughout the city instead of spending them on the most distressed areas. In addition, even when cities spend federal money in distressed areas, they often reduce general fund expenditures there; thus federal funds substitute for local funds rather than augment them.

Currently 50 percent of the beneficiaries of each CDBG project must be low- and moderate-income persons (defined as households with incomes less than 120 percent of median income in the region). Moreover, 70 percent of projects must meet this criterion. If a project benefits a majority of low- and moderate-income residents, then all of that money is counted as benefiting low- and moderate-income people, even though higher-income people also benefit. This all or nothing method of accounting for benefits leads to an overestimation of targeting to needy people. Theoretically, as high as 65 percent ((100 percent minus (50 percent times 70 percent)) of the beneficiaries of a community's CDBG allocation could be higher-income people. Moreover, many communities, particularly suburban, spend HUD funds on what HUD calls special populations, particularly the elderly and the handicapped, to qualify. One argument against targeting to the neediest persons is that cities want to attract the middle class back into cities, and overly strict targeting provisions would hinder their efforts.

Encouraging Cities to Target Their Own Funds

Some cities with strong economies have been able to focus economic development policies on enhancing opportunity. For example, the city of Charlotte, North Carolina, focuses its economic development programs on alleviating poverty. However, most cities' economic development programs do not strongly target distressed areas.[36] For example, even though half the elected officials in one survey reported that poverty is a serious problem in their city, most reported that economic development activities are not directed specifically toward reducing poverty.[37] For example, the economic development programs in one large, fast-growing southwestern city are directed almost entirely toward recruiting new industry to the region, and the lion's share of these jobs went to outlying areas far from the large disadvantaged, mostly Hispanic, community. In another big northeastern city, economic development programs are crafted largely to boost economic growth in the region, with little or no thought given to how the benefits of that growth could be used to enhance economic opportunity for disadvantaged residents.

Many cities do not target their economic development programs on needy places or people, in part because the most vocal and organized constituency for economic development is the segment of the local business community that benefits most directly from growth—the businesses that strongly depend on sales within the metropolitan area (e.g., local media, retail stores, utilities, and local banks). For example, a survey of elected officials of 188 large cities by the National League of Cities found that 48 percent of officials thought that promoting economic development was more important to their chances of getting reelected than reducing poverty, while 2.9 percent felt the opposite, and 49 percent viewed them as equal.[38] When areas are already growing, promoting economic development, especially by attracting

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[35] Ibid.

[36] Furdell, op. cit., footnote 6.

[37] In two surveys of local officials on local economic development goals, addressing issues of poverty ranked lowest. Ibid, and Ann Bowman, "The Visible Hand: Major Issues in City Economic Policy," (Washington, DC: National League of Cities, 1987).

[38] Furdell, op. cit., footnote 36.

firms from other areas, is inefficient from the national perspective and can increase congestion, raise housing and land costs, and increase costs to businesses, especially to those exporting products outside the region.[39] Appropriate development policies depend on strong involvement by local residents and businesses negatively affected by growth, but political factors often limit such involvement.

As a result, the degree of targeting that is appropriate depends on the condition of the local and regional economy. In cities that are losing jobs, increasing employment benefits all groups, including low- and moderate-income residents, even if the jobs are not specifically targeted to them. In contrast, in cities that are growing, there is less rationale for not targeting jobs specifically to low- and moderate-income persons and distressed neighborhoods.

There are several measures Congress could take if it wanted to increase targeting.

OPTION 2: *Change funding formulas so that a greater share of funds go to distressed cities and suburbs. Congress could:*

- Require that EDA spend more of its funds in urban areas. Currently approximately 80 percent go to rural areas and small cities. However, as discussed in chapters 4-7, technological change is not likely to lead to significant enhancement of rural economic prospects, so diverting economic development funds from rural areas may not be appropriate.
- Tighten the formula for allocation of CDBG funds so that fewer funds go to well-off and growing jurisdictions.

OPTION 3: *Increase the targeting of SBA loan programs (both 7(a) and 504), so that a greater percentage of loans serve minority-owned businesses (see below) and businesses in distressed urban core areas. Congress could:*

- Require SBA to develop better definitions of distressed places used in the 504 program, since the use of unemployment rates in counties does not adequately provide incentives for targeting problems of uneven development within metropolitan areas. One way to improve this would be for poverty census tracts to be used as one indicator of location in distressed area. Firms located in such areas would be given greater priority for SBA funding, provided that they meet normal SBA financial standards.
- Encourage SBA to make greater efforts to target funds to distressed areas or minority-owned businesses. Funding or guarantees for banks, Certified Development Corporations, and other institutions relying on SBA funds could be based in part on how well they target funds. SBA regional offices that approve loans could be required to establish targets for funding minority-owned firms and firms in distressed places.

OPTION 4: *Tighten criteria so that cities receiving federal aid spend more of it on distressed neighborhoods and disadvantaged persons. Congress could:*

- Change the CDBG criteria to focus more on low- and moderate-income people, perhaps lowering the definition of low- and moderate-income persons to households below 100 percent of median income and/or requiring that 80 percent of projects have over 60 percent of benefits going to low- and moderate-income persons. If Congress does not want to apply these stricter standards to all places, it could vary the percentage targets depending on the unemployment rate in the metropolitan area—the healthier the economy, the higher the percentages could be.

[39] Tim Bartik, *Does Local Economic Development Work* (Kalamazoo, MI: Upjohn Institute, 1993).

OPTION 5: *Federal funding could be used as incentives for cities and states to focus their economic development programs on distressed p/aces and disadvantaged persons. Congress could:*

- Encourage HUD to develop performance indicators on which to allocate additional block grant funds. One indicator could be the degree to which cities and states demonstrate a commitment to target their own programs.

Performance-Based Funding

Many federal urban programs (including job training, housing, and economic development) provide formula-based block grants to city or state governments, regardless of the performance of the grantee. Inmost cases, performance varies significantly between cities or states, with some cities using federal funds to craft and implement strategic and efficient actions, and others failing to plan or target, and then operating mediocre programs. Yet, for both the best performers and the worst, block grants provide the same amount of money. Without some kind of market-based competition, there is less incentive for poor performers to improve.

Currently, some federal programs are based on competition, including the Empowerment Zone and Enterprise Community programs and EDA funding. However, EZ/EC funding is based on the quality of the grantee's initial application, and further funding is not based on performance. Political and institutional obstacles in some cities may result in less than fully effective efforts. Anecdotal evidence from several cities receiving EZ designation suggests that local performance may vary significantly, with at least some programs getting bogged down in politics and bureaucracy. Moreover, in some instances, federal agency delay and unresponsiveness have not helped matters. The legislation to establish the program did create an Enterprise Zone Board headed by the Vice President to coordinate efforts within the federal government and to act as a means by which communities could seek help in resolving differences with federal agencies.

HUD has taken some steps in the direction of building performance incentives into CDBG. As part of Secretary Cisneros' HUD reinvention plan, "From Blueprint to Action," HUD has proposed consolidating 60 major programs into three flexible, performance-based funds: a Community Opportunity Fund (COF); an Affordable Housing Fund; and a Housing Certificate Fund. HUD also proposed that a percentage of program funds be retained for later distribution to reward those jurisdictions deemed good performers. The funds would be targeted for job creation and brownfield cleanup (see chapter 9).

However, HUD has made little effort to define meaningful performance-based standards. For example, some have suggested that one performance standard be whether communities have spent all of their CDBG allocation. However, this criteria would simply reward communities that spend money, even if the money is spent unwisely. Developing meaningful performance standards can be quite difficult. Standards must be able to control for the influence of factors, such as regional recessions, beyond the control of local officials. Moreover, while standards must be related to outcomes, they must not penalize communities with fewer resources and expertise, or lead to creaming by organizations receiving funds. For example, one complaint leveled against many job training programs is that they tend to enroll people who are relatively easy to employ, in order to pump up their placement rates.[40] Similarly, many locally operated public business finance programs fund relatively safe deals for fear of having too high a default rate, although strict federal oversight also makes cities hesitant to fund more risky deals. This criticism has also been leveled at SBA financing programs. Such creaming increases the

[40] United States Congress, Office of Technology Assessment, After the Cold War: Living With Lower Defense Spending, OTA-ITE-524 (Washington, DC: U.S. Government printing Office, 1992).

risk that public resources are simply substituting for private.

One reason why performance standards are difficult to develop is because there has been so little evaluation of local efforts .4] Careful and rigorous evaluations of urban development efforts are needed, in particular, evaluation of different strategies (e.g., loan funds, infrastructure, technical assistance) and approaches (e.g., government run programs, vouchers, networks). Better evaluation would lead to a more sophisticated set of indicators, which could help judge performance and make funding decisions.

Finally, an additional weakness of the current funding system is that though federal agencies concentrate on closely monitoring the grantees to ensure they do not violate procedures or accounting rules, much less is done to help communities identify and implement the most effective economic and community development strategies. In short, federal economic and community development programs try to ensure funds are spent efficiently, but not necessarily that they are spent effective y.

There are several drawbacks to this skewed priority. First, local grantee flexibility is often severely restricted as the grantees try to comply with a myriad of federal regulations. Because they are often second guessed by federal oversight officials, communities often choose safe projects that may not yield the most economic benefits, but are assured of getting approved. Moreover, the paperwork faced by local governments in managing these grants diverts resources from the real work. For example, there is a risk that the Empowerment Zone program, while initially designed as a flexible program, could become more rule bound, limiting local flexibility and initiative. Second, relying on rules enforced from Washington to secure objectives in distant communities is difficult. Communities can find a myriad of ways to bend the rules to allow them to do what they want.

OPTION 6: *In spite of the difficulties in developing effective performance indicators, there are several steps Congress could take. Congress could:*

- Modify existing block grant programs so that communities would receive a minimum amount based on need (perhaps 50 to 75 percent of current levels). The remainder of the money would be allocated across all the communities and states based on performance measures (e.g., quality of strategies, percent of funds meeting national objectives, degree of matching funds, degree of comprehensiveness, and measurements of outcomes). Outcome indicators could include such things as reduction in percentage in poverty (relative to the metro area), increases in employment, and increases in first-time housing purchases.
- Create a competitive, challenge-grant program combining all federal economic and community development funds (see box 2-l). Such grants would be based in part on need and in part on performance. One advantage of this would be that it would maximize federal ability to promote national objectives. However, a drawback, especially if the grants are based on responding to grant proposals, is that the more disadvantaged communities may not have the resources to design as effective programs or craft as effective proposals. As a result, such a system could have built into it provisions that reward performance in part on the level of improvement shown by a jurisdiction.

OPTION 7: *Finally Congress might want to ensure that federal economic development and community development agencies, in particular HUD and EDA, place greater emphasis on technical assistance and evaluation. Congress might:*

- Encourage EDA or HUD to do more to support innovative efforts, perhaps by providing funding (or reallocating funding) for an office of

[41] Bartik, op. cit., footnote [39].

BOX 2-1: Reinventing Federal Urban Economic and Community Development

Although the particular limitations of federally-supported economic and community development efforts can be addressed individually (e.g., institute new procedures for targeting, develop performance standards as part of block grants), one option for Congress would be to create a new approach that addresses all the limitations simultaneously. Such an approach would have several characteristics, it would:

- provide increased funding targeted to distressed urban core areas;
- be comprehensive and avoid piecemeal approaches;
- be flexible enough for localities to easily and imaginatively use the funds in ways they see as important, yet would ensure that valid federal objectives would be met;
- provide incentives for states and communities to change their behavior to better meet incentive requirements.

To do this, Congress could create a consolidated urban development initiative. This could be in one department, such as HUD or the Economic Development Administration. Or, to give the initiative more flexibility and a fresh new start, it could be housed in a newly created quasi-public National Urban Economic Development Corporation. This corporation could have a board of directors appointed by the President and Congress, representing industry, academia, CDCs, community-oriented banks; and, most importantly, state and local government.

Either entity would operate comprehensive, performance-based, flexible urban development programs Either would house all current federal urban economic and community development programs, Including EDA and CDBG. Other programs that it might include are the Minority Business Development Agency and some SBA programs such as the 504 loan program.

The organization's main role would be to make competitive challenge grants to states and cities (perhaps with a share of the funds going to states and a share directly to cities). States and cities would compete for grants for a multi-year period, with funding being renewed each year based on performance. Funding could be for a wide array of projects, activities, or organizations. Moreover, a portion of the city funds could be allocated on a metropolitan basis in order to promote regional cooperation and develop regional solutions. Some of the allocation could be based on need, while the rest could be based on performance. By basing funding on performance, the federal government could not only use market forces to drive performance improvement among grantees, but could also create incentives for Inducing state and local grantees to meet federal objectives.

Performance standards could include: 1) demonstrated commitment by the states and cities not only to leverage their own funds, but also to target the funds to distressed places and disadvantaged people; 2) efforts of states and cities to promote regional cooperation and initiatives to solve urban core problems; 3) extent to which states and cities refrain from recruiting firms from outside through financial incentives, particularly to prosperous, growing areas; 4) degree to which funds are focused on innovative activities, especially non-financial business assistance; 5) degree to which grantees provide services in a comprehensive, as opposed to piecemeal, manner.

In particular, such an organization might make competitive grants supporting locally based, fully integrated, one-stop service centers. These quasi-public centers would provide a wide array of services (e.g., training, technology, export assistance and management assistance) to help firms in central cities and inner suburbs expand and compete.

(continued)

BOX 2-1: Reinventing Federal Urban Economic and Community Development (Cont'd.)

In order to ensure that grantees are meeting the performance standards and yet avoid onerous rules and regulations, awarding and management of grants could be based on negotiated agreements between the organization and the states and localities. For example, the organization could assign one person to serve as a program officer for a small number of states (5 to 10) and metros (10 to 25, depending on the size) to work cooperatively with the cities and states, in part to help develop ongoing strategic economic development plans These officers would be able to focus on assuring that funding is spent to solve local problems effectively, not just on complying with rules, In part, DOD's Office of Economic Adjustment plays a similar role in helping regions deal with the economic impacts from defense cuts

The organization would also provide technical assistance and evaluate what works, It could employ a small cadre of the leading economic and community development experts to study best practices in economic development, to support demonstration and rigorous evaluation, to examine trends and changes in economic conditions that affect regional and local development, and finally, to effectively disseminate this knowledge to states and localities, Moreover, this group could help lagging performers improve their performance so as to qualify for increased funding,

Finally, the organization would play a catalytic role to stimulate the development of other urban initiatives, particularly in partnership with foundations and the private sector.

strategic economic development, whose job would be to learn from best-practice economic development efforts around the country and to diffuse that knowledge to economic development organizations throughout the nation.

▮ Coordination of Federal Economic Development

There is considerable agreement that comprehensive approaches to community development are more effective than piecemeal ones.[42] Yet, historically, federal economic and community development policy has been the province of a number of different agencies and within each, a large number of individual programs. According to GAO, the federal government assists distressed urban communities and their residents through at least 12 federal departments and agencies.43 The Departments of Labor and Health and Human Services help people enter the labor market by providing training and human services. The Small Business Administration (SBA) and the Minority Business Development Agency in the Department of Commerce both try to promote minority business. Twenty-four programs provide technical assistance to business.[44] At least six Departments provide economic development assistance.

This proliferation of programs causes a number of problems. First, because these agencies rarely work together, their programs cannot reinforce one another. Second, organizations at the local level must deal with a plethora of programs and agencies, making it difficult for localities to obtain assistance. Third, the crafting of comprehensive, integrated solutions at the local level is difficult, because each federally funded program

[42] U.S. Congress, General Accounting Office, *Community Development: Comprehensive Approaches Address Multiple Needs but Are Challenging to Implement,* GAO/RCED/HEHS-95-69 (Gaithersburg: MD: U.S. General Accounting Office, February 1995).

[43] Ibid.

[44] U.S. Congress, General Accounting Office, U.S. *Government Aid to Business,* GAO/GGD-95-3FS, (Gaithersburg: MD: U.S. General Accounting Office, October 1994).

has its own rules, eligibility requirements, and boundaries. Moreover, the overlap, specialization, and duplication at the federal level fosters similar conditions in most metropolitan areas.

As a result, efforts to improve the economic prospects of distressed urban areas and the lives of disadvantaged people in cities are an amalgam of separate subsystems, usually with very little overlap, cooperation, or coordination.[45] These subsystems include:

- **Economic development**. These efforts are usually run by city governments or private sector coalitions and are typically focused on specific enterprises, and in some cities are directed at the revitalizing the CBD. Their major goal is usually economic growth of the region, even if the region is growing rapidly, as opposed to overcoming uneven development within the region.
- **Community development**. These efforts, often run by housing activists and community development corporations, and supported by banks and foundations, usually focus on housing, some small-scale retail development, and community services. Often these efforts revolve around CDBG funds.
- **Job training**. The mission of these programs is to train and place disadvantaged residents; funding is by the Department of Labor.
- **Transportation**. The efforts to use transportation to promote economic development (e.g., by such means as providing transit services to assist disadvantaged inner city residents to commute to suburban jobs) are often run by regional or local transportation officials and supported by Department of Transportation Funds.
- **Health and social services**. These programs, often supported with HHS funds, provide direct services to people who are in poverty.
- **City services**. Cities provide basic services, including police, fire, water, and garbage, as well as investments in infrastructure.

Unfortunately, each of the subsystems is driven by different funding sources, different definitions of the customer, and different organizational and political imperatives. Because of this, in most cities, these parties usually work in isolation from one another, each addressing a part of the problem, but seldom in a synergistic manner.[46] Public programs rarely operate as full-service, one-stop shops. This smorgasbord makes it difficult to craft comprehensive strategies with mutually reinforcing components. As a result, an important function for federal urban policy in the post-industrial metropolis will be to enable and encourage local delivery organizations to craft integrated and strategic economic development solutions that link business development, job training, community development, transportation, and human services into a holistic framework.[47]

HUD has taken some steps to coordinate and consolidate its efforts, and has increased funding for comprehensive community-based organizations. It has proposed that its current community development programs be merged into a Community Opportunity Performance (COP) Funds program. COP funds would provide localities and states with flexible, formula-based funding for economic revitalization (including housing) and renewal of distressed communities. In addition, its Consolidated Plan allows communities to produce just one plan and one application for HUD's

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[45] William Schweke and Carol Conway, *Proceedings of the Macarthur Roundtable: Reinventing Urban Development Delivery* (Washington, DC: Corporation for Enterprise Development, Sept. 26, 1994).

[46] Corporation for Enterprise Development, *1995 Entrepreneurial Economy Review: The Path Toward Urban Revival,* (Washington, DC: CfED, 1995).

[47] Marc Bendick and Mary Lou Egan, "Linking Business Development and Community Development in Inner Cities," *Journal of Planning Literature*, vol. 8, August 1993, pp. 3-19.

major formula community development programs, including CDBG and several housing programs. One goal of the Consolidated Plan is to encourage local departments and agencies to become more strategic and to communicate and cooperate. However, it is not clear how successful the Plan will be in this respect, as some cities may view the plan as a pro forma exercise required before obtaining federal funds.

EZ and EC winners also had to demonstrate how they would coordinate efforts among various organizations in the cities. The creation of local empowerment zone boards to oversee efforts is one attempt to bring some coordination to the process. However, there is a risk that such boards may become too top heavy and actually impede effective action. For example, Detroit has proposed that its Empowerment Zone Development Corporation board be made up of 50 members.

OPTION 8: *Consolidate existing urban economic and community development programs into one program into one agency or institution. Congress could:*

- Move more toward consolidated block grants. Existing fragmented block grant and categorical grant programs could be consolidated and provided to states and cities. For example, instead of the current project-specific funding in EDA, Congress could put EDA funds into two block grant programs-one for states and the other for cities. The advantage of this approach is that it provides maximum flexibility to state and local governments. However, it provides few incentives for state and local government to improve performance or meet national objectives.
- Consolidation of programs into an urban development block grant program administered by the states could be a transitory measure to an operating regime where states assume full responsibility, including funding responsibility, for what are now federally-operated urban programs. Such a system would provide maximum flexibility to the states and could lead them to spend more to address uneven development. However, it is not clear, given the added fiscal responsibilities they are likely to face, that states would place significant priority on these problems.
- Create a competitive, challenge-grant program combining all federal economic and community development funds. This could be in one department, such as HUD or the Economic Development Administration. Or, to give the initiative more flexibility and a whole new start, it could be housed in a newly created quasi-public National Urban Economic Development Corporation (see box 2-1). One drawback of such an approach is that it may divert attention and energies from other important issues such as targeting, fostering local flexibility, and promotion of more innovative approaches.

New Institutions for Economic and Community Development

At the local level, one institutional solution to piecemeal, uncoordinated efforts is to increase support going to organizations that provide more comprehensive approaches to community and economic development.

In the area of community development, one method to boost coordination is to increase funding of Community and Local Development Corporations (CDCs).[48] These locally based, private non-profit organizations, governed by a board consisting primarily of neighborhood residents and business leaders, generally focus on revitalizing distressed areas. They are usually engaged in one or more types of community development, including affordable housing, commercial and industrial development, and small-scale business development. In addition to project specific work, many CDCs often conduct other activities to

48 Corporation for Economic Development, Rebuilding Inner-City Communities: A New Approach to the Nation's Urban Crisis (Washington, DC: CED, 1995).

benefit local areas, including providing social services.

Initially begun in the late 1960s, in part as an alternative to the federal Community Action Program, these programs focused less on advocacy and community action, and more on community and physical development.[49] The number of CDCs has grown significantly, to approximately 2,000, although not all of these serve urban areas, and many are not very large. According to one survey of over 1,100 CDCs, 88 percent create affordable housing.[50] In contrast, only about 25 percent are involved in economic development, and they are often engaged in commercial and industrial real estate activities. Some also operate revolving loan funds for business development, although usually on the micro-enterprise scale, since almost 75 percent of loans are under $25,000. Many CDCs, particularly the larger ones, also provide other services, such as job training and placement, child care, health care, youth programs, and anti-crime activities.

Funding comes in part from federal (largely through CDBG), state, and local governments. However, private foundations, as well as intermediary organizations, such as the Local Initiatives Support Corporation (initiated by the Ford Foundation) and the Enterprise Foundation (initiated by James Rouse), provide significant financing. In addition, some banks (in part through financing that allows them to fulfill CRA requirements) and other private companies invest in CDCs, particularly in housing projects.

CDCs, particularly the better and more established ones, offer several advantages.[51] First, because many are neighborhood based, they are able to craft more comprehensive solutions that try to solve an array of problems.[52] Second, in the midst of poverty and despair, many CDCs represent a hope and enthusiasm that is all too often missing in distressed urban areas. Because they do more than just provide housing or jobs in isolation, and instead also build "social capital," these organizations can help strengthen the community fabric, thereby facilitating development.[53] In many of these communities, it is not simply traditional business location factors (e.g., cost of land, availability of skilled labor) that hinder development, it is the lack of local leadership and institutions to create a coherent community that can support and foster development by the private sector.[54] In this respect, the maturation and expansion of CDCs in the 1980s has been an important institutional development that can serve as a foundation for the next steps in urban policy.[55]

Notwithstanding these strengths, the current organization of CDCs suffers from several weaknesses. First, in the face of large problems, their efforts remain small. In many places, CDCs have only marginal impact. For example, in the late 1980s, the average CDC created approximately 15 units of housing per year.[56] However, some of the

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[49] Mitchell Svirdoff, "The Seeds of Urban Revival," *The Public Interest*, Winter, 1994.

[50] National Congress for Community Economic Development, *Changing the Odds: The Achievements of Community-Based Development Corporations* (Washington, DC: NCCED, 1991).

[51] See Avis Vidal, *Rebuilding Communities: A National Study of Urban Community Development Corporations* (New York: New School for Social Research, 1992).

[52] Bennett Harrison, Marcus Weiss, and John Gant, *Building Bridges: CDC's and the World of Employment Training* (New York: Ford Foundation, 1995).

[53] Mitchell Svirdoff, op. cit., footnote 49, pp. 82-103.

[54] For a discussion of this as it relates to rural communities hard hit by plant closings, see Michael Hibbard "When the Going Gets Tough: Economic Reality and the Cultural Myth of Small Town America," *Journal of the American Planning Association*, vol. 52, No. 4, 1986.

[55] Corporation for Economic Development, op. cit., footnote 48.

[56] National Congress for Community Economic Development, op. cit., footnote 50.

more successful CDCs are much larger, and with more resources, CDCs could certainly do more. Second, in contrast to much of the rhetoric of the community development movement, much of their work has been focused on housing revitalization and construction, and much less on economic development.[57] In part, this has been because funding by government (through the Federal Low Income Housing Tax Credit and HUD) and foundations has been predominately for housing. However, economic development by CDCs is growing, although largely oriented to commercial and retail revitalization. As more and more jobs move to the suburbs, and unemployment and underemployment rises in distressed areas in core cities, everyone agrees that job creation is important. Foundations are increasingly supporting economic development, especially commercial revitalization.

While CDCs can play an important role in community development, they appear to be less well suited for economic development, especially business development beyond local commercial revitalization. Yet, other economic development organizations are also sometimes poorly suited. Urban economic development programs are often run by organizations, including city governments, that are not familiar with industry. As a result, business development programs are often too bureaucratic, too focused on general information rather than on real services (e.g., training, access to technology, management assistance), generally passive in orientation, and do not develop working relationships with firms.[58] Most public agencies have little contact with or knowledge of business needs. The best programs are customer oriented, focused on ongoing interaction with the business client, provide customized services, and are flexible. Non-governmental (private or quasi-public) organizations often do this best.

These problems are exacerbated by the fact that economic development programs take a "shotgun" approach to economic development, serving a wide variety of firms. The lack of sectoral specialization severely hinders service providers from developing in-depth, comprehensive knowledge about particular industries.[59] In many cases, providers are expected to give assistance to all industries while knowing little beyond the most general information about market structure, technology needs, and worker skill requirements. The generalist approach may serve novice entrepreneurs attempting to open up retail stores, but it falls far short when it comes to working with firms operating in intensively competitive and complex markets. To be competitive, firms need services that help them address pressing problems. General business development programs are not likely to provide this type and level of service.

As a result, federal policies could increasingly support organizations that have closer ties with industry and can provide real services to them. Such institutions can help small and medium-sized manufacturing and producer service firms improve quality, product design, productivity, and market savvy, and thus help them be more competitive. These organizations can also play a role in bringing key players together and marshaling the resources of the private sector. This kind of social and economic organization cannot be legislated or mandated: these efforts must emerge from particular places and particular actors, including residents, business leaders, universities, federal laboratories, and local government. However, the federal government can provide matching funds, can publicize success stories and other models, and can provide technical assistance.

Interest in these approaches in part reflects learning from sub-national European experiences.

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[57] Robert O. Zdenek, "Investing in Distressed Communities," *Economic Development Commentary,* Winter 1993, pp. 17-24.

[58] Office of Technology Assessment, op. cit., footnote 40.

[59] Mt. Auburn Associates, *Jobs and the Poor: Defining and Assessing Sector Economic Development Efforts by the Public Sector,* prepared for the Ford Foundation and Mott Foundation, forthcoming , 1995.

For example, in the United Kingdom the central government has played a direct facilitating role, not just financially for enterprise zones, but by providing managerial expertise and creating new organizational structures, in part by establishing and funding locally independent urban development corporations.

In Copenhagen, the Technology Institute (one of 31 technology services centers in Denmark) was established to help small and medium-sized industrial firms use advanced technologies. The Institute not only conducts applications-oriented R&D, but also provides a wide range of services to its clients. These include market research, assessment and consultancy on technical and management problems, demonstration of new technologies, financial consulting and referral. Over two-thirds of the Institute's budget comes from the firms it serves.[60]

Similarly, in Bologna, the Centro Ceramico, a research/industrial services center funded by the 500 ceramics firms in the Bologna area, works one-on-one with member firms to solve technical problems, including reducing environmental emissions, developing new materials and products, and putting in place more efficient production processes.[61]

There are similar programs in the United States. Although most are not targeted to distressed urban areas, the model holds significant promise for such areas. Oregon's Wood Products Competitiveness Corporation provides a wide range of services to Oregon secondary wood products producers, including marketing, training of workers and managers, manufacturing modernization, research and development, financing and promotion of cooperative industrial networks. In Pennsylvania, seven Industrial Resource Centers provide an array of services to small and medium-sized manufacturers. Originally established in 1988 as a manufacturing extension program, this effort has evolved and now offers a wider range of services. In New York City, the Garment Industry Development Corporation, funded in part by city government, unions, and industry, helps garment firms both to become more competitive and to hire low- and moderate-income New York residents.

Though a number of states and cities have tried to apply the new models of economic development,[62] few have focused on revitalizing distressed urban core economies. There are a number of reasons for this, but most of them come down to not knowing how to apply the new models to the particular case of distressed areas. Moreover, little or no technical assistance is available for this application. Finally, and perhaps most importantly, it is difficult to fund such efforts through some Federal programs. For example, the CDBG program focuses on projects with specific outputs (e.g., rehabilitating a building, giving a business a loan), rather than on creating and sustaining organizations that can foster business development. Moreover, historically HUD area and regional office interpretations of rules and documentation and other administrative requirements have been so time consuming and difficult to manage, that for many communities, housing rehabilitation and infrastructure was the path of least resistance and least likely to raise HUD office concerns. The structure and culture of EDA also constrains it from funding these types of economic develop-

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[60] Office of Technology Assessment, op. cit., footnote 40.

[61] U.S. Congress, Office of Technology Assessment, *Industry, Technology and the Environment: Competitive Threats and Business Opportunities*, OTA-ITE-586 (Washington, DC: U.S. Government Printing Office, 1994).

[62] R. Scott Fosler, "State Economic Policy: The Emerging Paradigm," *Economic Development Quarterly*, vol. 6, no. 1, February 1992, pp. 3-13.

ment organizations. Moreover, because much of EDA's funds are in Title 1, which principally funds infrastructure, it is difficult for EDA to fund non-infrastructure efforts.

OPTION 9: *Target a greater share of federal funding to more comprehensive, innovative economic development organizations. Congress might:*

- Encourage HUD to fund more innovative economic development institutions, perhaps through funds distributed on a performance basis.
- Broaden the applicability of activities under Title 1 in EDA to allow funding for economic development programs or activities. Another option would be to reduce or eliminate Title 1 funding, and allocate the funds to the more flexible Title IX. Congress might then broaden the definition of economic adjustment in Title IX to allow funding for long-term distressed areas, not just for areas suffering sudden and severe economic distress. If Title 1 were eliminated, appropriate infrastructure projects could be funded under Title IX. In addition, require EDA to open up its funding process to support the most effective organizations.

OPTION 10: *Increase support for Community Development Corporations (CDCs) and other similar comprehensive, locally based development organizations. Congress could:*

- Increase funding for HUD's $20 million National Community Development Initiative, which, in conjunction with foundations, funds community-based non-profit groups.
- Establish a separate quasi-public corporation to make grants for economic and community development to community-based organizations.[63]

■ Focus Efforts on Business Development

In part because of the potential of new information technologies to weaken and restructure the economies of the urban core, a new kind of urban policy effort may be needed, one focused explicitly on economic development, and specifically on business development. For example, Michael Porter argues that the cornerstone of a new model of urban economic development should be to identify the potential competitive advantage of inner city-based companies and thus understand the basis for sustainable market positions.64 The major thrust of the new urban economic development should be to build up the capacity and competitiveness of business in the central city and inner suburbs, relying less on tax incentives, low interest loans, and provision of buildings and infrastructure and more on improving the management and financial skills of small- and medium-sized business owners and managers.

Yet, historically, urban community development efforts have been organized around programs to supply housing, infrastructure, and social services. When economic development has been the focus, federal funds have often been used to provide subsidies (e.g., low-interest loans, free land, developed infrastructure) to corporations to induce them to locate or build a facility in the city. For example, two-thirds of CDBG economic development funds are for assistance to individual firms, and 78 percent of these funds provide low-interest loans to help business develop and expand.[65] Similarly, tax incentives are a major component of the empowerment zone program.

In a study of CDBG economic development funds, only 4 percent of assisted businesses re-

[63] In 1991, Congress proposed the National Community Economic Partnership Act, which would have provided $250 million over three years in a competitive process for CDCS to do community economic development projects. As originally proposed, the funds would be administered by a quasi-public corporation. However, in the final legislation it was housed within the Office of Community Services at HHS. The program was included in the urban aid bill vetoed by President Bush and included, but not appropriated, in the Crime Bill.

[64] Porter, op. cit., footnote 15

[65] The Urban Institute, op. cit., footnote 29.

ported receiving technical assistance, while 98 percent received either grants or loans.[66] Providing direct loans in a retail manner to industry may not make much sense.[67] First, it is not clear that capital is the major need of many of these firms. In many cases, firms need managerial or technical assistance to prepare business plans, keep their books properly, and develop marketing strategies. After these are in place, finding private financing becomes much easier. Second, a dedicated direct loan program is a costly way to provide capital to industry. An alternative method would be to have banks make the loans, but provide a processing fee to help cover the costs of processing small-scale loans, or provide a loan loss reserve pool to encourage banks to make more risky loans. Finally, by making direct loans or grants, many of these programs can help only a few firms a year.

While incentives and business financing can play a role, urban economic development should do much more than recruit industry from outside through large one-time incentives. Building partnerships with industry, community organizations and others is probably more important. Moreover, the nonprofit sectors in these areas need to be stronger and better linked to industry. The following factors will be important for an urban economic development initiative.

Urban Blue Collar Industry Initiative

Low- and moderate-income urban residents are experiencing increased economic difficulty partly because of the movement of blue collar jobs out of urban cores. While it is not realistic to expect to replace all the jobs that have been lost, employment in these sectors might be stabilized or increased slightly. Industries such as manufacturing, freight, distribution, and recycling can thrive in urban cores, particularly if they adopt flexible technologies and seek market niches (see chapter 6). Therefore, federal assistance might help firms in these industries become more competitive, particularly through application of advanced technology. Currently, some, but not all of the 44 Manufacturing Outreach Centers supported by DOC's National Institute of Standards and Technology's Manufacturing Extension Partnership target manufacturing firms in central cities and inner suburbs. For example, the Chicago Manufacturing Center has focused a share of its efforts on helping the city's manufacturers, many located in distressed areas, become more competitive (see box 2-2). And the Center itself is located in the Empowerment Zone.

OPTION 11: *Target a greater share of federal assistance to modernize manufacturing to manufacturers in urban areas. Congress could:*

- Encourage NIST to provide guidance to NIST's Manufacturing Outreach Centers (MOCs) to establish urban manufacturing initiatives.
- Provide increased funds for MOCs ($73 million in FY 1995) and require that some of the money be spent to create centers that focus at least in significant part on serving manufacturers in distressed urban areas. Centers need not necessarily be located in these places, but would have to serve firms located there. Section 103 of S17, The New Urban Agenda Act, introduced in 1995 by Senators Arlen Specter and Carol Moseley-Braun, requires the Secretary of Commerce to give preference for awarding funds to manufacturing centers located in empowerment zones and other distressed areas. In addition, Congress could broaden the range of industries able to be served to include other blue collar industries, including wholesaling and freight transportation.

Minority Entrepreneurship

Evidence suggests that minority-owned firms are more likely to hire minorities, even if they are not

[66] Ibid, p. 3-30.

[67] Doug Ross and Robert Friedman, "The Emerging Third Wave: New Economic Development Strategies of the '90s,'" The Entrepreneur/al Economy Review, vol. 9, No. 1, Autumn 1990.

located in places with high levels of minority residents.[68] Bates found that most white-owned small businesses in non-minority neighborhoods employ no minority workers and that roughly one-third of these businesses in minority areas employ no minorities. In contrast, 97 percent of black employers in minority areas hired minority workers, (in most cases minorities made up over 75 percent of their workforce) and black-owned firms outside minority neighborhoods employ a large proportion of minorities.[69] Therefore, policies to encourage minority entrepreneurship are one way to create jobs for minority urban residents. As discussed above, targeting a greater share of SBA loan funds to minorities is one way to do this.

Bates also documents that black-owned firms in urban minority areas had lower levels of capitalization, were smaller, had owners with less education, and had higher chances of failure.[70] Many of these firms were small local-serving businesses (e.g., retail, personal services, construction) and had little prospects for expansion, in part because they depend on the low spending power of the local areas. In contrast, stronger black-owned firms tended not to be located in urban minority areas, and were in industries (e.g., manufacturing, producer services) that generated income from wider markets. This suggests that policies that target minority business focus more (but not exclusively) on businesses that exhibit growth potential and sound business fundamentals, and less on local-serving businesses with little potential to expand.[71] As noted below, many minority-owned firms are in suburban locations, but they are still likely to hire minority workers. Thus, they can provide employment opportunities for central cities minorities. And if these firms employ central city residents, their employees will also support central city local-serving businesses.

Urban Neighborhood Networks

Many successful immigrant areas within formerly declining or stagnant parts of U.S. cities have vibrant cooperative business networks. For example, in Los Angeles, the Chinese community relies heavily on networked relations, both formal and informal, to boost economic activity. They have formed banks, accounting firms, and other business service companies. These ethnic firms have extremely high levels of intra-community purchasing, outsourcing and hiring. As a result, money is recycled within the community many times before it leaves, creating more jobs and wealth.[72] One approach would be to fund programs that help local organizations to identify and promote local, import-substituting market niches, and foster ethnic and area commercial networks.

Urban Technology Initiative

There are a number of technological innovations and applications, which, if diffused to urban settings, could improve economic prospects. For example, Argonne National Laboratories outside of Chicago is working with several CDCs, in areas such as energy-efficient housing rehabs, setting up recycling facilities, developing small-scale and inexpensive remediation and assessment technologies for small brownfield sites, and writing software to map urban land use (see box 2-2).

In addition, a number of communities, including Los Angeles and Durham, North Carolina, are exploring how access to the Internet and other information and communication technologies can help create jobs in inner city neighborhoods. For example, in Los Angeles, black residents from the

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[68] Timothy Bates, *Banking on Black Business* (Washington, DC: Joint Center for Political and Economic Studies, 1993).

[69] Ibid.

[70] Timothy Bates, "Small Business Viability in the Urban Ghetto," *Journal of Regional Science*, vol. 29, No. 4, 1989, pp. 625-643.

[71] Bendick and Egan, op. cit., footnote 47.

[72] Ibid.

BOX 2-2: Applying Federal Laboratory Expertise to Solving Urban Problems

Argonne National Laboratory (ANL), located outside of Chicago, and Bethel New Life, Inc. (BNL), a community development corporation (CDC) in West Garfield Park (on the near west site of Chicago) have formed a "Towards a Healthy, Sustainable Community" project, a community economic development initiative focused on recycling, environment and energy. The two-year-old partnership brings together Argonne's technologies and Bethel's expertise in community economic development to create new liveable wage jobs in new industry as the foundation for a healthy, sustainable community.

Staff at Argonne and Bethel have identified five main areas of endeavor that make use of Argonne's expertise in energy and the environment, as well as Bethel's track record in community economic development.

Industrial Site Reclamation and Retention

More than 40 vacant or abandoned industrial buildings are clustered in the vicinity of the Bethel headquarters alone, and many more are scattered throughout the area. The ANL-BNL partnership is developing a process for analyzing abandoned buildings and land formerly used for industrial purposes buildings, with the aim of:

- Developing cost-effective methods of assessing and cleaning-up contaminated sites in order to use this process in the area and offer it to other community development groups throughout the nation.
- Bringing industrial properties located in the community to a condition in which prospective new owners and tenants will be assured of compliance with pertinent environmental regulations.

In its first project, completed in late 1994, Argonne served as the site characterization technical advisor to a small minority-owned, female-headed business specializing in environmental services The two completed Phase 1 assessment of a six-acre site, which Bethel is now in the process of selling to a company that makes fiberboard from waste wood.

Promoting Manufacturing Jobs Through Partnerships

West Garfield Park is home to approximately 40 small- to medium-size manufacturers. Bethel has formed a partnership with Argonne and the Chicago Manufacturing Center (CMC) (a Manufacturing Outreach Center supported in part by the National Institute of Standards and Technology) to help firms modernize, become more competitive, and retain or create jobs. For example, BNL developed onsite training programs for employees who want to upgrade their skills. The CMC augments Bethel's program by offering a variety of services to improve firm performance. "Benchmarking," for example, enables a company to compare its performance with that of similar companies.

Recycling Spin-offs

Bethel has also focused on environmentally based community economic development. In 1992, Bethel opened a $1 4-million Material Recovery Facility (MRF) providing employment for community residents while handling 45 tons of recyclable daily. Bethel realized that for the project to achieve its full potential, they need to encourage scrap-based manufacturers to use the end products of the MRF. Argonne has been conducting research and development, in collaboration with industry, to make recycling of a wide variety of waste streams technically feasible and economically attractive.

Affordable, Energy-Efficient Housing Rehabilitation

Another Bethel-Argonne project involves the development of a collaborative team which will incorporate energy conservation measures in a large set of multi-family dwellings in the community. In addition to Bethel and Argonne, the project will bring together the resources of local utilities, Chicago Department of Housing, and the Illinois Department of Energy and Natural Resources. The team is

(continued)

BOX 2-2: Applying Federal Laboratory Expertise to Solving Urban Problems (Cont'd.)

investigating cost effective opportunities to include energy conservation measures in moderate rehabs. In addition, they hope to help others use the process to include energy efficiency in large scale residential rehabilitation projects such as those being proposed under the Empowerment Zone initiative

Education and Training

Education and training are key components of the Argonne-Bethel partnership. All of the earlier projects require a trained work force and engineers who can be a part of developing and refining the technology for problem solving and appropriate industrial applications. The partnership is also developing three specific projects

- Short-term certification training for environmental technician and hazardous waste handler, with pathways for further training in specific waste materials, assessment technology, and self-employment.
- A training program for residents on how to catalog solid waste streams at Argonne. This training will be useful to the residents as they return to West Garfield Park with the experience to assist the community in establishing additional recycling activities.
- The Urban Engineering Program is being developed to help prepare academically and economically disadvantaged children (grades 4-12) for careers in science and engineering.

Watts area telecommute to downtown and suburban jobs from local satellite offices of Business Services Etc., Inc. The company employs graduates of the Urban League job training program to provide remote computer and word processing services to business clients.

In other places, organizations are helping urban residents become better prepared to cope with a technologically advanced work place. For example, in Detroit, Focus Hope, a non-profit community development organization, trains disadvantaged residents to use advanced technologies related to the automobile industry. Their Center for Advanced Technology trains community residents in advanced automobile engineering methods. In addition, predominately minority two-year colleges can play important roles in training minorities for technology-based jobs, particularly in manufacturing.[73] Urban policy efforts might profitably focus on helping local organizations apply advanced technology solutions to urban problems and helping urban residents, particularly minorities prepare for these jobs.

DEVELOPING PARTNERSHIPS AND METROPOLITAN LINKAGES

In an era of reduced federal resources, increased capacities at the state, local, and private (non-profit and profit) levels, and increased variation and diversity between places, federal policy needs to focus less on simply providing funding to a large number of places through grant and other programs, and more on intervening strategically in the metropolitan development system. As a result, it will be important to encourage state governments and industry to be proactively a part of the solution to urban problems. A second component will be to establish linkages between all parts of the metropolitan economy. This is even more important, now that one of the defining features of the post-industrial metropolis is that it is not a collection of small, nearly self-sufficient economies, but is a truly metropolitan-wide economy (see chapter 3). As a result, federal policy should encourage efforts to link opportunities and policies in the growing outer suburbs to the needs and efforts in the urban core.

[73] Stuart Rosenfeld and Marcia E. Kingslow, *Advanced Opportunity for Manu facturing: The Potential of Predominantly Minority Two-year Colleges,* (Chapel Hill, NC: Regional Technology Strategies, Inc., 1995).

■ Tapping Into Industry's Role

In addition to providing greater support to more innovative efforts, federal agencies and programs could do more to develop new partnerships between industry, government and communities. Urban policy has often meant creation of specific programs or mandates for action that have failed to adequately involve the private sector. In addition, even with adequate federal funds, these efforts would be less than fully successful unless they tapped into the expertise and creativity of the private sector.

There are a number of partnerships that suggest productive avenues. For example, the city of Birmingham, Alabama, in an effort to award more contracts to black-owned building and contracting firms without using set-asides, established a mentoring program in which successful contractors provide technical and business assistance to struggling minority contractors. In Chicago, the Sears Merchandise Group recently announced a $250,000 grant to help establish a training center for minority entrepreneurs. In Boston, the Harvard Business School, under the direction of Michael Porter, is sending its MBA students to inner-city businesses to provide technical assistance and management training. Other business schools, including Columbia and MIT, are doing the same. The Initiative for A Competitive Inner City was formed in Brooklyn, New York, to help graduates and alumni of business schools provide management assistance to inner city firms.

Similarly, a national program by the Food Marketing Institute is working with its members, large grocery store chains, to promote expansion into under-served inner city areas. On a similar program, the Local Initiatives Support Corporation, a non-profit corporation created by the Ford Foundation that funds CDCs and other urban development efforts, has organized a consortium of 10 large financial institutions, who have put up $24 million to be invested in inner-city supermarkets and shopping centers.[74] Increasing the number and quality of retail and service stores in underserved inner-city areas would increase employment in these areas by keeping more of the local dollars circulating in the community.

In addition, there is potential to connect inner-city businesses with markets and strengths in the greater region. A number of places, including Baltimore and Columbus, included such options in their applications for Empowerment Zone designation. In some cases this might mean fostering mentoring programs, while in others it could mean the development of cooperative industrial networks where urban and suburban firms cooperate to address common concerns (e.g., purchasing, marketing, training) .[75]

OPTION 12: *One important role for the federal government is to catalyze these partnership efforts, partly by documenting what is going on and then publicizing what can be learned from them. Congress could:*

- Encourage federal policymakers to consider working with trade associations, large corporations, and other business organizations to explore the extent to which efforts that firms find profitable also help revitalize urban economies, and to help catalyze such efforts.

/ Metropolitan Cooperation

First, the federal government can provide incentives for municipalities in a metropolitan area to work together. The Intermodal Surface Transportation Efficiency Act (ISTEA) and the Clean Air Act Amendments are precedents for this approach. However, it is not clear how effective ISTEA has been to date in bringing about regional cooperation. Effective regional planning will also

[74] Neil R. pierce, "A New Way to Bring Home the Bacon, " *National Journal,* Oct. 8, 1994, p. 2359.

[75] Gregg A. Lichtenstein, *A Catalogue of U.S. Manufacturing Networks* (Gaithersburg, MD: National Institute of Standards and Technology, State Technology Extension Program, 1992); also Brian Bosworth and Stuart Rosenfeld, *Significant Others: Exploring the Potential of Manufacturing Networks* (Chapel Hill, NC: Regional Technology Strategies, Inc., 1992).

help to overcome the fragmentation of land use planning in American metropolitan areas.

OPTION 13: *Federal policies and programs can provide incentives for local governments in a metropolitan area to cooperate. Congress could:*

- Encourage the Administration to review, perhaps through the National Economic Council, existing federal programs as to the extent to which they hinder or encourage regional cooperation at the metropolitan level.
- Require that states and cities receiving federal funds for applications such as transportation, economic development, and housing, establish metropolitan-wide development councils to work to minimize uneven development.

Establish Metropolitan-Wide Organizations

Many federal and state-funded programs are operated by separate organizations in suburban and central city areas. For example, the Job Training Partnership Act (JTPA), the major source of federal training funds, is usually organized into multiple Service Delivery Areas (SDAs) with the central city SDA being separate from suburban ones. [76] For example, in the Chicago metropolitan region there are five SDAs that receive funds from the Department of Labor. Some suburban county and central county SDAs work cooperatively together, at least informally. But most do not. As a result, in many metropolitan areas, suburban SDAs do not market job openings to urban residents, even though most new jobs are in the suburbs. Likewise, many central city SDAs do not fund organizations to place people in suburban jobs. The lack of a regional structure makes it difficult to craft metropolitan-wide training, placement, and transportation solutions for employment. Even in places where there is interest in consolidating the numerous SDAs into a metropolitan-wide entity, local political factors can hinder it. In at least one case, a large city mayor successfully opposed such a move because he felt the city would not get adequate funding under such an arrangement. The result, however, was that urban residents who needed the jobs were effectively separated from where the jobs were located and growing.

OPTION 14: *In addition, instead of providing services through federally funded organizations now set up at the county or city level, Congress could:*

- Encourage the formation of metropolitan-wide organizations to manage or at least coordinate efforts. Specifically, Congress could provide incentives under the JTPA program for Service Delivery Areas (SDAs) to cooperate across SDA boundaries. More proactively, Congress could consider requiring that SDAS be consolidated to the metropolitan level. Congress, however, would need to be careful to avoid arrangements that may allow outer suburban jurisdictions to unfairly capture a larger share of resources than prior arrangements.

Linking Urban Residents with Suburban Jobs

While economic development in the core appears to be able to provide some jobs in the core, dispersion of jobs will nonetheless continue because of the technological changes described in this report. As a result, urban core residents need access to jobs throughout the metropolitan economy. This was not a problem when the poor and unemployed lived near large concentrations of jobs, either in the downtown or in core city industrial areas, and the metropolitan labor market was by and large synonymous with the central city. However, as jobs decentralize, particularly jobs that provide opportunity for people with less education, policies that recognize the metropolitan nature of the economy are needed. Anecdotal evidence suggests that many urban residents do not even consider suburban job openings, particularly those in the outer suburbs, in part because they never

[76] Gary Orfield and Carole Ashkinaze, *The Closing Door* (Chicago, IL: University of Chicago Press, 1991).

become aware of them. Thus, one strategy for economic development is to overcome isolation by developing and maintaining connections to growing suburban labor markets (see box 2-3).

There are three main components of metropolitan-wide employment accessibility policy.[77] First, people in central city areas may need job training to prepare them for suburban jobs in back office operations, light manufacturing, or retail. The gap between present skills and needed skills can be enormous for the higher-end service jobs concentrated in many CBDs. The gap is much smaller for blue collar and back office employment, which has decentralized to the suburban periphery. As a result, central city training systems need to train for jobs regardless of where the jobs are within the metropolitan area. Moreover, the largest training needs seem to be in basic areas, such as reading skills, positive work habits, and problem solving.

Second, effective job information systems are needed to match city workers with job openings in the suburbs. Regional job information programs, including those operated by employment services

BOX 2-3: Improving Access to Transportation and Distribution Jobs: Columbus Seeks to Create New Links

During the past three years, local officials in Columbus, Ohio, estimate that air cargo and related distribution operations at Rickenbacker International Airport and the adjacent industrial park have generated about 5,000 new jobs. And they expect transportation and distribution employment in the area to grow by an additional 25,000 jobs by the year 2010.

Rickenbacker is located at the edge of the greater Columbus area, about 15 miles from downtown. Businesses on and around the airport draw most of their employees from the city and three adjoining counties. Jobs in the Rickenbacker area are generally accessible only by auto; there is currently no public transportation to the airport or the industrial park. Says William Honey of the Greater Columbus Chamber of Commerce:

"This is a real concern for us. Columbus has a low unemployment rate--in fact, we're at virtually full employment. We already have companies telling us that they can't find workers. But we also have a high poverty rate; in fact, Columbus has more people living below the poverty level than a number of larger cities--Philadelphia, for example. Entry-level jobs in transportation and distribution typically pay about $7.00 an hour in this area, which ought to provide an attractive alternative to public assistance. But the low-income population is concentrated in the center of the city, and most of the growth is on the periphery."

Local officials and the business community have proposed to address this spatial mismatch by extending public transit from the city to outlying areas. The proposed new services would be part of a package of metropolitan transportation improvements that would be financed in part by a new half-cent sales tax surcharge, which will be submitted for voter approval in November 1995.

The city and the Chamber of Commerce are also exploring ways to encourage some growing distribution businesses to locate in older industrial areas, closer to the inner city, rather than in outlying areas. Strategies they are considering include tax incentives, encouraging re-use of abandoned land under the state's new voluntary-clean-up law, and assistance in the development of day care services for local residents.

[77] Mark Alan Hughes, "Employment Decentralization and Accessibility: A Strategy for Stimulating Regional Mobility,'' *APA Journal*, vol. 57, No. 3, Summer 1991, pp. 288-298.

and the Job Training Partnership Act Private Industry Councils (PICs) can help make these linkages. In addition, less formal systems, based on building networks between suburban employers and city residents can help.

Finally, central city workers need transportation to suburban jobs (see chapter 9), and they are often dependent upon car pooling or public transportation. In some cases, transit routes can be more effectively organized to facilitate reverse commuting. For example, SEPTA, the transit authority in the Philadelphia region, has successfully implemented some reverse transit routes. Similarly, the Milwaukee transit authority, partly at the urging of the local PIC and suburban employers, has established new routes to help urban workers commute to the suburbs. In other cases, specially organized van pools or buses can be set up. In Chicago, for example, Suburban Job Link operates buses every day to transport largely minority residents of Chicago's near west side to suburban jobs.

There have been limited federal efforts in this area. The JOBLINKS Employment Transportation Initiative, created by the Federal Transit Administration, is a demonstration project on how transportation may improve employment outcomes of participants in the Department of Health and Human Services Job Opportunities and Basic Skills (JOBS) program. However, it is of short duration (one year), limited funding ($83,000 for each of 12 sites) and is largely rural.[78]

HUD's "Bridges to Work" program is an anti-poverty strategy to link unemployed and underemployed in central cities to jobs in the suburbs. The program was initially funded mostly by five private foundations that put up $1.2 million. HUD and DOT contributed an additional $250,000 between them. The first phase of the project involved planning in nine communities. As a result, six cities, Baltimore, Chicago, Denver, Milwaukee, Philadelphia, and St. Louis, were chosen for a four-year demonstration project to begin at the end of 1995. The cities were selected in part because they developed a plan and collaborative relationships among job providers, job training organizations, transit providers, and social services organizations. The four-year demonstration project will include a control group and an experimental group in four of the cities to rigorously test its effectiveness. Total funding will be $25 million over the four years. Currently, HUD is working with HHS, DOL, and DOT to negotiate funding shares. Funding is coming from internal department funds. Congress has not explicitly appropriated money for this purpose.

OPTION 15: *Increase support for mobility to work programs. Congress could:*

- Fund the "Bridges to Work" program and, based on its findings, expand the program to more cities and more participants. Senator Bill Bradley recently introduced Mobility for Work Legislation that would provide federal funds for a similar program.
- Provide tax incentives to suburban employers who provide van pools or other transportation for disadvantaged urban core residents. Possible incentives could include tax credits for van service to and from existing transit or bus lines, and accelerated depreciation of the vehicles.

REDUCING SUBSIDIES TO PERIPHERAL DEVELOPMENT

Since the earliest years of the Republic, localities and regions have competed with each other to attract investment, and to some extent to attract certain types of residents. However, in the last 20 years, competition for industry and people has intensified significantly, resulting in widespread industrial recruiting and increased efforts at exclusionary zoning to restrict the entry of low-income residents. Cities compete with each other to attract industries that provide jobs, and high-in-

[78] Mark Alan Hughes, "Changing the Geography of Work," a report to the Ford Foundation, March 1994.

come residents, who pay more in taxes than they consume in services.[79] There are several reasons why these practices have increased. First, before the 1970s, when the economy was growing rapidly and regional dislocations were minimal, jurisdictions had less need to compete for a share of the economic pie because the pie was growing. Second, the decline in federal support to cities over the last two decades has made them much more dependent upon the health of their local economies and the prosperity of their residents for revenues. As a result, they are more active in trying to get a favorable mix of industry and residents. Third, the rise of metropolitan-wide economies, in part facilitated by technological change, means that business has more locational freedom and that jurisdictions are competing more fiercely to attract and retain industry.

The system of 50 states and thousands of local governments has a number of advantages. The system widens jurisdictional choices for industry and individuals. Moreover, private enterprise and state and local governments must compete to attract people and industry, and this competition exerts pressure on them to keep taxes low and to operate efficient government services. States and cities cannot become complacent about the quality or cost of the services they offer.

Despite these advantages, aspects of this jurisdictional fragmentation weaken the competitive position of urban core jurisdictions. Outlying and often more fiscally healthy jurisdictions offer incentives to attract industry, often at the expense of core jurisdictions (see chapter 8). Competition among local governments exacerbates the fragmentation of land use planning, which in the era of the post-industrial metropolis often has deleterious results.[80] Finally, there is some evidence to suggest that greenfield development in outer suburbs and exurban areas does not pay its own way. For a number of areas, including infrastructure and transportation, places with lower densities of development often cost more to serve, yet pricing policies often do not reflect these differences. Federal tax policy also appears to favor suburban as opposed to core areas. In sum, the actions of the public sector, including the federal government, distort the locational decisions of the market.

In this case, the failure of market prices to reflect full costs, including externalities, means that price signals are being given that further stimulate urban sprawl and dispersed development. Dispersed development is cheaper than it would be if it paid its full costs, and core development is more expensive. Moreover, such development patterns appear to systematically weaken the development prospects of the urban core.

Dispersed development weakens the economic prospects of the core and possibly creates inefficiencies at the metropolitan level. Yet, unduly restricting development in the outer suburbs or exurban locations through such mechanisms as growth controls may also be economically inefficient. However, an array of mechanisms, including marginal cost pricing, development levies, and full-cost recovery regulations, have the advantage of using the market's own signal mechanism—price—to adjust land uses and to encourage a more cost-effective pattern of urban development. But these are in themselves incomplete because they address only localized and direct costs, not the region-wide social, economic, and environmental costs of excessive suburbanization and inner city decline. For that to occur, mechanisms that internalize the external costs of development are also needed.

The private sector and the market may ultimately address part of this imbalance if the rent gap and cost differentials between city and suburban land development become smaller. But it is the public sector's role to review the nature of, and biases inherent in, the tax and regulatory environments, and to address the social, economic and environmental consequences of uneven urban

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[79] Peter D. Salins, "Cities, Suburbs, and the Urban Crisis," The Public Interest, No. 113, Fall 1993, pp. 91-104.

[80] Anthony Downs, *New Visions for Metropolitan America* (Washington, DC: The Brookings Institution, 1994).

growth and change. In some cases, government policies (subsidies) or lack of policies (e.g., to price negative externalities) appear to allow new development, particularly low-density development on the periphery of metropolitan areas, to not pay its own way. It is not clear how large these subsidies and externalities are, nor whether requiring dispersed development to pay its full share would significantly impact urban growth patterns. However, efforts in that direction have the potential to not only increase economic efficiency, but also to strengthen the development prospects of the core. A number of policies could move in this direction.

Marginal Cost Pricing of Urban Services and Infrastructure

Pricing policies for most utilities (public and private, including telecommunications, power, cable TV, postal service) do not generally reflect the differences in costs of serving areas that differ in density (see chapter 8). For example, the cost of serving rural telephone users is generally most expensive (and is subsidized by non-rural users), followed by dispersed suburban users, with densely populated (usually urban core areas) the cheapest to serve. Yet, telephone regulation limits the extent to which telephone service providers can charge prices that reflect the true cost of providing services to business and residents in different density locations. Encouraging pricing of services to reflect these differences at least in part could increase costs in outer and exurban locations and reduce costs in central city locations. Clearly, the major motivations for any deregulation of utility, telephone, and mail services will be for other reasons, including attempts to increase overall efficiency. In addition, average cost pricing does promote the goal of universal service. However, as discussed in chapter 8, moving to marginal cost pricing in rural areas, at least, is estimated to have only a minimal impact on phone penetration rates. Overall, these changes could also have a beneficial effect on urban cores.

Full Cost Pricing

Policies to internalize externalities could help reduce the cost advantage outer suburbs and exurban sites currently enjoy. For example, efforts to enforce the Clean Air Act provisions on trip reduction in non-attainment metropolitan areas are likely to benefit the urban core because transit access is greater there. Similarly, efforts to have drivers pay the full cost of driving are likely to benefit urban cores. Likewise, congestion pricing for driving would require automobile drivers to bear the costs they impose on other drivers in the form of increased traffic congestion. To be most efficient, the price charged a motorist for driving should account for the costs imposed on all motorists as a result of the additional delay caused by that motorist's entry into the system. Various forms of traditional toll barriers could partially do this, but would not necessarily account for regional mileage traveled. More importantly, they would impose high transaction costs (toll infrastructure, labor, and delays imposed by the tolling process) to accomplish the policy objective.

Some systems developed in the Intelligent Transportation Systems program could enable real-time congestion pricing to be implemented. Congestion pricing uses tolls on highway use at peak periods. Technological innovations now make it possible to impose such tolls with low transaction costs. To date, few places have experimented with congestion pricing despite widespread interest. The lack of experience with congestion pricing hampers assessment of its impact on metropolitan form. Given the importance of context, the handful of congestion pricing-like schemes provides an uncertain base on which to speculate about its impact on U.S. metropolitan form.

Although the effect of congestion pricing on urban form is difficult to predict, it is possible that congestion pricing can help major centers and the CBD by providing greater access. On the other hand, congestion pricing is also likely to lead to increased pressures for development at the periph-

cry, particularly among higher-income households who put a high value on their time. In contrast, policies to make users pay the full cost of using a particular road, through such mechanisms as tolls, could have the effect of increasing the cost of travel in more dispersed settings, leading to more concentrated residential and commercial development pattems.[81]

OPTION 16: *Without further and more definitive information, it is not clear how important subsidies are to encouraging peripheral development. Therefore, Congress could:*

- Require that HUD undertake a major study to assess the nature and extent to which public policies at all levels of government inadvertently subsidize suburban and exurban development, particularly at low densities, and what policy steps could be taken to reduce or eliminate these subsidies.

Reining in Business Location Incentives

It is one thing for companies to leave the center city to move to the outer suburbs because land costs or rents are cheaper. Market forces are operating well here. However, it is quite another thing when financially well-off suburban jurisdictions provide financial incentives (e.g., free land, reduced taxes) to induce companies to move out of the city. Clearly, there are many cases where companies would have moved even without incentives. Yet, there are others where the incentives tip the balance. For example, Brooks Sausage, a minority-owned and largely minority-employee firm, formerly located in the South Side of Chicago, was offered significant incentives to relocate its facility to a smaller city in Wisconsin; it moved, and laid off its Chicago workforce. Similarly, the Securities and Exchange Commission located in Washington, D. C., has been offered millions in incentives by Maryland and a suburban jurisdiction to move out of the District. Moreover, state incentive policies exacerbate this pattern. Virtually no states use incentives to target new investment to distressed areas, particularly in cities. In contrast, usually states provide funds for companies in suburban or smaller city locations, in large part because they are responding to locational preferences by industry. Central cities and inner suburbs are often at a disadvantage in attracting investments, and state incentive programs only exacerbate this. For example, the state of Virginia and the city of Manassas are providing close to $100 million to a joint venture by IBM and Toshiba to establish a semiconductor fabrication plant in Mannassas, an outer suburb of Washington, D.C. In some cases, states even fund companies that are moving out of the central city to the outer suburbs. For example, the state of Illinois provided Sears with $110 million to move out of the downtown, where a large share of its workforce were central city residents, to Hoffman Estates, a suburb 40 miles from the downtown, with little public transportation access for potential workers from the central city.[82]

Unfortunately, because of the weakened fiscal conditions of most urban jurisdictions, they either cannot match these incentives, or if they do, they must reduce funding on other important urban services. Moreover, in some cases, cities use federal funds, including CDBG funds, to lure firms to their communities.

OPTION 17: *Finding policies to curb incentives is difficult. However, because of the nature of competition between states or between cities, only higher levels of government can control such giveaways, in this case*

[81] Just as Intelligent Transportation Systems enable realtime congestion pricing systems to be implemented, in part th
ment systems, they could also enable greatly expanded use of toll systems.

[82] Sears had threatened to relocate to North Carolina.

the federal government. 83 To end or reduce bidding wars, Congress could:

- Prohibit executive branch agencies from entering incentive bidding contests for the attraction of federal facilities. For example, a number of states bid for the Superconducting Super Collider, and many bid for other federal facilities, such as the Department of Defense accounting centers. However, with reduced federal budgets, the monies for such incentives may be more important to federal agencies than they were in the past.
- Ensure that federal programs and practices do not further bidding wars. While most federal economic development programs prohibit using the money to encourage firms to move, the CDBG program does not. As a result, one option would be to apply such anti-pirating provisions to all federal economic development programs. Recent legislation in the House (HR 463) and Senate (S192) would prohibit the use of CDBG funds for this purpose. Because states and cities are still likely to find ways to use federal funds to recruit industry or to substitute their own funds in incentive deals, more fundamental measures to restrict incentives may be needed.
- Encourage the Secretary of Commerce to convene a meeting of state economic development directors to try to reach an agreement to stop, or at least significantly curb the practice. If an initial agreement could be reached, it would be in the interest of states to keep it, since all would benefit.[84]
- Require city and state recipients of federal economic and community development funds (including tax breaks and tax-free financing—e.g., Industrial Development Bonds) to report all subsidies given to relocating firms (over a certain minimum amount, such as $1 million) to HUD. This information could be reported electronically and be accessible through the Internet to anyone in the nation. As a result, watchdog efforts by other communities or states could help ensure that communities and states reported all the incentives they are providing.
- Reduce federal funds for economic development in proportion to industrial recruitment incentives offered. Congress could encourage compliance with an agreement to curb bidding wars by directing the Administration to reduce funds from those budget categories in proportion to the dollar value of incentives provided by cities and states to attract new business. States that spend money on incentives for relocating firms could have the amount of federal economic development funding reduced by some proportion, depending perhaps on the degree to which they provide more incentives than other states.
- Make state and local incentives subject to federal taxation. Congress could modify federal tax law so that tax abatements provided by states and localities to businesses would be treated as part of corporate income for federal tax purpose. In order to make the system manageable, Congress may want to set a minimum amount of incentives above which businesses must report (for example, $500,000 or $1 million). The IRS could also be required to report this information to the designated federal agency overseeing incentives.

Federal Telecommuting Programs

Although telecommuting may have environmental and transportation benefits, it also appears to foster residential decentralization (see chapter 7). Federal policy should realize this. For example, the federal government, through the General Services Administration, pays for telecommuting centers that exurban commuters travel to one to

[83] Samuel Nunn, "Regulating Local Tax Abatement politics," *Policy Studies Journal, vol. 22, No. 4, 1994,* pp. 574-588.

[84] Collectively states would benefit from incentive curbs because the same level of development would occur in the United States without the incentives, and states would have to pay much less to attain it.

three days a week. However, the large majority of these federal commuters still have offices in the core which the federal government must also pay for, in addition to the cost of their telecommuting office space. The rationale for such subsidies is that the workers are not driving as much, thereby reducing congestion and air pollution. However, being able to telecommute a few days a week from a center, and not paying any of the costs, makes it easier for these workers to live in exurban locations. Workers living closer in receive no such subsidy. Congress could consider requiring users of telecommuting centers to pay at least part of the net costs of supporting these centers.

Brownfield Redevelopment

More so than outer suburbs, inner suburbs and central cities (or new firms locating there) are burdened with cleanup costs on contaminated land because in many cases, the industries responsible for the contamination cannot or will not pay. A number of problems attend the reuse of brownfields, including cost, liability concerns, and delays and uncertainty; all discourage development of these sites. Though removal of these impediments would not solve all redevelopment problems at brownfield sites, it would improve their development prospects. There are a number of federal policies that could encourage reuse of these sites, including modification or clarification of liability issues, funding for cleanup, and EPA delegation of authority to states.

Brownfields are currently receiving a lot of attention from all levels of government in the United States.[85] In particular, state authorities and organized stakeholder groups are promoting legislative and administrative changes in the way that many of these properties are handled. During 1994-1995, nine states passed legislation creating voluntary cleanup programs.[86] Though many of these changes are directed toward improving the prospects for brownfield cleanup and redevelopment, some expand the scope beyond brownfields to all hazardous waste sites including cleanups pursued through enforcement driven programs, such as state superfunds and property transfer laws. Legislation designed to change state policy on such factors as cleanup standards and liability at a site will impact all hazardous waste cleanups in a state. However, it is uncertain whether state programs will be able to provide enforcement immunity to particular parties, since liability assurances are limited and extend protection only from state enforcement actions, leaving liability under federal law or third-party actions in place. As a result, state assurances may not go far enough for some stakeholders to promote further brownfield cleanups and redevelopment.

As states rethink their policies toward hazardous waste site cleanups, many are taking a more comprehensive approach to the law, easing some of the constraints considered barriers to brownfield activity. States are making an effort to clarify cleanup standards and processes, clarify liability at brownfield sites to include some level of government oversight without slowing the process unnecessarily, and to offer financial incentives to promote cleanups. However, considerable variation is still evident in some important elements.

In addition to brownfield activity at the state level, EPA and Congress are addressing the problem at the federal level. EPA's Brownfields Action Agenda works to remove identified barriers to cleanup and redevelopment. Congress is currently addressing brownfield issues in Superfund reauthorization and in separate bills on lender and fiduciary liability for cleanups. Addressing the issue of liability under federal law will be important to facilitate brownfield redevelopment.

A second important issue is who should pay for cleanup and redevelopment, and if there is a federal role, what form should it take? Some have advo-

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[85] U.S. Congress, Office of Technology Assessment, *The State of the State of Brownfields* (Washington, DC: OTA, June 1995).

[86] These states are Nebraska, Wisconsin, Colorado, Tennessee, Connecticut, Ohio, North Carolina, California, and Virginia. Stateside Associates, personal communication, May 1995.

cated large new programs to fund not only brownfield cleanup but also redevelopment. There are three potential drawbacks to such programs. First, it is not clear that market forces would not adjust the price of privately owned sites to reflect expected cleanup costs, especially if there has been a site assessment. Second, under the polluter pays principle, it is not clear that private companies responsible for the pollution at sites they still own should receive cleanup subsidies. But providing assistance for orphan sites, where there is no identifiable owner may make sense. Third, while federal cleanup funds may be needed, the rationale becomes weaker for government assistance for redevelopment. Many of these sites have good redevelopment prospects that should attract investors as long as environmental uncertainties and problems do not overwhelm the calculation.

OPTION 18: *In some places and at some sites, federal financial assistance may be appropriate to help stimulate brownfield development. As a result, Congress could:*

- Establish programs to fund brownfield assessment and cleanup. Several bills have been introduced addressing financing of brownfield assessment and cleanup. For example, HR2178, introduced in August 1995, would provide federal assistance for brownfield cleanup. Under the bill, the Environmental Protection Agency would make grants to applicants to pay for site characterization and assessment. In addition, EPA would be authorized to make loans for site cleanup. In making the awards, one of the criteria for approval is the extent to which the assessment or cleanup is linked to redevelopment. Such provisions are important, since there is a risk that a brownfield finance program could result in sites with little development potential being cleaned up.
- Establish a "Brownfield IRA" that would allow small and medium-sized companies to put aside tax free a certain amount of money per year up to some limit (perhaps $250,000) that must be spent for cleanup or be subject to taxes and penalty. The brownfield problem can be particularly onerous for small and medium-sized firms faced with transferring ownership of a site, and therefore fall under state property transfer or brownfield laws. As a result, such a mechanism might be particularly helpful to firms where the owner is planning to sell and knows ahead of time that cleanup will be an issue.

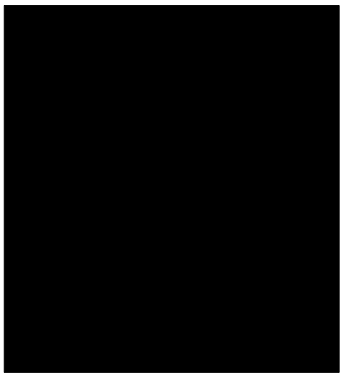
Evolution and Current Conditions of the U.S. Metropolitan System

3

A metropolitan region (metro) is a complex techno-politico-socio-economic system, with attributes that result from ongoing decisions by individuals, governmental bodies, and business firms. These decisions are shaped in no small part by the technological possibilities of the time. Not only does the shape of metros reflect changes in systems and organization of production, but the structure and function of metros themselves influence the performance of the economic system.

Today, advanced industrial economies are in the midst of a technological revolution, driven by advances in microelectronics technologies. It is not clear whether this is on the order of a shift from an industrial to an information economy, as some speculate, or a more modest, but still important shift from one technology system to another. However, it does suggest that a new form of metro is emerging, in ways with potentially profound benefits to some places and costs to others.

In preparation for the discussion in chapters 4-7 on how this latest wave of technological change is reshaping American metropolitan areas, this chapter provides background on historical and current conditions in U.S. cities and metros. It first presents an overview of how technological change has affected the historical development of U.S. metropolitan areas. It then discusses the current spatial distribution of households and industry in the U.S.



TECHNOLOGY AND STAGES OF AMERICAN URBAN GROWTH

Because technological change in the United States has not been a continuous process, but rather one in which clusters of technological innovations emerge in particular periods, many believe that development of the cities and metros in the United States has pro-

ceeded in a discontinuous rather than linear fashion.[1] Urbanization has been driven by technology transitions that redefine urban hierarchies and bring new types of specialization to the urban economic base. As a result, the pattern of urbanization has not been a smooth evolution to the conditions of the present, but has been marked by major transformations from one form of city to another.

New technology changes the spatial distribution of industry and people in several ways. First, the widespread distribution of new types of physical infrastructure make new locations accessible and cheaper. For example, the building of the interstate highway system allowed manufacturers traditionally dependent upon rail and ship to locate in other areas. Today, widely deployed advanced telecommunications infrastructure may allow some information processing firms to locate in more peripheral areas than they might otherwise (see chapter 7).

Second, industries or demographic cohorts with different locational patterns grow or decline at different rates. For example, increases in agricultural productivity, largely a result of mechanization and application of biochemical processes, resulted in declining farm employment, leading in turn to the migration of 24 million persons from rural areas to metropolitan areas between 1922 and 1954.[2] More recently, the increase in central city employment in the late 1970s and 1980s was due in large part to the absolute and relative employment growth in sectors such as legal services, banking, and other producer services.[3] For example, the doubling of legal service jobs from 1977 to 1987, an industry heavily concentrated in large urban area downtowns, contributed to the turnaround of the decline or stagnation of many central cities in the 1980s.[4] These new legal jobs required an estimated 120 million square feet of new office space—the equivalent of three Chicago central business districts.

Third, as discussed in chapters 4-6, location of jobs can also change as technology, product mix, and industrial organization change. Technology can be particularly important in this process, since it can alter the nature and mix of inputs, including type and quantity of labor, materials, energy, land, and buildings needed. As these change, optimal locations also change.

Finally, technologies can influence where people live, in turn influencing where firms locate, particularly residentiary employment that serves local markets (see chapter 7). For example, the development of air conditioning made large sections of the South and West attractive to millions more people. Medical technology advances have enabled a larger share of the population to live longer after retirement, allowing the retirement population of states like Florida, Texas, California, and Arizona to expand significantly. Social Security, and the ability to take it wherever you go, was also a very significant factor in the expansion of these places. Today, many claim that technologies to facilitate telecommuting from home will further increase residential dispersion.

The importance of technological change is not to suggest that other socioeconomic and public policy factors have not also played, and will continue to play, important roles. Crime, single-parent families, teenage pregnancies, welfare dependency, and drug availability all contribute to urban problems and, by extension, economic and residential spatial patterns. Likewise, public policy interventions, such as the building of the interstate highway system, use of investment tax

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[1] John Borchert, "American Metropolitan Evolution," *Geographical Review*, vol. 57, 1967, pp. 301-32.

[2] James Heilbrun, *Urban Economics and Public Policy* (New York, NY: St. Martin's Press, 1987).

[3] Thierry J. Noyelle and Thomas Stanback, Jr., *The Economic Transformation of American Cities* (New York, NY: Rowman and Allenheld, 1984); William Beyers, *The Producer Services and Economic Development in the United States*, Final Report to the U.S. Department of Commerce, Economic Development Administration, 1989.

[4] Barney Warf and Chand Wije, "The Spatial Structure of Large U.S. Law Firms," *Growth and Change*, vol. 22, No. 4, Fall 1991, pp. 157-74.

credits for new facilities, the location of public housing, and tax and other policies that create advantages for home ownership all have helped to form the present patterns of urbanization (see chapter 8). Nevertheless, technology plays an important enabling role in shaping metropolitan areas.

All four kinds of technological change noted above have had considerable impact on urban form and life in the United States. In fact, as a result of these technology systems changes, some urban scholars argue that there are distinct historical periods of urbanization.[5] These can be classified as follows:

Artisan and Craft City, 1820-1870

The period of the first industrial city in the United States was from approximately 1820 to 1870. An overwhelmingly rural society had only a few large trading centers that were predominantly "walking cities," with little reason for space between work and home, between social classes, or between races. There was little functional separation of land uses, production was not centralized, and there was little social segregation. Early manufacturing was tied largely to craft or labor-intensive primitive machines. Because surface transport was primitive, the foci of activity were ports and docks, and desirability of locations decreased with increasing distance from the center, where churches, public buildings, and the homes of the most prominent citizens were clustered. Scattered dam-site mill towns were built in the 1820s and 1830s as the domestic textile industry grew, bringing a different building pattern.

Early Industrial City, 1870-1920

It was the growth of the manufacturing economy from 1870 to 1920 that transformed urban structure. Manufacturing replaced cotton as the nation's leading growth sector in the years between 1842 and 1859, and as the full U.S. industrial revolution unfolded, the national market was broadened by canals and railroads, factory organization of production beyond the textile industry, and the replacement of a self-sustaining rural economy by commercialized agriculture.

The northeastern industrial belt lay at the heart of a national rail network, with processing centers at rail nodes. Accompanying urban impacts included concentration of production and circulation around central business districts, separation and specialization of land uses, and the outward thrust of residential areas of the high-status groups, first to country estates and later to garden suburbs, leaving behind the working classes in the inner city. Technologies, including transportation (railroads and steam-powered ocean vessels), new materials (steel), new industrial processes (Taylorism), new energy sources (electricity), and new communications technologies (telegraph and telephone), allowed urban centers to spread more widely across the nation and permitted larger scale industrialization. The densities of population and activities in urban centers made investments in urban rail centers (long distance and commuter) financially viable. Coinciding with this came the change from an urbanism made up of mill towns and mercantile ports to one characterized by the classic core-oriented industrial city.

During this period, the dominant flow of migrants was from rural to urban areas, as early stage agricultural mechanization took hold and industrialization proceeded at a rapid pace. Initially this flow, plus European immigration, produced a concentration (or absolute centralization) of population in the urbanized core of the young metropolis, while population in the surrounding rural-urban fringe (the ring) declined in many places. Within cities, electric streetcars and train lines contributed to suburbanization of residences. Water and sewer systems and advances in public health made high urban densities safer. At the beginning of the period, 1870, about one-fourth of all Americans

[5] This section is based on a report prepared for the Office of Technology Assessment. Brian Berry, "Classification Systems for U.S. Cities," 1995.

lived in urban places—by the end, 1920, over half were in cities.

Mass-Production Metropolis, 1920-1970

The period 1920 to 1970 saw the emergence of a new form of city—a third stage of industrialism and urbanism. A wave of technologies—including the new transportation technologies of automobiles and airplanes; new infrastructure technologies, including widespread diffusion of electricity, highways, and water systems; mass production manufacturing technologies; and importantly, agricultural mechanization—drove the change. In addition, newly rationalized, vertically integrated corporations with a national market emerged.

Air travel, long-distance communications, and truck transport began to recast regional relationships, allowing large-scale urban development to spread farther south and west. Arterial highways, then limited access parkways, then interstate highways, tied metropolitan regions and finally the entire nation together. Widespread electrification allowed industry much greater locational freedom, stimulating much of southern and western industrialization. In addition, the development of air conditioning made living and working in hot southern and western climes more tolerable. Agricultural mechanization led to significant decreases in agricultural labor, with concomitant migration from rural to urban areas.

During this period, growth continued to concentrate in metropolitan areas, while some growth spilled over the existing urban boundary into the rural fringe. This brought about widespread suburbanization and a relative decentralization of population to the formerly rural fringe. Congestion and rising land values in the urbanized core, the construction of a national highway system, Veterans Administration and Federal Housing Administration subsidies for single-family homes, investment tax credits for new infrastructure, and a shortage of suitable development sites encouraged firms and households to move outward. In the latter stage of this phase, as the outmigration of population from the core began to exceed both in-migration from other regions and natural increase, the population of many urban cores began to decline (a situation of absolute decentralization), in some instances very rapidly. Migration of blacks, displaced by agricultural mechanization in the South, coupled with housing segregation and the construction of concentrated low-income housing, led to the creation of an increasing number of black ghettos, particularly in northern-midwestern central cities.

Within metropolitan areas, cities were reshaped by the automobile. Initially, streetcars created radial extensions from urban cores. Increasing automobile use caused residential locations to expand significantly, leading to patterns of "bedroom suburbanization." Residential suburbanization during this time meant the development of many suburbs as basically bedroom communities largely dependent on the core city, although some local service functions (e.g., retail, personal services) grew in the suburbs. Steel girder buildings, electric elevators, and telephone communications facilitated intensified use in the central business district through the construction of skyscraper office towers.

Post-Industrial Metropolis, 1970-Present

The next phase of urban development, beginning in approximately 1970, can be characterized as post-industrial metropolitan development, where business spreads throughout the metropolis; residential growth moves to the outer suburbs and exurban areas;[6] some parts of some central cities, especially central business districts (CBDs), revive while others decline; and many sections of

[6] Exurban counties are defined as counties adjacent to metropolitan areas with significant commuting to the metro, but below the levels that would make them officially part of the metropolitan area. Richard Morrill, "Population Redistribution within Metropolitan Regions in the 1980s: Core, Satellite and Exurban Growth," *Growth and Change,* Summer 1992, pp. 277-302.

older central cities and inner suburbs, particularly those formerly dependent on mass production manufacturing, stagnate or decline. In this period of metropolitan growth, old dichotomies between cities and suburbs have given way to a more spatially diversified and complex ordering of economic space. Core technologies underlying this stage, as discussed in chapter 4, are information and telecommunications technologies, particularly as applied to industry in both manufacturing and services. New transportation technologies, including development of long-distance passenger jets and completion of the interstate highway system are also important. The development and widespread diffusion of these technologies are contributing to a spatial restructuring of metropolitan economies. For example:

- Some metropolitan areas dependent upon older technologies and industries, particularly low-technology manufacturing, stagnate and decline. Others successfully make the transition to technologically based manufacturing or producer services industries and continue to grow.
- Many central cities experience slow growth or decline in employment and population. Moreover, such decline now spreads to an increased number of older, inner suburban areas.
- Most central city economies restructure, shifting from an economy based on goods production, distribution, and retail trade, to one based on producer services, often employing a high share of managerial and professional workers. In addition, industries such as universities, hospitals, government, and tourism (e.g., hotels, museums, airports), become more important to core economies.
- In part due to the decline or stagnation of urban core economies, coupled with an increased shift to a white-collar occupational structure, both poverty rates and ghettoization increase. Moreover, minorities make up a large and growing share of most central cities.
- A large share of outer suburbs and exurban areas grow rapidly, both in terms of employment and population. Low-density residential development spreads even farther outward, leading to large, sprawling metropolitan areas.
- Metropolitan economies become "polycentric," with concentrations of business activity in many different parts of the area and the fastest growth taking place in suburban "edge cities." However, in many places this growth is relatively uneven, with some parts of the metro growing and others stagnating.

DESCRIBING THE POST-INDUSTRIAL METROPOLIS

This section describes metropolitan development patterns in the United States over the last two decades. It examines the economic and demographic changes from three aspects: interregional changes, central cities and inner-suburbs, and outer suburban and exurban areas.

Inter-Metropolitan and Inter-Regional Economic Trends

Urban/Rural Growth

During the 1970s, after decades of relative decline, population and employment rose faster in rural areas than in metropolitan.[7] There are a number of reasons given for the growth in rural employment and population in the 1970s. These include energy and minerals price increases (natural resource industries are more concentrated in rural areas), the relative decline of urban manufacturing and growth in rural manufacturing, increased numbers of retirees living in rural areas and the rise of amenities in smaller places that allowed rural preferences to be realized, and finally,

[7] Metropolitan areas include Metropolitan Statistical Areas (MSA's) and Primary MSA's (PMSA's). MSA's include cities (defined as political units) and contiguous groups of cities with more 50,000 in population. PMSA's are component metropolitan areas of larger Consolidated MSA's (CMSA's). U.S. Census Bureau, *Statistical Abstracts of the United States* (Washington, DC: 1993), pp. 37-39.

TABLE 3-1: Population change for regions and metropolitan categories, 1970-90

Region and metropolitan category[a]	Population 1990 (millions)	Percentage change 1970-80	1980-90
North			
Large	62.9	-0.9	2.8
Small and mid-size	25.6	5.2	3.3
Rural	22.6	8.0	0.1
South			
Large	28.2	23.4	22.3
Small and mid-size	31.9	20.9	13.4
Rural	24.9	16,3	4.6
West			
Large	33.8	20,0	24.2
Small and mid-size	10.8	32.2	22,8
Rural	8.1	30.6	14.1
U.S. totals			
Large	124,8	8.1	12.1
Small and mid-size	67.9	15.5	10,8
Rural	56.0	14.3	3.9
Region totals[b]			
North	111.1	2.2	2,4
South	85.0	20.1	13,3
West	52.7	24,0	22.2
Total	*248.7*	*11.4*	*9.8*

[a]Large metropolitan areas (MAs) include 39 CMSAs and MSAs with 1990 populations exceeding 1 million.
[b]These regions are consistent with standard census definitions where the North region represents the combined Northeast and Midwest census regions. When an individual MA overlaps regions, its statistics are assigned to the region where its principal central city is located

SOURCE: Compiled by William Frey, "The New Urban Revival in the United States, " *Urban Studies,* vol. 30, Nos. 4/5, 1993

improved transport (e.g., completion of the interstate highway system) and communications that made many rural areas more accessible to industry.[8]

Many expected this trend to continue in the 1980s. In 1980, a Presidential Commission report on urban issues[9] reflected the widely held view of the time that as new technologies and new modes for distribution of consumer goods made heretofore exclusively urban amenities and jobs accessible to low-density rural and small city locations, Americans, known to prefer these locations, would choose them over congested larger metropolises.[10] Yet, this predicted movement of people and jobs to smaller cities and rural areas did not take place; indeed, the opposite occurred (see table 3-1). Rather than continued reconcentration of population away from large metropolitan areas to smaller metropolises, and from both large and small metropolises to non-metropolitan locations, in the 1980s the largest metropolises gained population faster than smaller metropolises, and these grew at a rate considerably slower than their rate of growth in the 1970s. Non-metropolitan areas

[8]William H. Frey, "The New Urban Revival in the United States," *Urban Studies,* vol. 30, No. 4/5, 1993.

[9]President's Comission on a National Agenda for the Eighties, *Urban America in the Eighties: Perspectives and Prospects,* Report on the Panel on Policies and Prospects for Metropolitan and Nonmetropolitan America (Washington, DC: U.S. Government Printing Office, 1980.)

[10]J.M. Wardwell and D.L. Brown, "Population Redistribution in the United States During the 1970's," in D. L. Brown and J.M. Wardwell, eds., New *Directions in Urban-Rural Migration (New* York, NY: Academic Press, 1980), pp. 1-35.

had a rate of growth much below the level of the 1970s. Overall, the percent of the civilian labor force living in metropolitan areas increased from 79.1 percent in 1976 to 81.1 percent in 1990.[11]

However, since 1990, there has been a small rebound in rural growth. Between 1990 and 1994, population grew 0.9 percent per year, faster than in the '80s, but still less than the 1.1 percent in metro areas.[12] The share of the civilian labor force working in metropolitan areas declined slightly to 80.7 percent in 1994, while the share in rural areas increased slightly.

There are two important aspects to this rural growth. First, over half (53 percent) of the labor force growth in non-metropolitan areas occurred in non-metropolitan areas adjacent to metropolitan areas.[13] In part, as discussed in chapter 4, this rural growth is stimulated by business suburbanization that allows workers to live in rural areas and commute to metros for employment. Second, much of the growth is fueled by the increasing number of retirees. Between 1970 and 1989, the population over age 65 grew 54 percent, compared to an increase of 19 percent for the rest of the population. Many of these retirees chose locations in the South and the West in non-metro areas with significant amenities. In fact, when classified by type of county, counties classified as retirement destinations grew faster (10.7 percent) between 1990 and 1994 than any other county type, and almost three times as fast as rural areas in total (3.9 percent).[14]

Inter-Metropolitan Differences

America is neither predominantly an urban nor a rural nation, but rather a metropolitan nation where the majority of the population lives and works in large urbanized areas that include both historic central cities and inner and outer rings of suburban development. A metropolitan area (metro) is defined by the U.S. Bureau of the Census as "a large population nucleus, together with adjacent communities that have a high degree of economic and social integration with that nucleus."[15]

In 1990, 75 percent or 193 million Americans lived in either large or small metropolitan areas; more than half the population, 126 million people, lived in the 40 largest metropolitan areas (population of 1 million or above), and 43 percent lived in the top 25 metros (population of 1.5 million or above).[16] While the central city population of the largest 25 metros has changed very little since 1950, the suburban population has risen sharply (see figure 3-1). In 1950, metropolitan population was almost twice as great as central city population, meaning that urban and suburban populations were approximately equal. By 1990, the metropolitan population had surged to nearly four times central city population.

In the 1980s, both the population and civilian workforce of large metros (over 1 million population) grew slightly faster than smaller metros, consistent with the urbanization trends of the 1980s (see table 3-1). The share of the workforce living in large metros increased slightly from 49.9

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[11] Economic Research Service, Department of Agriculture, based on data supplied by the Bureau of Labor Statistics, U.S. Department of Labor, 1995.

[12] Kenneth M. Johnson and Calvin L. Beale, "The Rural Rebound," *American Demographics*, July 1995, pp. 46-55.

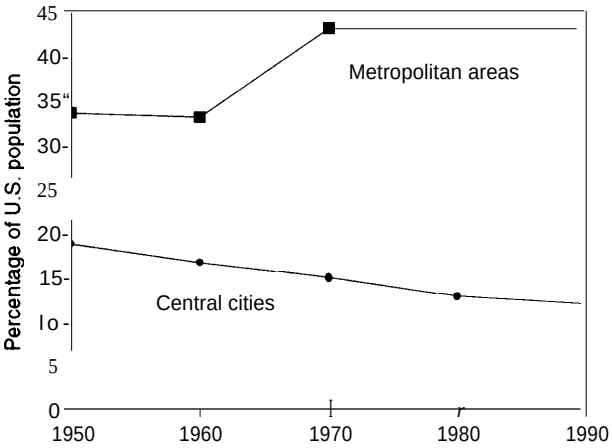
[13] Economic Research Service, op. cit. footnote 11.

[14] Ibid.

[15] U.S. Bureau of the Census, *Current Population and Housing Survey* (Washington, DC: U.S. Government Printing Office, 1992).

[16] Frey, op. cit., footnote 8.

FIGURE 3-1: The 25 Most Populated Metropolitan Areas and Their Central Cities as a Percentage of Total U.S. Population



SOURCE: U.S. Census Bureau, State and Metropolitan Area Data Book, 1991.

percent in 1976 to 50.5 percent in 1994; however, all of that growth was a result of workforce growth in fringe, as opposed to core, counties of metro areas.[17] More recently, consistent with the technological trends discussed in chapters 4-7, growth has been fastest in small and medium-sized metros, which gained 2.7 million workers between 1990 and 1994, compared to 1.4 million for large metros.

Not all metropolitan areas grew, however. About half of the largest 25 metros experienced decline or little to no growth between 1970 and 1990, even as the other half incurred substantial growth (table 3-2). In fact, five (13 percent) of the largest 40 metropolitan areas lost population between 1980 and 1990 (Detroit, Pittsburgh, Cleveland, Buffalo, and New Orleans), and 49 (22 percent) of the 228 next largest metros also shrank. For example, the city of Pittsburgh's population declined by 30 percent between 1970 and 1990, while the metropolitan population fell by 4 percent.

With the exception of New Orleans, four of the five declining large metros, and a large majority of the declining smaller metros, have much in common. Many were based on older industries that experienced considerable employment loss in the last 15 years, including tires, automobiles, and steel, or were centers for the excavation and refining of copper, coal, aluminum, and oil. Moreover, 30 of the 54 declining small metros (55 percent) are located in six states (Ohio, Pennsylvania, Iowa, Michigan, New York, and West Virginia) whose economies have been rooted in natural resources or manufacturing. Many of these declining, smaller metros are still dominated by their historic, industrial-era cores, whereas many larger metros, in spite of declining center cities, are growing because people and jobs are locating in the suburbs. In short, there appears to be increasing divergence in economic health between metropolitan areas: some areas have been able to grow as they increased linkages to global markets and/or assumed more specialized roles and functions; other less fortunate areas have been less successful and have stagnated or declined.

Metropolitan areas, and in particular, larger areas, grew in the 1980s for several reasons. First, many of the industries concentrated in rural areas grew slowly in the 1980s, meaning that national growth tended to be concentrated in urban areas. For example, employment in agriculture, mining, and manufacturing all declined between 1977 and 1992. In contrast, as discussed below, employment in services, particularly producer services, which have been concentrated in major metropolitan areas, grew significantly (see chapter 5).

Second, the growth of the minority population, either through immigration or through natural increase (i.e., higher fertility rates), boosted growth in many metropolitan areas, particularly the largest. Between 1980 and 1990 the minority population in the largest metropolitan areas (over 1 million) grew 37 percent, compared to 27 percent in smaller metros. The white population is growing faster in mid-size metropolitan areas (7.1

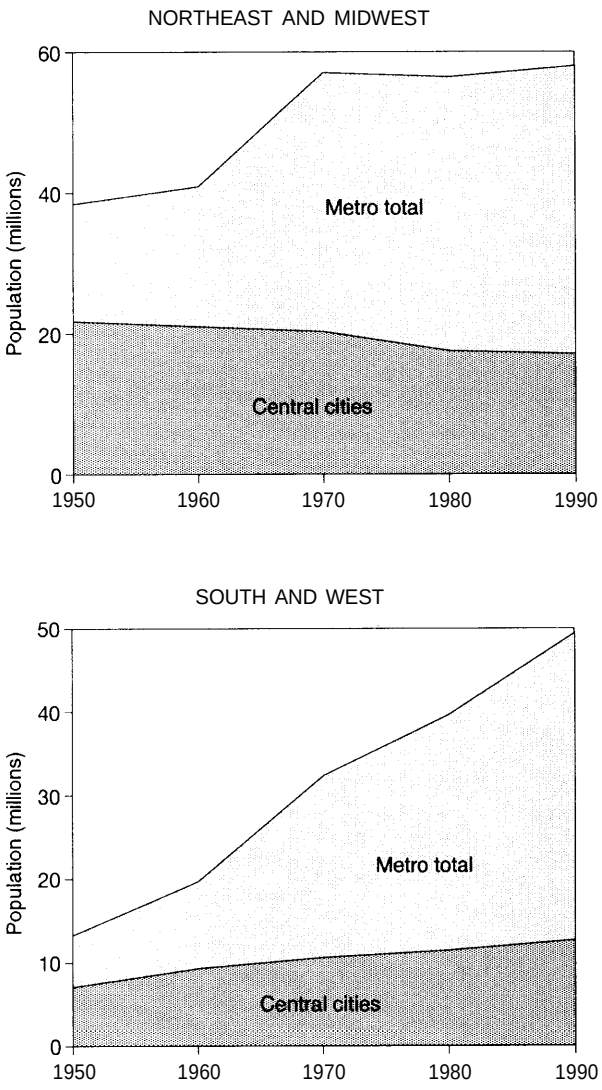
[17] Economic Research Service, op. cit., footnote 11.

TABLE 3–2: Population change in the 25 largest metropolitan areas, 1970–90

Region and metropolitan area	1990 population (1000s) Metropolitan central area	city(s)	Metropolitan area percentage change 1970–80	1980–90	Central city change 1970–80	1980–90	Suburban change 1970–80	1980–90
North								
New York	18,087	7,323	-3.6	3.1	-10.4	3.5	1.7	2.8
Chicago	8,066	2,784	2.0	0.9	-10.8	-7.4	11.8	7.1
Philadelphia	5,899	1,586	-1.2	3.8	-13.4	-6.1	5.1	8.0
Detroit	4,665	1,028	-0.7	-1.9	-20.5	-14.6	8.4	2.5
Boston	4,172	574	0.8	5.0	-12.2	2.0	3.4	5.5
Cleveland	2,760	506	-5.5	-2.6	-23.6	-11.9	0.5	-0.3
Minneapolis-St. Paul	2,464	641	7.8	15.3	-13.8	-0.1	20.8	21.9
St. Louis	2,444	397	-2.2	2.8	-27.2	-12.4	6.5	6.4
Pittsburgh	2,243	370	-5.2	-7.4	-18.5	-12.8	-1.8	-6.3
Cincinnati	1,744	364	2.9	5.1	-15.1	-5.5	10.0	8.3
Milwaukee	1,607	628	-0.3	2.4	-11.3	-1.3	8.9	4.8
Kansas City	1,566	435	4.4	9.3	-11.6	-2.9	13.8	14.8
South								
Washington	3,924	607	6.9	20.7	-15.7	-4.9	14.4	27.0
Dallas-Fort Worth	3,885	1,454	14.6	32.5	4.2	12.8	47.3	48.2
Houston	3,711	1,631	43.0	19.7	29.3	2.2	61.1	38.1
Miami	3,193	359	40.1	20.8	3.5	3.4	47.9	23.4
Atlanta	2,834	394	27.0	32.6	-14.1	-7.3	44.1	42.4
Baltimore	2,382	736	5.3	8.3	-13.2	-6.4	19.4	16.5
Tampa-St. Petersburg	2,086	519	46.0	28.1	3.3	1.7	80.4	40.4
West								
Los Angeles	14,532	3,485	15.2	26.4	5.4	17.4	19.0	29.5
San Francisco-Oakland	6,253	1,096	12.9	16.5	-5.4	7.6	18.3	18.6
Seattle	2,559	516	14.0	22.3	-7.0	4.5	22.4	27.7
San Diego	2,498	1,111	37.1	34.2	25.6	26.8	49.2	40.7
Phoenix	2,122	983	55.4	40.6	35.2	24.5	85.8	58.3
Denver	1,848	468	30.7	14.2	-4.3	-5.1	55.6	22.6

SOURCE: Compiled by William Frey, "The New Urban Revival in the United States," *Urban Studies*, vol.30, Nos. 4/5, 993.

FIGURE 3-2: Population Change in Central Cities and Metropolitan Areas



NOTE: Population figures for the largest 13 metropolitan areas in the Northeast and Midwest and the largest 12 in the South and West in 1990

SOURCE" U S Census Bureau, State and Metropolitan Area Data Book, 1991

percent) than in larger metros (3.8 percent), indicating that the nation's large metros are becoming more minority. 18

Inter-Regional Differences

In addition to differences in growth between different-sized metros, there have also been differences in growth between regions of the country. The West and the South have been gaining population and employment faster than the East and the Midwest for decades. Yet, there has been some lessening of differences between northeastern and midwestern metros and so-called Sunbelt metros in the Southeast, Southwest, and West. Importantly, many large metros in the North and Midwest reversed the decline in population of the 1970s in the 1980s. Large metros in the South and West continued, however, to grow faster than those in the North (see figure 3-2). Still, employment growth in the 1980s favored metropolitan areas of the South and particularly the West, while employment growth in the Northeast and Midwest was 94 and 93 percent, respectively, of the national average. [19]

However, such simple North-South or coast-heartland dichotomies appear to be becoming less critical as some southern and coastal metropolitan areas (e.g., Los Angeles, Houston, Boston) that appeared to be immune to recession have undergone cyclical and structural difficulties in the last decade, while some northern and interior cities remain healthy or have rebounded to some extent (e.g., New York in the 1980s, Minneapolis, Columbus). Places that did well in the '80s, such as California and Massachusetts, grew slower in the '90s, and some midwestern metros are growing rapidly. Between 1990 and 1994, the Midwest reversed a decade of slow workforce growth, and grew as fast as the nation as a whole (4 percent). The Northeast, however, continued its pattern of slower employment, actually losing 1.3 percent of

[18] The Asian Population more than doubled from 3.5 to over 7 million. Hispanics grew by more than half—from 14.6 million to 22.3 million. Blacks, numerically the largest minority, increased by 3.5 million over the 1980s, to almost 30 million people. Frey, op. cit., footnote 8.

[19] Economic Research Service, op. cit., footnote 11.

its employed workforce.[20] These regional growth patterns have varied for a number of reasons, including: changes in defense spending, which tended to be concentrated along the coasts;[21] changes in the value of the dollar which disproportionally affects places dependent upon trade, such as the industrial Midwest; and changes in energy and natural resource prices, which affect many western and mountain areas.

One reason for the growth of population in coastal locations in the 1980s is that many of the large coastal metros—New York, Los Angeles, San Francisco, Miami, and Houston—were ports of entry for immigration from Asia, Africa, the Caribbean, and Central and Latin America, accounting for 43 percent of national minority growth. Twenty percent of the nation's 1980s total minority population growth—a 2.8-million increase—occurred in the Los Angeles metro, then home to 12 percent of the nation's total minority population. New York's minority population increased by 1.4 million.[22]

Central City and Older, Inner Suburban Economic Trends

The 1980s growth of large metropolitan areas is not synonymous with, but is nonetheless related to, the fate of historic core cities. Whereas most of the 40 largest metropolitan areas grew (on average 1.9 percent), half of the central cities continued to decline in population. However, of the 18 central cities that lost population in the 1970s, four—New York, Boston, San Francisco-Oakland, and Seattle—grew in the 1980s, and all of the other 14 cities, except Denver, lost population at a slower rate than in the earlier decade (see table 3-2). Many other cities have lost population. Of the 196 cities in the United States with more than 100,000 residents in 1990, 65 lost population since 1970. For example, since 1970, the population of Richmond, Virginia, declined from 250,000 to just over 200,000, while the total population in the metropolitan region increased from 676,000 to 866,000.[23] Overall, population of the 25 largest American cities in the 1980s grew annually by a modest 0.5 percent, compared with a 5.3 percent decline in the 1970s; and the top 40 cities grew 3.3 percent in the 1980s, compared with a 3.0 percent decline in the 1970s. The share of U.S. population living in the largest 25 central cities declined from approximately 18 percent in 1950 to 13 percent in 1990.

Metros with minimal population growth generally had declining central city populations, while the central city population of most growing metros held steady or grew as well.[24] One study of the 60 largest metropolitan areas found that between 1970 and 1987, suburban population growth rates were higher in metros with higher central city population growth, and central city populations grew faster if suburban jurisdictions were also growing faster.[25]

Total central city populations in the largest 13 Northeast and Midwest metros declined each decade from 1950 to 1990 (figure 3-2), and metropolitan population rose sharply during the 1960s and then plateaued from 1970 to 1990. In contrast, the central cities in the South and West have had slow

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[20] Ibid.

[21] U.S. Congress, Office of Technology Assessment, *After the Cold War: Living With Lower Defense Spending*, OTA-ITE-524 (Washington, DC: U.S. Government Printing Office, February 1992).

[22] Frey, op. cit., footnote 8.

[23] U.S. Census Bureau, op. cit., footnote 7.

[24] Growth in these latter cities may be due in part to the fact that many of these cities are what David Rusk refers to as elastic cities that have grown through annexation to incorporate new areas of development. David Rusk, *Cities Without Suburbs* (Baltimore: Johns Hopkins Press, 1994).

[25] Peter D. Linneman and Anita A. Summers, "Patterns and Processes of Employment and Population Decentralization in the U.S., 1970-1987," Wharton Real Estate Center Working Paper #106, October 1991.

population growth (figure 3-2). However, some of these central cities of the South and West grew by annexation, thus making it appear as if their central areas gained population, when in fact they have not.[26]

A number of factors are involved in explaining population loss in some cities, including: smaller household size; increased commercial space in the CBD that displaces population; and abandoned or vacant land, for which precise data are often unavailable. Recent studies discuss the increasing number of single persons, childless couples, or single-parent households that now comprise the populations of core cities.[27] Household size in the largest 40 metros decreased over the 20-year period by 16.5 percent, but housing units increased by 28 percent, indicating that fewer people occupied more housing. Perhaps the most interesting aspect of these data, however, is that core counties in the Detroit, Cleveland, St. Louis, Baltimore, Pittsburgh, Buffalo, Hartford, and Rochester metros lost population and housing units, indicating that many housing units were not in use or were abandoned. For example, in Philadelphia, where population declined by 23 percent from 1950 to 1990, there were 27,000 vacant residential structures and 15,800 parcels of vacant land, most of which were abandoned.[28]

The difference between central city and suburbs is not always stark. In fact, many older, inner suburbs have also lost populations and jobs. Moreover, some suburbs, particularly outer suburbs, have grown quickly in housing and employment, some of it in clusters of offices referred to as edge cities, while others, particularly older, inner suburbs, have not grown. Of 3,000 suburban jurisdictions in the largest 60 PMSAs, the range of differences between one suburban area and another was extreme—e.g., employment growth rates between 1980 and 1986 as high as 106 percent and as low as negative 47 percent, with 27 percent of suburban communities losing employment from 1980 to 1986.[29] A 1987 HUD study indicates that even in revived or prosperous metropolises like Boston and Los Angeles there were many suburbs—perhaps 30 percent—in decline.[30]

There are generally two kinds of economically troubled suburbs. First, many places defined as suburbs are in fact older, somewhat smaller, industrial towns and cities now part of much larger metropolitan areas: characteristically, they have a high incidence of considerable poverty, unemployment, and abandoned and aging housing. Many of these older suburban cities with declining manufacturing-based economies, such as Camden and Patterson, New Jersey; East St. Louis, Illinois; Gary, Indiana; and Hamtramack, Michigan, are in as bad or even worse shape than parts of the inner central city. Second, there are also older inner suburbs to which, for a variety of reasons, new industry has not moved and that have attracted many low-income residents. Such suburbs are often places in which persons leaving ghetto neighborhoods in the inner city "spill over" into proximate suburban jurisdictions. In both cases, these suburban jurisdictions often lack the resources to adequately deal with the problems facing them.[31]

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[26] Rusk, op. cit., footnote 24.

[27] L.S. Bourne, "Close Together and Worlds Apart: An Analysis of Changes in the Ecology of Income in Canadian Cities," *Urban Studies*, vol. 30, No. 8 (1993), pp. 1293-1317. Bourne discusses the inner city as place with high concentration of elderly, young, and single-parent households.

[28] Philadelphia City Planning Commission, *Vacant Land in Philadelphia*, January 1995.

[29] Linneman and Summers, op. cit., footnote 25.

[30] Scott A. Bollens, "Municipal Decline and Inequality in American Suburban Rings, 1960-1980," *Regional Studies*, vol. 22, 1988, pp. 277-285.

[31] Ibid.

Central City Economies

Central cities that increased in population in the 1980s tended to be those that had managed a successful transition from an older industrial economy to an advanced service economy via specialization as locations for corporate headquarters; finance, insurance, and real estate (FIRE); and related producer services (e.g., law, advertising, and hotels). This was especially the case for so-called global cities (e.g., New York, Los Angeles, San Francisco, Chicago) that served as command and control centers for global corporations and for operations of global financial institutions and related businesses,[32] but also cities such as Boston, Dallas, Minneapolis, Seattle, and San Jose, whose regions specialized in high-tech manufacturing. As discussed below and in chapter 9, the mismatch between the types of jobs in these advanced service cities and the skills of the local labor force, who are often not well suited to the needs of this economy, has increased in many places. Older cities in regions where transition to these service and high-tech manufacturing sectors did not advance, or was not sufficiently centralized, tended to continue declining.

Most central city economies can be divided into two components, the Central Business District (CBD) and the rest of the central city (RCC). The definition of the inner city is sometimes also used to refer to areas with high minority and poverty concentrations in the central city. During the 1980s, employment in the CBD of most central cities grew slowly at about 1 percent annually, compared to 3.4 percent for suburbs.[33] While manufacturing and retail employment declined in the CBDs of the largest 60 metropolitan areas between 1976 and 1986, FIRE and business services grew, and as a result, total employment grew.[34]

The RCC of many central cities grew faster in employment than CBD employment between 1976 and 1986. However, cities where the opposite was true tended to be larger and older cities (e.g., Chicago, Boston, Baltimore, Milwaukee, Philadelphia, Pittsburgh, St. Louis) that had experienced overall difficulties, but some CBD revival.[35] It does appear that the CBD and the RCC are in competition for jobs—as gains in CBD growth were correlated with losses in the RCC.[36]

For example, a study of employment in metropolitan Milwaukee supports the view that the inner city and not the entire central city is the area of the metro which is most "at risk." Manufacturing is still important to the entire Milwaukee metro (22.6 percent of jobs are in manufacturing) and especially to the inner city (31 percent of its employment base), but manufacturing jobs in the latter declined, and the best manufacturing jobs that are left are held by skilled employees, many of whom are older. Otherwise, most industries (e.g., FIRE, government) are underrepresented in the inner city, allowing the conclusion that "the inner city is not a very important source of metropolitan employment."[37]

In part because of their high costs of doing business, central city economies appear to be heavily dependent upon job creation through expansions or new startups, as opposed to attraction of new industry. Historically, central city economies have been sustained by their role as creators of new jobs (either through expansion or new firm startup), and when this function declines, the central city

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[32] See Mitchell Moss, "Telecommunications, World Cities, and Urban Policy," *Urban Studies*, vol. 24, 1987, pp. 534-546.

[33] Linneman and Summers, op. cit., footnote 25.

[34] Given the difficulty in defining central city boundaries, developing data on employment change in CBDs is difficult. The Wharton data are among the most recent.

[35] Linneman and Summers, op. cit., footnote 25.

[36] Ibid.

[37] This section is based on a report prepared for the Office of Technology Assessment. Sammis White, *Changing Spatial Patterns of Employment Location: Milwaukee, Wisconsin, 1979-1994,* July 1995.

economy declines. For example, no new jobs were created in the Milwaukee CBD from 1979 to 1994 due to large firms moving in (2,700 were lost due to relocation outside the CBD), while the CBD created 6,600 jobs due to expansions and 381 from new firm formation.[38] For all firms, the city lost 30,000 jobs through movement to the suburbs alone, and gained approximately 11,500 from firms moving into the city. Similarly, in New York between 1976 and 1986, almost 160,000 jobs relocated out of Manhattan, while only 36,000 moved in, for a net loss of 120,000. For New York City as a whole, 163,000 jobs moved out, and 37,000 jobs moved in, for a net loss of 126,000. In contrast, over the same period Manhattan added 456,000 jobs from new startups and expansions, a large share of these in business services and FIRE.[39]

Sectoral Change

Central-city economies are losing certain types of employment faster than others, and in the process are becoming more specialized in services in general, and advanced services in particular. They are generally losing blue collar jobs, including construction, particularly in the Northeast and Midwest.

Manufacturing is no longer an economic activity identified with the central city. Decline of manufacturing employment in high-cost urban areas, particularly in the Midwest and Northeast, is not new. However, its severity and speed is new. Between 1979 and 1994, manufacturing employment declined by 47,000 in the Milwaukee central city and inner-ring suburbs, but increased by 13,000 in outer-ring suburbs. In the 1980s, the 28 largest central counties of the Northeast and Midwest regions lost a total of nearly 1 million manufacturing jobs (see table 3-3 and figure 3-3).[40] A large share of manufacturing is now located in the outer suburbs and exurbs of major metropolitan areas.[41] In the early 1960s such plants were generally located in central cities and inner suburbs, but as metro areas grew, manufacturing decentralized.

Wholesaling and retailing are two other major industrial sectors that were once predominantly urban, but now are primarily suburban. (see figures 3-4, 3-5, and table 3-4). In New York, for example, with retail-rich Manhattan at its core, two-thirds of all retail is located in the suburbs. In Milwaukee between 1979 and 1994, retailing and wholesaling jobs declined by over 11,000 in the central city, but increased by 28,000 in the sub-

TABLE 3-3: Employment Change in Largest Central Counties; 1980-90

Region	Total	Manufacturing	Services
Northeast/Midwest *(28* counties)	1,634,000	-971,000	*2,605,000*
South/West (35 counties)	6,026,000	-17,000	6,043,000

SOURCE: John D. Kasarda, "Industrial Restructuring and the Changing Location of Jobs," *State of the Union: America* in *the 1990s, Volume 1: Economic Trends,* Reynolds Farely (ed.) (New York, NY: Russell Sage Foundation, 1995)

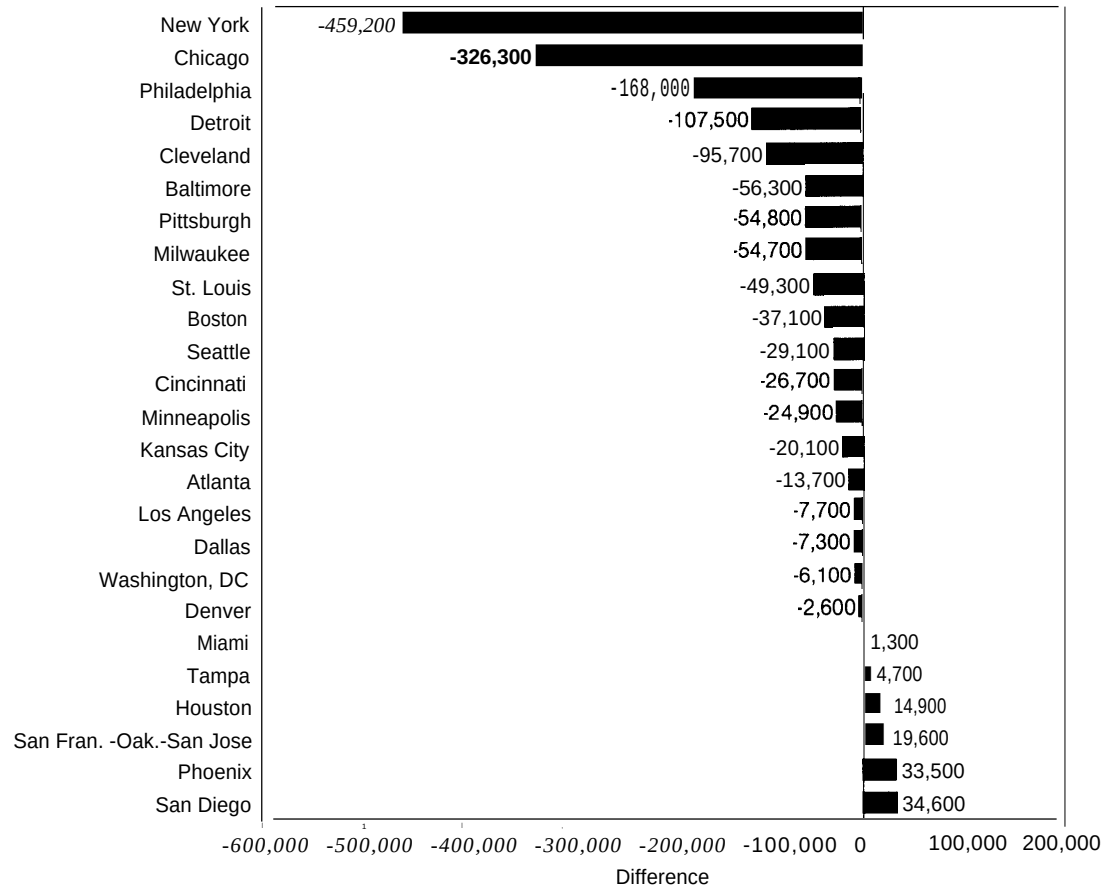
[38] One hundred and eighty-nine new jobs were created in the inner-city from industry attraction, while 1,225 were created from expansion and 1,730 from new firm formation. (Ibid).

[39] Stephen Leshinksi and Apryl Priestly, memorandum, "Regional Employment Relocations" October 12, 1990, Port Authority of New York and New Jersey.

[40] John D. Kasarda, "Industrial Restructuring and the Changing Location of Jobs," in Reynolds Farley (ed.), *State of the Union (New* York, NY: Russell Sage Foundation, 1995), pp. 23-26.

[41] Arthur C. Nelson, William J. Drummond, and David S. Sawicki, "Exurban Industrialization: Implications for Economic Development Policy," *Economic Development Quarterly, vol. 9, No. 2,* May 1995.

FIGURE 3-3: Central City Employment Change by Industry: Manufacturing (1967-1987)



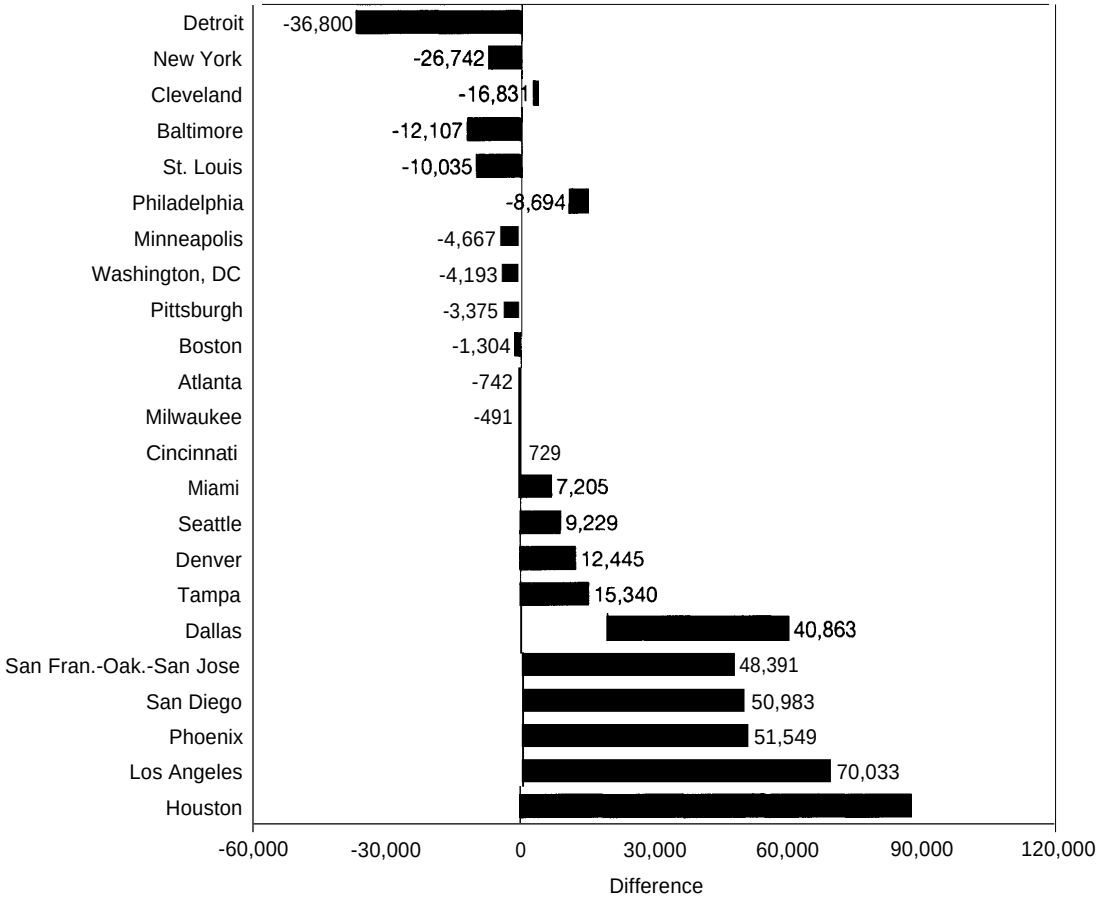
SOURCE: U.S. Bureau of the Census, City and County Data Book, *1974, 1994.*

urbs, particularly the outer-ring suburbs .42 In part, retailing followed the market—when people moved to the suburbs, so did retailing. However, it was probably not until the 1980s that some large department stores, for example, closed their city flagship stores. Likewise, as a greater share of the population, generally consumers with higher incomes, moved to the suburbs, many consumer services became predominately suburban industries.

Wholesaling also moved to the suburbs, as discussed in chapter 5, in part to be near beltways and interstate highways and to gain access to larger parcels of low cost land (see table 3-4). During the past two decades, most of the growth in warehousing and distribution activity has occurred on the periphery of America's metropolitan areas, rather than in the urban core. For example, while overall employment in Manhattan grew by 8 percent

[42] White, op. cit., footnote 37.

FIGURE 3-4: Central City Employment Change by Industry: Retail Trade (1967-1987)



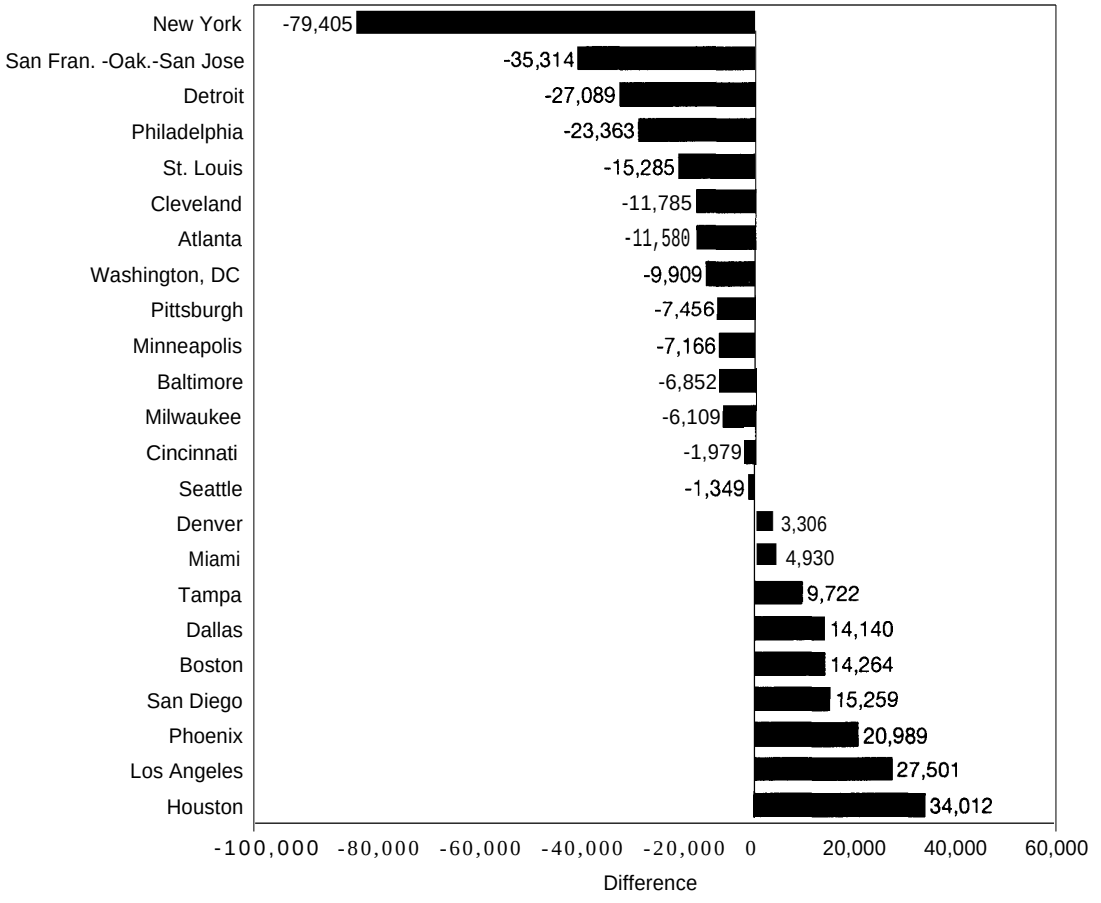
SOURCE: U.S. Bureau of the Census, City and County Data Book, *1974, 1994.* Data was unavailable for Chicago and Kansas City

between 1979 and 1989, employment in wholesaling declined by 14percent (see table 3-5). In the 26 counties surrounding the city, in contrast, wholesaling employment grew by 31 percent—a gain of more than 100,000 jobs.

As center cities lost industries like manufacturing, retail, wholesale, and consumer services, producer services in many places filled the gap (e.g., financial services, advertising, accounting, law).[43] (See figure 3-6 and table 3-4.) Many of these industries rely upon face-to-face contact and the need to be near other industries or government agencies (e.g., many parts of the legal industry locate downtown to be near courts and government agencies that formulate and manage regulations). A major reason for the growth in producer services in central counties since the 1970s is that they were already specialized in industries, part-

[43] Producer services is a generic industrial category that also includes business services. Legal and financial services are also producer services. Business services include accounting, marketing, advertising, public relations, etc.

FIGURE 3-5: Central City Employment Change by Industry: Wholesale Trade (1967-1987)



SOURCE: U.S. Bureau of the Census, City and County Data Book, *1974, 1994* Data was unavailable for Chicago and Kansas City

icularly financial services and business services, that grew faster than the national economy.[44]

The importance of producer services to the current and future economic viability of the central city cannot be underestimated. In 1984, the core counties of the 24 largest metros housed 66 percent of law offices with more then 50 employees, 75 percent of investment and securities offices with more than 50 employees, and 39 percent of all jobs in information-intensive industries (see figure 3-7). In nine major metros white-collar services constituted between 20-40 percent of central city economies in 1970, but as much as 40-60 percent of the these same economies in 1990.[45]

[44] For example, core counties of metropolitan areas over 1 million population gained 2.5 million jobs in producer services between 1974 and 1985, but 1.9 million of those jobs were due to the fact that these counties were already specialized in these fast-growing industries. See Amy Glasmeier and Marie Howland, *From Combines to Computers* (Albany, NY: State University of New York, 1995).

[45] Kasarda, op. cit., footnote 40. The metros include New York, Philadelphia, Boston, Baltimore, St. Louis, Atlanta, Dallas, Denver, and San Francisco.

TABLE 3-4: Distribution of Employment Within Metropolitan Areas

Industry	SIC CODE	Percentage of employees in the metropolitan area working in the core county			Change in percentage share: 92-85	Change in core county employment (thousands)	
		1974	1985	1992		1974-92	1985-92
Museums, Zoos and Botanical Gardens	84	87%	83%	79%	-3.9	11	3
Security Brokers	62	91	85	78	-7.3	107	28
Air Transportation	45	87	75	78	3.1	82	58
Advertising	731	86	78	72	-5.9	17	-11
Legal Services	81	69	68	67	-1,0	211	90
Water Transportation	44	72	66	65	-1.5	-23	-16
Accounting	872	73	63	62	-0,9	106	51
Transportation Services	47	78	65	61	-3.9	45	13
Finance, Insurance, Real Estate-Administration	679	77	65	58	-7,7	-4	-31
Trans., Communication, Utilities-Administration	497	68	61	56	-5.0	-17	-42
Banking	60-61	67	64	56	-7,4	177	4
Real Estate	65	66	60	55	-5,1	52	-7
Educational Services	82	57	56	55	-1,1	213	68
Hotels	70	63	58	55	-3,7	76	10
Insurance Carriers	63	71	60	53	-6.9	-31	24
Communications	48	64	57	52	-4,7	-31	-29
Management and Public Relations	8740	63	53	50	-2,5	124	43
Membership Organizations	86	61	53	50	-2,8	122	66
Services Administration	899	76	53	49	-4,2	46	27
Total Administration		65	55	49	-5.4	-116	-212
Health Services	83	54	50	49	-1,0	983	567
Wholesale Trade	50	64	55	49	-5,4	78	-40
Social Services	83	59	51	48	-2.4	217	100
Electric, Gas and Sanitary Services	49	62	53	48	-5,5	2	-2
Trucking & Warehousing	42	61	49	46	-3,4	-26	12
Engineering & Architectural	871	58	49	43	-6.0	89	16
Manufacturing	20-39	54	47	43	-2.0	-1,550	-775
Construction	15-19	52	43	40	-2.8	-168	-122
Retail	53-59	51	44	41	-2.7	405	80
Computer & Data Processing	737	53	41	33	-7,8	113	29

NOTE Data are for 15 of the 25 largest metropolitan areas: Atlanta, Baltimore, Boston, Chicago, Cleveland, Dallas, Denver, Detroit, Houston, Los Angeles, Minneapolis, New York, Pittsburgh, and San Francisco-Oakland-San Jose, Washington, DC.

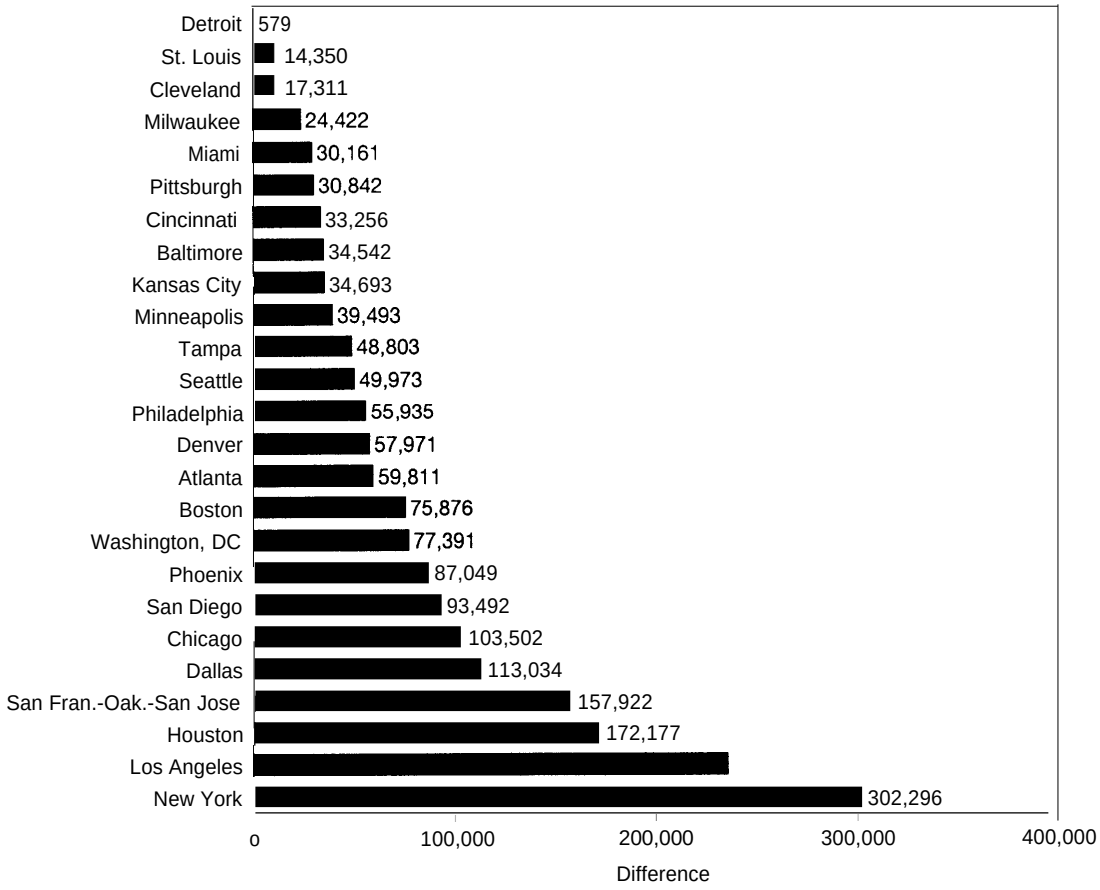
SOURCE: U.S. Census Bureau, County *Business Patterns 1974, 1985, 1992.*

TABLE 3-5: Wholesaling Employment in the New York Region

	1979	1989	Percent
Manhattan	190,800	163,500	-14,3
Other boroughs	88,5000	**90,000**	1.7
Inner suburbs	161,700	190,300	17,7
Intermediate suburbs	118,100	169,700	43,7
Outer suburbs	69,100	97,200	40.7

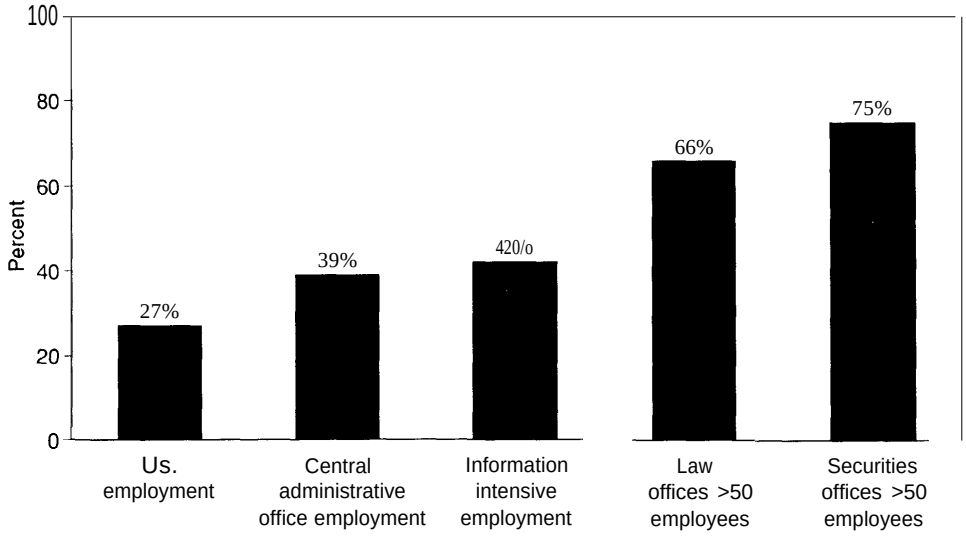
SOURCE Data from U.S. Department of Commerce, Bureau of Economic Analysis.

FIGURE 3-6: Central City Employment Change by Industry: Taxable Services (1967-1987)



SOURCE U S Bureau of the Census, City and County Data Book, 1974, 1994.

FIGURE 3-7: Share of Total U.S. Employment in Core Countries of the 24 Largest Metros for Selected Sectors, 1984



SOURCE: M.P. Drennan, "Information Intensive Industries in Metropolitan Areas of the United States of America, " Environment and Planning A, vol. 21, No. 12, 1989

However, particularly in core counties of larger metros, the rate of growth is slower than in the suburbs or mid-size metros even though employment in producer services has grown in central cities. Between 1974 and 1985, core counties of the largest 40 metros gained 2.5 million producer services jobs, but they would have to gain an additional one million to keep pace with growth in the rest of nation.[46] In fact, the fastest growth in producer services has been in the suburbs, and often in cities of 25,000 to 49,999 that are located within metropolitan areas—i.e., in suburban cities that are part of larger MSAs.[47]

Some of this gain is due to relocations. For example, while central cities housed approximately 42 percent of corporate headquarters in 1984, by the early 1990s this number had decreased to 29 percent, as many corporate headquarters relocated to the suburbs or to smaller metros (see table 3-4.[48] The most famous relocation is probably that of Sears, which in the late 1960s built the world's tallest building as its central Chicago headquarters, and then in the late 1980s moved its Merchandise Group to Schaumburg, a northwestern Chicago suburb, leaving much of the Sears Tower empty. Over one-quarter of new employment in the New Jersey suburbs of New York in finance, insurance, and real estate between 1976 and 1986 was due to relocations out of Manhattan.[49] In addition to the relocation of some more complex functions outside the core, many routinized functions of producer service industries—so-

[46] Glasmeier and Howland, op. cit., footnote 44.

[47] Marie Howland, "Producer Services," *Economic Development Commentary,* Fall 1991, p. 7.

[48] Thomas Stanback, *The New Suburbanization: Challenge to the Central City* (Boulder, CO: Westview Press, 1991).

[49] Memorandum, Stephen Leshinksi and Apryl Priestley, "Service Sector Study Update: Manhattan Job Generation, " Port Authority of New York and New Jersey, July 25, 1990.

called "back-office" operations that do not require the face-to-face contact provided by the core—are often located in the suburbs to avoid the higher transaction costs of the central city.

The loss of intrametropolitan share is a cause of concern, particularly since the loss of manufacturing, wholesaling, and retailing has made producer services the mainstay of the center city's economy. This loss may mean that the central city is slowly losing the very economic activities upon which its economy has depended for the last 30years. If this is true, it would be a clear indicator of core city decline. As discussed in chapters 4 and 5, the rise of information technologies (such as e-mail, faxes, video-phones, and networking) is likely to have a decentralizing effect on many producer service sectors, enabling many firms to move out of high-cost, congested cores to the suburbs where they are closer to their workforce. It may mean that the suburbs are growing much faster than central cities, and that economic functions heretofore concentrated primarily in the central city are now distributed throughout the metropolitan area.

But the decentralization of some kinds of producer services may not necessarily denote the economic autonomy of the suburb, nor its independence from the central city for some kinds of specialized business services. One study of corporate service linkages in New York, Los Angeles, and Chicago suggests that even where central administrative or corporate headquarters have relocated to the suburbs, they still rely on world-class producer services located in large center cities.[50] It is not clear whether this relationship holds true for other large cities. Another study of 60 metro areas for two different periods (1976-80 and 1980-86) concluded that suburban employment growth translated into city employment growth and continues to do so, "probably because suburban employment utilizes the services of central city-based agents such as banks, lawyers, accountants, and consultants."[51] In contrast, the study found that while central cities benefit from employment expansion in the suburbs, suburbs now benefit less from employment expansion in the central city. This study's conclusion and the above discussion of corporate linkages in New York, Chicago, and Los Angeles are only apparently contradictory, in that it is quite possible for suburban employment to exceed that of the center city in a variety of sectors, but still depend on the center city for some kinds of specialized business services. This, indeed, is what appears to be the case, and it indicates the subtle and complex character of the present relation between cities and suburbs.

In addition to producer services, three other industries help support many central city economies. First, cultural and educational institutions, including museums, zoos, universities, teaching hospitals, and medical centers, all have important historical associations with the center city and often find it difficult to move (though some cultural institutions are beginning to establish suburban branches) (see table 3-4). Major university medical centers and hospitals located in central cities further enhance the picture of the central city as a place that specializes in the kind of information and know-how essential in today's economy; and there are many attempts not only to stress the important medical and research capacities of university teaching hospitals, but also their potential contribution to the economy in the form of commercially profitable ventures in bio-chemistry and bio-medicine. For example, both Pittsburgh and Baltimore have made much of their teaching hospitals (University of Pittsburgh Medical Center; Baltimore's Johns Hopkins and the Maryland General hospital) in developing an economic development strategy for their respective cities. In Milwaukee, one of the only sectors to add jobs

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[50] Alex Schwartz, "Corporate Service Linkages in Large Metropolitan Areas: A Study of New York, Los Angeles, and Chicago," *Urban Affairs Quarterly*, vol. 28, No. 2, 1992, pp. 276-296.

[51] Linneman and Summers, op. cit., footnote 15, pp. 41-42.

faster in the central city than the suburbs was hospitals.[52]

Second, industries that reflect the role of the central city as a center of tourism and conventions (i.e., hotels and airports) are still important.[53] Tourism is a growing source of employment for many central cities, particularly those endowed with certain kinds of amenities, such as museums, zoos, and historic sites, that allow the city to sell itself as a place of amusement, pleasure, and recreation. During the 1970s and '80s, scores of central cities developed downtown shopping malls and new hotel complexes.[54]

Third, for certain cities that are state capitals, have Federal or state installations or courts, or the national capital, government services are also important because government tends to stay in historically established locations. For example, the Milwaukee CBD, as well as the downtowns in the six largest Ohio cities, specialize in government (as well as education and medicine).[55]

Poverty and Race

At the same time that central city economies have lost blue collar jobs and gained producer services jobs employing a higher percentage of college educated workers who commute in from the suburbs, their populations have become poorer and increasingly minority (see table 3-6). As discussed in chapter 9, the economic decline of some urban core economies accompanied by the increased specialization in information-based services in most has contributed to the economic difficulties of the poor in central cities and inner

TABLE 3-6: Selected Statistics for 94 Large U.S. Cities[a]

	1960	1970	1980	1990
Population as percent of U.S.	26.1%	22.5%	20.9%	20.1%
Percent minority population	18.9	24.1	37.1	40.1
Unemployment rate	5.5	4.7	7.3	8.1
Percent employed in manufacturing	25.3	22.1	17.4	14.0
Median family income as percent of U.S. median family income	**106.7**	100,4	92.6	87.5
Family poverty rate	17.2	11.0	13.6	15.1
Percent population in census tracts with more than 40% poverty	8.0	5.1	8.1	10.8
Female headed families with own children as percent of all families	7.9[b]	10.4	13.8	14.5

[a]Based on the 100 Largest MSA Central Cities in 1980 with the exception of Anchorage; Fort Lauderdale; Jackson, MS; Jersey City, Newark; and Amarillo for which tract-level data was not available in 1960.
[b]Estimated.

SOURCE: U.S. Census data for 1960,1970,1980, and 1990, as compiled by John D. Kasarda, *Urban Underclass Database Machine Readable Files,* Social Science Research Council, New York, 1992 and 1993 (except as noted). Calculations by U.S. Department of Housing and Urban Development

[52]The others were transportation services, security and commodity brokers, and legal services.

[53]For *a* variety of interesting discussions concerning the center city "marketed" as a center of culture, tourism, entertainment, and education, see Gerry Kearns and Chris Philo, (eds.), *Selling Places: The City as Cultural Capital, Past and Present (New* York, NY: Pergamon Press, 1993).

[54]Bernard J. Frieden, "The Downtown Job Puzzle," *The Public Interest,* vo1. 97, Fall, 1989, pp. 71-86.

[55]Richard D. Bingham and Deborah Kimble, "The Industrial Composition of Edge Cities and Downtowns: the New Urban Reality," Unpublished Paper, Maxine Levin College of Urban Affairs, Cleveland State University, 1994; also White, op. cit., footnote 37.

suburbs.[56] Metropolitan and urban economic decline contributes to increased poverty and unemployment rates.[57]

Such sectoral changes are reflected in the transformation in educational levels of central city employees (regardless of place of residence). For instance, in Baltimore the proportion of jobs held by those without a high school diploma decreased from 48 to 15 percent between 1970 and 1990. The proportion held by high school graduates increased slightly from 29 to 32 percent. But both those with some college and college degrees increased from 10 to 26 percent and from 12 to 27 percent, respectively.[58] In a sample of 10 cities the number of jobs held by people with less than a high school diploma declined by 602,000 while those jobs held by college graduates increased by 1,126,000.[59] (See box 3-1.) These central city jobs are increasingly filled by suburbanites where educational attainment in higher. Stanback, looking at the four largest U.S. cities, found that educational attainment was somewhat lower than in the suburbs in New York, Los Angeles, Chicago, and Philadelphia, with about a 10 percent difference in share of the population with more than two years of college.[60]

These changes also appear to be related to increases in unemployment rates in central cities. Unemployment among both white and black males without a high school degree increased in central cities between 1968 and 1992, but was most pronounced for blacks. For example, for black males aged 16 to 64 out of school, without a high school degree, and living in the central cities of 22 of the largest metropolitan areas, depending on the census region, unemployment increased from between 13 to 26 percent in 1968-70, to between 52 to 63 percent in 1990-92.[61] For those with a high school degree but no college, the rates increased from between 11 and 13 percent in 1968-70 to 22 to 43 percent in 1990-92. In other words, in many

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[56] Timothy J. Bartik, *Economic Development and Black Economic Success,* Upjohn Institute Technical Report No. 93-001 (Kalamazoo, MI: Upjohn Institute for Employment Research, January 1993), p. 6. Black concentration in slow-growing metros, Bartik argues, may help to explain disparities in income and economic opportunity between blacks, other minorities, and whites.

[57] "Poverty in Urban Neighborhoods," in *The Urban Institute Policy and Research Report* (Fall 1993), pp. 11-13. Mark Alan Hughes makes the similar argument that ghettoes are not rooted in racial or ethnic differences, but in structural conditions relating to metropolitan decentralization that impact certain inner-city neighborhoods in extreme ways, denuding them of economic and social vitality and creating an environment of "isolated deprivation." See Mark Alan Hughes, "Formation of the Impacted Ghetto: Evidence from Large Metropolitan Areas, 1970-1980," *Urban Geography,* vol. 11, No. 3, 1990, pp. 265-284. Hughes identifies white ghettoes in Cleveland's inner city that suffer from the same deprivation and for the same reasons as black ghettoes.

[58] By comparison, for the country as a whole: the proportion of jobs held by those without a high school diploma fell from 36.1 percent to 13.3 percent over the same period; those with a high school diploma increased slightly from 38.1 percent to 39.2 percent; those with some college increased from 11.8 to 20.8 percent; and those with a college degree increased from 14.1 percent to 26.5 percent. What this shows is that the number of jobs for people without a high school diploma dropped much more precipitously and the number of jobs for those with some college increased to a greater extent in Baltimore than in the U.S. as a whole.

[59] The 10 cities surveyed are Baltimore, Boston, Chicago, Cleveland, Detroit, Los Angeles, New York, Philadelphia, St. Louis, and Washington, DC. Kasarda, op. cit., footnote 40.

[60] Stanback, op. cit., footnote 48.

[61] If adjusted for periods of the business cycle, actual rates of increase in employment may be somewhat smaller given that 1990-92 was a period of recession, and 1968-70 was a period of economic growth. John Kasarda, "Industrial Restructuring and Changing Job Locations," draft chapter, forthcoming in "Industrial Restructuring and the Changing Location of Jobs," in Reynolds Farley (ed.), State of the Union (New York, NY: Russell Sage Foundation, 1995), pp. 23-26.

BOX 3-1: Economic Change and the District of Columbia

There is growing concern among many federal policymakers about the fiscal crisis and weakened economy of the District of Columbia. The evolution of the District's economy is representative of the changes that have occurred in many urban economies in the last decade. Two larger economic trends have affected the health of many U.S. cities: the shift of economic opportunities from one region to another, and the shift of people and jobs from central cities to outlying suburbs. It is the latter that has played a role in the difficulties the District faces.

In fact, the region's population grew 23 percent (815,000) between 1980 and 1991, ninth fastest of the largest 20 metropolitan areas in the country. Region-wide employment grew 2.7 percent between 1989 and 1994, and in 1991 the region had the second lowest unemployment rate of these 20 metropolitan areas.

The second trend—the shift in jobs and populations outward from core cities to outlying suburban location—has affected virtually all metropolitan areas including Washington's. Yet, unlike many central cities of large metropolitan areas, the District gained jobs in the 1980s (10.8 percent increase). However, jobs in the suburbs increased by 51.5 percent, or approximately 775,000 jobs. As a result, the District's economy has become a smaller component of the region's economy, with employment declining from 44 percent of the metropolitan economy in 1970 to 30 percent in 1988 to 28 percent in 1994 (see table A). Since 1989, however, the District has lost jobs. From 1989 to 1994, the District lost 27,000 jobs, while the region as a whole gained 61,000 jobs. Virtually all of the District's job loss was in the private sector, although this is likely to change as the federal government downsizes.

TABLE A: Employment Changes in the District and the Region

	1989	1994	Growth rate, %	Change in jobs
Total jobs—District	695,000	667,900	-3.9	-27,000
Total jobs—region	2,281,000	2,343,000	2.7	61,700
Government jobs—District	276,500	275,000	**-0.5**	**-1,500**
Government jobs—region	595,000	622,300	4.5	26,800
Private jobs—District	418,000	392,000	-6.1	-25,500
Private jobs—Region	1,610,000	1,720,000	2.1	34,900

SOURCE: Bureau of Labor Statistics, *Employment and Earnings,* 1990 and 1995.

Shifting Occupational Structure

Not only has the District lost jobs since the late-1980s, its employment structure has shifted significantly. From 1980 to 1990 jobs in the District held by high school dropouts declined by 25 percent while those held by college graduates increased by 43 percent. The proportion of job holders in the District without a high school degree declined from 23 percent in 1970 to 7 percent in 1990, while those with college experience increased from 46 percent to 72 percent. ' Jobs in the District increasingly require higher levels of educational attainment.

While some of the improvement in educational levels of city job holders is due to increases in better educated District residents, much of the increase in college jobs was absorbed by suburban commuters. As a result, less educated District residents, particularly minorities, fell farther behind. Among 10 large central cities, the District has the highest index of dissimilarity between the educational distribution of District jobs and the educational levels of District residents. While 72 percent of the District job

(continued)

[1] John D. Kasarda, "Industrial Restructuring and the Changing Location of Jobs, *State Of the Union: America in the 1990s, Volume 1: Economic trends,* Reynolds Farely (cd,) (New York, NY: Russell Sage Foundation, 1995).

BOX 3-1: Economic Change and the District of Columbia (Cont'd.)

TABLE B: Educational Requirements of District Jobs and Educational Attainment of District Residents

	Educational distribution (percent)			
	High school	High school graduates	Some college	College graduates
Jobs	7	21	25	47
White residents	2	7	14	78
Black residents	26	40	20	14
Hispanic residents	**50**	**21**	10	19

SOURCE: John D. Kasarda, "Industrial Restructuring and the Changing Location of Jobs, " *State of the Union: America in the 1990s, Volume 1: Economic trends,* Reynolds Farely (ed.) (New York, NY: Russell Sage Foundation, 1995)

holders have some college experience, only 34 percent of black District residents, who accounted for 65 percent of the population in 1990, have some college experience (see table B).

There are three reasons for the increasing education mismatch between minority District residents and District jobs. First, improvements in education levels for District minorities have not kept pace with education levels of whites. Second, jobs in the District as well as nationwide have required more education,

Third, relative to the rest of the region's economy, the District has been gaining higher skilled jobs and losing lower skilled jobs. For example, the sectors employing the most people in the District include legal services, education, membership organizations, social services, and health services, which all employ high levels of managers, professionals, technical, and sales staff. In fact, of the sectors in which the District increased its share of region-wide employment from 1985 to 1992, legal services, educational services, and health services, only the latter employed a moderate share of lower-skilled workers (table C).

In contrast, jobs that might employ lower skilled District residents at relatively good wages, such as manufacturing, wholesale trade, and transportation and utilities, have been declining, in part because the suburbs, and particularly the distant suburban counties such as Loudon, Prince William, and Frederick counties, are gaining jobs as these sectors spatially disperse.

Population Loss

The District has lost more than 53,000 residents between 1980 and 1992, a loss of over 8 percent. In 1960, the District's population was 37 percent of the region's population; in 1994 its percentage of the region's population was 15.5 percent.

The District's population is not only declining, but has recently also been getting poorer. While the percentage of the population classified as in poverty declined from 19.4 percent in 1985 to 16.5 percent in 1991, it increased to 18.5 percent in 1992. Middle-class people of all races and ages from 25 through 65 are leaving the city. Nearly 25 percent of the District's households had incomes less than $15,000 annually, and nearly 40 percent less than $25,000 annually, reflecting in part the large share of female-headed single-parent households, elderly persons over 65, and single-person households in the District. Fifty-three percent of the District's children, even when not classified as below the poverty line, live in poverty areas, and half of the persons (49,000) afflicted by poverty are in long-term poverty, i.e., they have been poor for eight or more years.

(continued)

[2] Ibid.

BOX 3-1: Economic Change and the District of Columbia (Cont'd.)

TABLE C: Sectoral Composition of the District Economy

Percentage of jobs in the metropolitan area located in the District

	1974	1985	1992	
% of region's private sector jobs	%	%	%	Jobs
Total	34%	26%	23%	
Legal services	68	69	72	29,600
Educational services	73	68	69	37,900
Membership organizations	73	60	53	41,100
Hotels	56	**48**	44	14,500
Social services	61	**47**	41	17,800
Health services	18	**31**	37	61,700
Services to buildings	53	**42**	31	10,300
Management and public relations	40	**28**	26	13,200
Real estate	46	**36**	24	11,200
Communications	38	**29**	21	10,100
Banking	35	**33**	19	9,700
Retail	24	**17**	14	49,200
Manufacturing	24	**17**	10	13,800
Wholesale	31	**13**	10	7,800
Total private sector jobs	**309,000**	**364,000**		**407,000**

SOURCE: U.S. Census Bureau, *County Business Patterns,* 1974, 1985, and 1992

The District also performs poorly on a wide range of socio-economic indicators. Of 31 central cities studied in 1989, the District ranked 26 out of 31 with respect to infant mortality, 13 out of 31 in regard to crime, 11 out of 31 in regard to per capita income, 20 out of 31 concerning per capita tax revenues, and 26 out of 31 with respect to per capita expenditures.

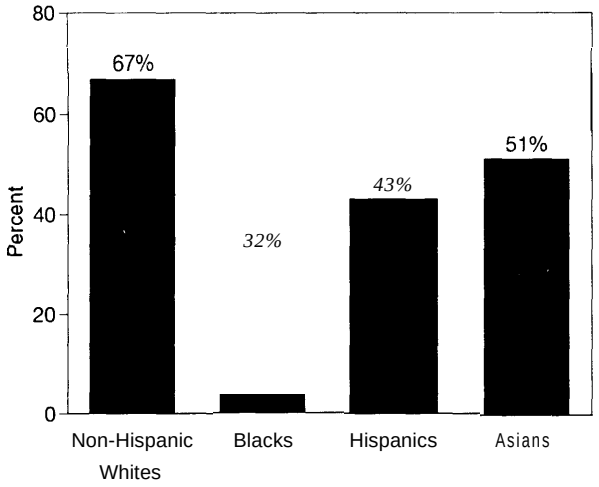
large cities over 40 percent of black males with no college education are unemployed.

Though there are many difficulties in measuring poverty,[62] it is clear that both poverty and ghettoes are growing in America and America's cities. The number of people in poverty increased from 29 million in 1980 to 39 million in 1993.[63]

[62]The principal difficulty is that most measurements of poverty rely on the national Consumer Price Index (CPI), which does not take into account regional and local variations in standard of living. For example, people in New York City who make considerably more money than people living in Atlanta may in fact be worse off because of the high cost of living in New York as opposed to Atlanta. The national CPI cannot account for all these variations, so it may appear, for example, that there are fewer people in New York "below the poverty line," whereas in fact, because of the actual rather than statistical CPI, more people in New York are in poverty. Moreover, on occasion elements that makeup the national CPI are understated or overstated. Between 1970 and 1980 the increase in the cost of home ownership and general price levels were overstated (by about 6.5 percent), which caused the poverty rate to be overestimated by about 11 percent, or an additional 1.5 percent of the population was determined to be below the poverty line. An additional problem is that comparing poverty data over time is complicated by changes in the boundaries of census tracts and metropolitan areas. See John Weicher, "Measuring Poverty and Progress," *Cato Journal,* vol. 7, (Winter, 1987), pp. 715-730.

[63]General Accounting Office "Community Development: Comprehensive Approaches Address Multiple Needs but Are Challenging to Implement," (Washington, DC: U.S. General Accounting Office, February 1995).

FIGURE 3-8: Proportion of U.S. Metropolitan Population Residing in Suburbs (1990)



SOURCE" William H. Frey, "Minority Suburbanization and Continued 'White Flight' in the U.S. Metropolitan areas Assessing Findings from the 1990 Census, " *Research in Community Socioiogy, Vol.* 4, 1994, pp 15-42

Of the 40 largest cities, 29 had poverty rates in 1990 above the national average and 11 of these have rates 1.5 times greater. A slightly larger percentage of whites, blacks, Hispanics, and Asians were poor in 1990 than in 1980, while the poverty rate in the largest 71 cities increased from 16.1 percent to 18.2 percent over the period.[64] Moreover, the poor are more concentrated in central cities than in suburbs. The central city poverty rate (18 percent) was approximately 10 percentage points higher than suburbs in 1990.

In addition to being concentrated in central cities, poverty is also concentrated within certain urban neighborhoods, variously described as poverty areas, poverty neighborhoods, or ghettoes.[65] Not all those who are poor live in poverty neighborhoods or ghettoes, and not all those who live in such neighborhoods are poor. Similarly, though poor blacks and/or poor Hispanics comprise the population most often residing in these areas, not all ghettoes are minority ghettoes.[66] However, the share of the black poor in metro areas who live in ghettos increased from 37.2 to 45.4 percent—indicating an increasing isolation of the black poor from the black and white middle class. [67]

While minorities make up about one quarter of the nation's population, their share in central cities is considerably higher. (see figure 3-8) Eleven of the top 25 cities in the nation are "minority-majority" municipalities, and Dallas and St. Louis (49.6 percent and 49.9 percent minority population, respectively) are close to being minority-majority cities. Moreover, 22 of the central cities of the largest 25 metropolitan areas lost white population during the '80s.[68] For example, Chicago's white population declined 18 percent, Miami's 34 percent, and Detroit's 40 percent.[69]

[64] Sue G. Neal and Harold L. Bunce, "Socioeconomic Change in Distressed Cities During the 1980s," *Cityscape,* Vol. 1, No. 1, August 1994.

[65] The various descriptions sometimes also determine how an area with a high concentration of poverty is defined — e.g., Weicher defines poverty neighborhoods as "contiguous census tracts, each having 20 percent of its population below the poverty line," whereas Jargowsky defines ghettoes as places whereat least 40 percent of the population is below the poverty line. See John C. Weicher, "How Poverty Neighborhoods are Changing, " in Laurence E. Lyre, Jr. and Michael G.H. McGeary (eds.), Inner-City Poverry in the United States (Washington, D. C.: National Academy Press, 1990); and Paul A. Jargowsky, "Ghetto Poverty among Blacks in the 1980s," in *Journal of Policy Analysis and Management,* vol. 13, No. 2, 1994, pp. 288-310.

[66] Indeed, during the 1980s the numver of neighborhoods with whites in the majority, and with poverty rates of at least 40 percent grew by 141 percent, whereas black poverty neighborhoods grew by only 49 percent. White ghettoes have a high rate of growth because they start from a small base; of the 11 million persons who lived in urban ghettoes in the United States in 1990, seven out of eight were members of minority groups, six million of these were blacks. Jargowsky, ibid.

[67] Ibid.

[68] Frey, op. cit., footnote 8, table 7.

[69] Ibid.

Suburban and Exurban Economic Trends

The spatial form of U.S. metropolitan areas has evolved significantly in the last 20 years. The once standard view of cities as consisting of a major central business district, an inner ring of low-income residents, and an outer ring of more affluent suburban residents, no longer adequately describes most U.S. metros. Today the suburb, so defined, is rare. Residential development has extended even beyond the metropolitan periphery to low-density "exurban" locations. What were once bedroom suburbs have been replaced by a metropolitan area outside the central city that is increasingly urbanized, and, like the core, is a place not only for residences but for businesses and employment. Many people both live and work in the suburbs and rarely visit the central city; others still commute to the core for work, but find that other economic functions such as retail, personal, business, consumer, and social services are available in the suburbs. This suburban job growth has led some to argue that "downtown," by which they mean a diversified center of economic activity that includes offices and retail, has relocated to the suburbs[70] or, specifically, to business and commercial centers in the suburbs known as "edge cities" that in some cases are larger than the central business district.[71]

Yet this picture needs shading: suburbs are still growing with respect to central cities, but at a slower rate. Outer suburbs and exurbs adjacent to and likely to become part of the metro area are growing at the fastest rate, as might be expected given their available vacant land. And some inner suburbs are beginning to suffer from the same problems and the population decline that has long affected many central cities.[72]

Population Growth and Density

Since the 1970s the majority of Americans in metropolitan areas have lived in the suburbs.[73] By 1993 the proportion of suburban to central city residents for the entire nation reached 63 percent to 37 percent,[74] in the top 25 metros 75 percent of the population resides in suburbs; and in the top 40 metros 71 percent is suburban.

In spite of growth, suburban population densities are still considerably below central city densities; however, over time, there appears to have been a slight evening out. In 1980, for example, the difference between central city densities and metro area densities for the largest 40 metros was approximately 10 to 1, whereas in 1990, with more or less the same land area but a higher metro population, the difference in density for the same group of cities was about 9 to 1.[75] This is due in part to the fact that some central cities have been losing population. For example, the population density in the city of Chicago fell from 16,000 persons per square mile in 1950 to 12,000 in 1990. But also densities in outer, established suburbs appear to be increasing as infill and multi-family homes increase. For example, population density tripled from 400 to 1,200 in Chicago suburbs from 1950 to 1990.[76] Between 1980 and 1990, popula-

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[70] T.J. Baerwald, "The Emergence of a New Downtown," *Geographical Review*, vol. 68, 1983, pp. 308-318.

[71] Joel Garreau, *Edge City: Life on the New Frontier* (New York, NY: Doubleday, 1991).

[72] Bollens, op. cit., footnote 30.

[73] Suburban residents outnumbered central city residents by 53 percent to 47 percent by the early 1970s.

[74] Frey, op. cit., footnote 8.

[75] In the 1970s, many metropolitan areas expanded through the addition of adjacent, often rural counties to the definition of the MSA. As a result, population densities decreased in the 1970s for many metros, as less dense areas were now included as part of the metropolitan area. Far fewer counties were added in the 1980s.

[76] Between 1980-1990, when population in the Chicago metro area grew by 1.6 percent, 90 units of local government in the city of Chicago or its inner suburbs lost 700,000 population, whereas 165 units of local government, all in the suburban or metropolitan exurban areas of the Chicago metropolis, gained one million residents (discussions with officials from the Northeastern Illinois Planning Commission, Chicago - October 1994).

tion density of the largest 40 metropolitan areas increased 14 percent, from 456 persons per square mile to 523.[77]

However, exurban and satellite city development is increasing, as low-density development spreads outward from outer suburbs in metropolitan areas. The fastest growing sections of many metropolises are now the low-density exurban areas at furthest distance from the central city. A recent study of seven major metropolitan areas, Los Angeles, Boston, Minneapolis, Atlanta, Phoenix, Detroit, and Houston, concluded that in every case but one—Phoenix[78]—the exurban areas of the metro grew much faster than either inner suburbs, outer suburbs, or the central city.[79] Similarly, between 1980 and 1990, satellite metros (smaller metropolitan areas adjacent to larger metros in consolidated metropolitan areas) grew faster in population (17.2 percent) than suburbs (13.8) or central counties of large metros (8.4).[80]

This decentralization of residencies results in the physical size of metropolitan areas increasing, and because new development is low density, it results in a reduction of overall metropolitan population density. Measuring changes in population density is difficult, in large part because population and land area statistics are not collected for the actual developed area of a metropolitan area, but rather for a somewhat arbitrarily defined set of counties intended to coincide with development patterns. However, some metropolitan-specific information does indicate the extent of population dispersion. For example, the Philadelphia area, with a population of 3.7 million that is only 100,000 larger than in 1960, is spread out over a land area 32 percent larger than in 1960, representing the development of 125,000 acres of open space. In Chicago, while the region's population grew only 4 percent, the residential land area expanded 50 percent.

Business Suburbanization

One reason for the exurban population increase is the increasing rate of business suburbanization, which lets workers live even farther out in cheaper homes. In the last two decades, an increasing share and variety of metropolitan employment has located in the suburbs (see table 3-4).[81] The pattern of suburban business location is diverse and complex and differs from metro to metro and within metros. Businesses locate in metropolitan areas to take advantage of the benefits metros offer,[82] but their precise location in the suburbs may result from a number of causes, including factor cost differentials (price of land and rent, taxes, etc.), labor supply, commuting patterns, the layout of roads and highways, etc.[83] High costs stemming from congestion in the core as well as an increasing ability offered by technology to gain from metropolitan-wide advantages (communications, labor supply, etc.), have led suburban locations to be increasingly cost effective (see chapter 4). For example, between 1976 and 1986, 123,000 jobs were relocated out of Manhattan, with about 55

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[77] These measures, however, hold counties constant between 1980 and 1990 and may not include the newly developed area at the edge of the metros.

[78] Phoenix is one of those Sunbelt cities that still annexes its suburbs.

[79] Alden Speare, Jr., *Changes in Urban Growth Patterns, 1980-1990* (Cambridge, MA.: Lincoln Institute of Land Policy, 1993), pp. 15-16.

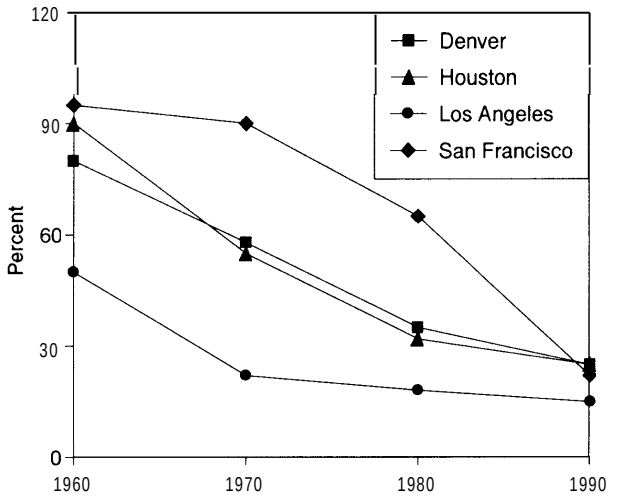
[80] Morrill, op. cit., footnote 6.

[81] Stanback, op. cit., footnote 48.

[82] In other words, they want to be near the conveniences, amenities, institutions, opportunities for learning, and information and infrastructure that can be found in metro areas (metro-wide or urbanized agglomeration effects), or they seek specifically to be near other firms that make or sell similar products and that are organized in industrial or business clusters. See Howland, op. cit., footnote 47; and Stanback, op. cit., footnote 48, esp. pp. 57-81.

[83] Gary Pivo, "The Net of Mixed Beads: Suburban Office Development in Six Metropolitan Regions," *APA Journal*, Autumn 1990, pp. 457-468.

FIGURE 3-9: Percent of Metropolitan Office Space Located in the Central Business District



SOURCE: Gary Pivo, "The Next Mixed Beads, Suburban Office Development Regions, " *APA Journal,* (Autumn, 1990), pp 457-468

percent going to the suburbs of New York and New Jersey, and the rest moving outside the metro area.[84] In Milwaukee, the central city lost 14,000 jobs between 1979 and 1994, inner-ring suburbs gained 4,800, and outer-ring suburbs gained 82,000.[85] Between 1989 and 1993, albeit a recessionary period, downtowns in the six largest Ohio cities lost an average of 7.17 percent of employment, while suburban business centers gained 2.1 percent, although even some older ones lost employment. [86]

Though no metropolitan areas are the same, in general the economies of metropolitan areas are becoming less monocentric (most economic activity located in one place—the central business district); and instead more polycentric, where economic activity is located in many centers throughout the metropolitan area. The common vision of the metropolitan area as a place with one economy, located among downtown skyscrapers and inner-ring factories, no longer describes the metropolis common to America at the end of the 20th century. For example, 57 percent of office stock is located in the suburbs, up from 25 percent in 1970 (see figures 3-9 and 3-10).[87]

However, there are several patterns of office development. [88] On the one hand, there is the phenomenon of specialized economic activities located in high concentrations in industrial and office parks and retail malls in a variety of so-called "edge city" clusters. Garreau identifies 181 such edge cities, located in 34 metropolitan areas around the country.89 In six metropolitan areas, Pivo found that the largest 10 percent of office clusters in the suburbs (areas where two or more offices are closer than one quarter mile) contain over 40 percent of the office space, while the largest 25 percent contain over half.[90] Thus, while most office space is in larger clusters, some is in much smaller clusters, sometimes of only two or three office buildings with several hundred thousand square feet.[91] One study of Dallas-Ft. Worth found that while 60 percent of all jobs in the region

[84] Leshinksi and Priestly, op. cit., footnote 39.

[85] White, op. cit., footnote 37.

[86] Richard D. Bingham and Deborah Kimble,''The Industrial Composition of Edge Cities and Downtowns: the New Urban Reality," Unpublished Paper, Maxine Levin College of Urban Affairs, Cleveland State University, 1994.

[87] Pive, op. cit., footnote 83. Also, Neil Pierce, *Citistates: How Urban America Can Prosper in a Competitive World,* (Washington, D.C.: Seven Locks Press, 1993).

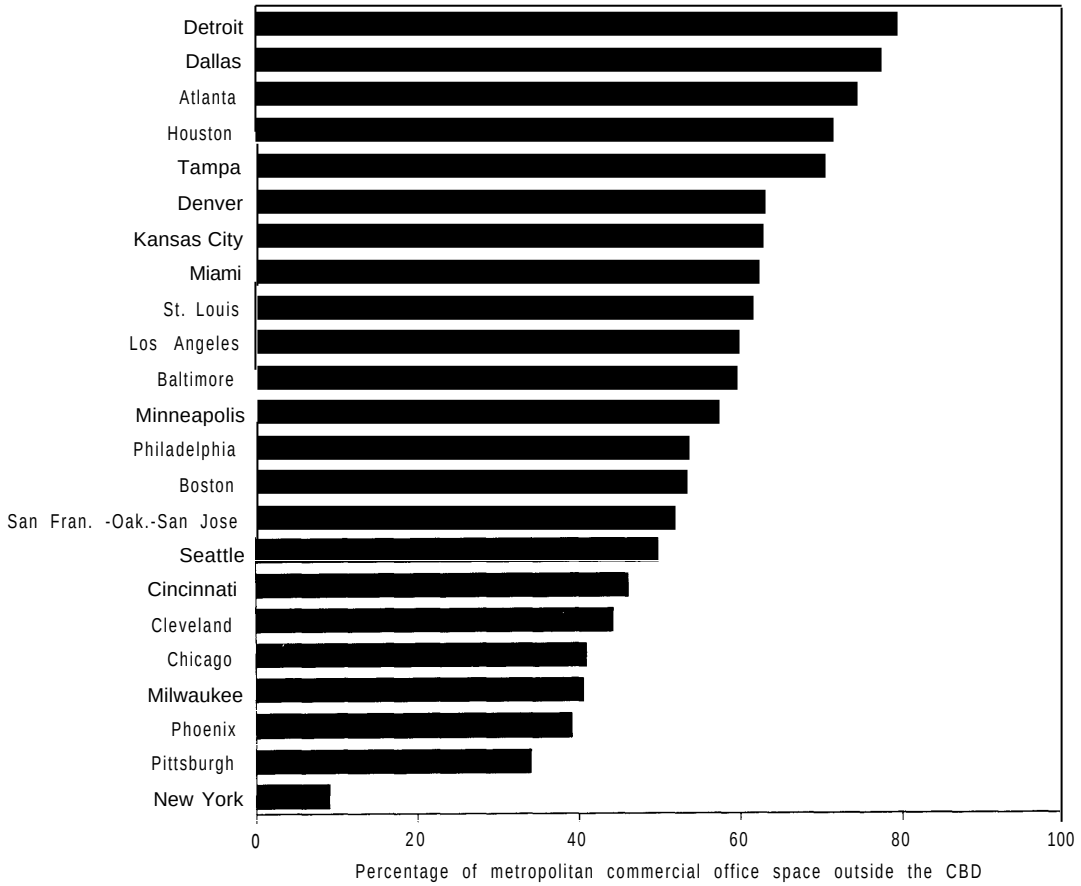
[88] See Robert Cervero *America's Suburban Centers: The Land Use-Transportation Link,* (New York, NY: Unwin Hyman, Ltd., 1989).

[89] See Garreau, op. cit., footnote 71. The term edge city was coined by Garreau, but the concept of concentrated perimeter development belongs to many other analysts, including Cervero, Hartshom and Muller, Fishman, etc.

[90] These areas were Los Angeles, Houston, Seattle, Denver, Toronto and San Francisco.

[91] Pivo, Op. cit., footnote 83.

FIGURE 3-10: Percentage of Commercial Office Space Outside the Central Business District (CBD) in 1988



SOURCE: U.S. Bureau of the Census, State and Metropolitan Area Data Book, 1991

are concentrated at 5 percent of the work sites, 40 percent are concentrated in the remaining 95 percent of work sites.[92] Presumably, functions in these dispersed offices have less need of a high level of face-to-face contacts enabled by location in the central business district. Moreover, while some clusters may be large, compared to the size of the central business district they are small. The largest of these clusters, at 3.5 to 6.5 million square feet, are still one-fifth to one-tenth the size of the region's central business districts, and the average square foot of office per acre in these clusters was more than four times lower than the region's central business districts.[93]

[92] Brian Berry, Donald A.. Hicks, and Paul Waddell, *State of the Region 1992,* (Dallas, TX: Bruton Center for Development Studies, university of Texas at Dallas).

[93] Pivo, op cit., footnote 83.

Just as suburban economies are different from central city, so suburban "edge cities" appear to be different from each other. In Ohio, for example, such edge cities contain employment in the aggregate that is more diverse than the employment in the state's major central cities (Dayton, Cincinnati, Cleveland), but each edge city is itself quite specialized: 20 percent of the edge cities concentrate on manufacturing; wholesale and retail trade is found in 22 percent of these perimeter centers of economic activity; 27 percent specialize in personal and producer services; and some are centers for hospitals, social and government services.[94]

In some metropolitan areas growth has been relatively even, but in many metropolitan areas growth is spatially uneven.[95] Some suburbs are growing rapidly at rates much higher than the central city and also much higher than their respective metropolitan area generally, while some suburbs, as discussed above, are losing jobs. In suburban Chicago, for example, three densely developed centers of suburban employment—O'Hare Airport, Schaumburg, and central Du Page county—accounted for 27 percent of total net employment growth in metropolitan Chicago in the 1980s.[96] And though their employment density was much lower than Chicago's central business district (average employment density of 126,000 per square mile), these three "edge cities" did reach densities of about 30,000 workers per square mile.[97] Moreover, the counties in which they were located experienced high employment growth in the 1980s—northwestern Cook county and Du Page county accounted for 65 percent of the decade's metro employment growth of 394,000 jobs, or roughly 257,000 jobs. If one adds to these figures for suburban Chicago employment growth in the 1980s, the employment growth in the central business district—from 491,000 to 522,000 jobs, or an increase of 31,000—and the fact that the city of Chicago as a whole experienced a slight job loss (20,000 jobs), the uneven aspect of suburban economic development becomes a bit clearer. The suburbs are growing very fast and to a certain extent unevenly.

Similarly, northwest Atlanta employment growth is densely concentrated in several perimeter activity centers.[98] At the same time, the southern suburbs, which are predominately black, are very sparsely developed or declining. The city of Atlanta's share of the metropolitan region's jobs declined from 40 percent in 1980 to 28 percent in 1990. However, the northern, predominately white, suburbs gained all the share that the city lost, exacerbating spatial mismatch for minorities concentrated in the central city and southern part of the city.

CONCLUSION

The spatial and economic structure of U.S. metropolitan areas has undergone considerable change in the last 20 years. Growth is much more diffuse, but also more uneven, at both the intra- and inter-metropolitan levels. In other words, an increased number of metros now vie for growth, and the dominance of a few traditional large cities is giving way to what some term concentrated dispersal to a larger number of metropolitan areas. Yet, this decentralization is hightly selective and uneven, and not all places will be able to succeed, particularly those that have not managed the transition to the post-industrial metropolis.

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[94] Bingham and Kimble, op. cit., footnote 86.

[95] Robin Bloch, "The Metropolis Inverted: the Rise and Shift to the Periphery and the Remaking of the Contemporary City," Ph.D. dissertation, UCLA (1994).

[96] John F. McDonald and Paul J. Prather, "Suburban Employment Centres: The Case of Chicago," *Urban Studies*, vol. 31, No. 2 (1994), 201-218.

[97] Ibid.

[98] Keith Ihlandfeldt, "The Spatial Mismatch Between Jobs and Residential Locations Within Urban Areas," *Cityscape*, vol. 1, No. 1, August 1994. Ihlandfeldt uses data from Atlanta that shows the growth of jobs in its northern suburbs, and the lack of jobs in its southern suburbs.

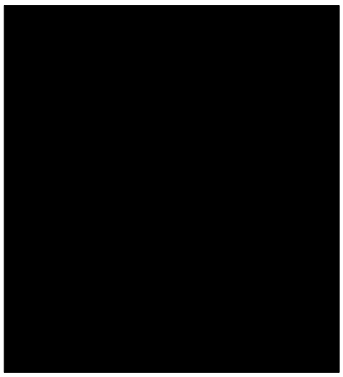
Similar patterns are occuring within metropolitan areas. The historic dominance of the central city is giving way to a much more dispersed pattern of growth as economic activity spreads unevenly throughout the metropolitan areas in other nodes and centers (what some term edge cities). Some sections of the metro, usually a select group of outer suburbs and even exurban locations, are growing quickly and becoming home to fast-growing companies, while other sections, particularly many parts of the central city and inner suburbs, are suffering job loss, disinvestment, and poverty. As discussed in the next four chapters, the technological revolution based on telecommunications and information technologies now underway is likely to exacerbate and accelerate these trends, leading to both positive and negative outcomes.

Technological Change and Employment Location

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Advanced industrial economies are in the midst of a technological revolution, driven in large part by rapid advances in microelectronics technologies. These digital electronic technologies permit information in a myriad of forms to be generated, routed, and transmitted cheaply, instantaneously, and at high volumes virtually anywhere. There has been much speculation about the impacts of the "information superhighway," "digital society," and emerging "cyberspace," on society in general, but surprisingly little is known about the potential effects of this technology revolution on human settlement patterns broadly, or on urban conditions in the United States specifically.[99]

Today, economic activities are increasingly shaped through continuous and real-time interactions facilitated by information technologies. Because these interactions differ so markedly from past interactions that were more heavily burdened by space and time constraints, they have, through their impact on industries and jobs, the potential to significantly reshape American's metropolitan areas, and to bring about significant growth for some kinds of places and decline for others. In fact, some argue that these technologies underpin the transformation of metropolitan



[1] For a discussion of these trends in the OECD nations, see Organization for Economic Cooperation and Development, *Cities and New Technologies* (Paris: OECD, 1992); also, John Brotchie, Mike Batty, Ed Blakely, Peter Hall, and Peter Newton, *Cities in Competition: Productive and Sustainable Cities for the 21st Century* (Melbourne, Australia: Longman, 1995). For a discussion of trends in Australia see Patrick Troy, ed., *The Impact of Technological Change on the City*, unpublished manuscript, 1995. See also "City vs. Country: Tom Peters and George Gilder Debate the Impact of Technology on Location," *Forbes ASAP*, January 1995.

areas,[100] and that the conceptual and policymaking frameworks built up since the beginning of the 20th century to deal with the physical, social, and economic aspects of the industrial city are largely outmoded.[101] Clearly, technology is not the only force working to reshape metropolitan economies; other factors such as changing industrial organization, demographics, and social conditions (including crime in central cities), also play a role. However, because of the magnitude of technological change, technology will play a central role.

Because the form of cities and metropolitan areas is largely shaped by patterns of commerce and industry, this chapter examines the likely impact of the information technology revolution on the location of employment.[102] It first discusses the information technologies that facilitate electronic information generation and transfer. It then presents an overview of how information technologies are affecting the spatial distribution of economic activities, and finally, it examines the likely impact of these technologies on metropolitan form.

The analysis in this chapter is based on a case examination of the impact of technology on a number of industries, including telecommunications, banking, insurance, securities trading, and professional services (chapter 5); and freight transport, wholesale trade, and manufacturing (chapter 6). These industries were chosen because much of their function involves "exporting" products or services to places other than the area where they are located, and as such determine the economic growth of regions or metropolitan areas, and to a lesser extent, parts of metro areas. In contrast, growth or decline in industries that serve local customers (e.g., barbers, repair shops, grocery stores) is largely a response to economic growth in other sectors that export their output outside the region. For example, local insurance agents are a residentiary function, since they are located near their customers, but a nationwide insurance customer service center is an export function, since the jobs are not dependent upon demand from the local economy. Analysis in this chapter is also based on the examination of three cross-cutting technological issues in chapter 7, 1) telecommuting of individual workers, which has the potential to affect where individual workers live and work; 2) the effect of Intelligent Transportation Systems (ITS) on urban form; and 3) the spatial distribution of the telecommunications infrastructure, which some argue limits where information-intensive industries can locate.

TECHNOLOGICAL UNDERPINNINGS OF THE NEW PERIOD OF METROPOLITAN GROWTH

To understand better how this next wave of technologies is likely to recast industrial and residential locational patterns, it is important to understand first the key technologies being adopted by industry. Many of the early applications of information technology (IT) were to improve internal operations (e.g., first mainframe computing and then desk top computing) and often created "islands of automation" with little interconnection between components. As a result, their impact on the location of activities was limited. It is only recently that technologies facilitating linkages and communication between operations have begun to be widely adopted. These technologies are falling in price while increasing in performance, and as a result, will continue to be adopted throughout the economy. For the purposes of this report, these technologies can be grouped into three categories: technologies to transfer informa-

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[2] Paul Knox, *Urbanization: An Introduction to Urban Geography* (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1994).

[3] Stephen Graham, (University of Newcastle upon Tyne) "Cities in the Real-Time Age," paper presented at the Information and Telecom Tectonics conference, Michigan State University, Mar. 21, 1995.

[4] People may want to live in bucolic rural settings, and IT may enrich those settings, but as long as people depend on their livelihood through work, they live near were work locates.

tion into electronic form, to distribute and route information, and to transmit this information to different locations. What makes these technologies revolutionary is their ability to capture, store, and transmit information in digital form, which makes electronic, and therefore instantaneous, transmission possible. Rapid adoption of these technologies is being driven by the significant increases in productivity they make possible.

Transforming Information Into Electronic Form

Generation and consumption technologies transfer information into electronic form or allow it to be used (read, heard, etc.). For example, image technology digitizes and stores images of physical documents, such as checks, forms, and letters. High-resolution monitors allow information to be easily viewed. Other technologies include fax; video conferencing and video phones; computers, including portable and laptop computers; optical scanning technology; bar code readers; graphics software; knowledge-based software systems; electronic storage technologies, including floppy and hard disks and CD-ROMs; database software systems; voice recognition; remote sensors; and robotics and CAD/CAM.

Electronic Data Storage and Retrieval Technologies

Electronic data storage capacity and access speed have increased while costs have gone down. Moreover, database software has become more sophisticated. As a result, a large share of information is stored and accessed electronically. The development of laser-based CD-ROMs and CDs that can both be read and written to make data storage even cheaper and faster. These technologies allow users to obtain information without having to handle paper records.

Scanning and Imaging Technology

Image technology, such as faxes, converts images on paper to electronic form that can then be reproduced in original form. Optical character recognition (OCR) technology converts images of text into digital code that can then be processed by computers. For example, new check encoding machines recognize some check amounts and automatically magnetic encode them; for images that are unrecognizable, the machine transfers the image of the check to a terminal at which a person manually encodes the amount.

The use of imaging and OCR technology was initially limited by three factors—the relatively high cost of digital transmission of complex images, the cost of imaging equipment, and the high error rates involved in imaging certain types of documents. However, with the growth of fiber-optic networks and rapid progress in data compression technology, costs of transmission have gone down. Also, equipment costs have fallen significantly, and error rates have declined.

Searchable Databases

Database software systems accessible through PCs allow information to be obtained according to selected search criteria. These systems facilitate distributed work by allowing remote access to data files. For example, work is underway to establish an information network for realtors that would allow automated online title searches, eliminating the need for title search firms to go to courthouses for searches. Similarly, online legal research has reduced the need to be near law libraries.

Electronic Files/Distributed Computing

Electronic folder management, an offshoot of imaging and database applications, consists of whole files of documents that are stored and retrieved electronically. Digital pictures of documents, rather than pieces of paper, are moved through the system. Such file folder imaging allows all information about a client or project to be collected and handled electronically. Combined with distributed computing that links personal computers together into a system, workers are able to share access to the same information, including a wide variety of information from offsite and distributed locations if desired. For example, some insurance firms are using this technology to store all information about clients and policies.

Law firms are also increasingly using image technology to enter legal documents into a computer format. Similarly, US West produces Yellow Pages by using shared folders so that everyone, including sales reps, graphic artists, and the collections office, can access work electronically.

A similar version of this is groupware that enables distributed teams to work together. Groupware, such as Lotus Notes, is based on client/server systems that allow users (or clients) to communicate securely over a local area network or telecommunications link with a document residing on a shared computer (or server).

Video Transmission

In spite of being invented in the 1930s and being touted at the 1964 New York World's Fair as the wave of the future, video telephony has been slow to be adopted. In the 1980s, an increasing number of companies purchased dedicated video conferencing equipment. Yet these systems were costly and cumbersome to use.[103] However, newer systems utilizing video modems are less expensive and more portable, and thus much more useful. Video modems translate and digitize data and send it over high-capacity lines. In fact, some expect desktop video conferencing will become commonplace for many users with access to advanced telecommunications. The cost is equivalent to two long-distance phone calls.

Personal Computers

Advances in speed, storage capacity, and ease of use have increased the utility of personal computers. In addition, new graphical user interface software (e.g., "Windows") makes computing easier for non-technical personnel, allowing more functions to be put on computers. Portable computing has become more powerful and cheaper in the last five years, better enabling distributed work. For example, the IRS is experimenting with the use of laptops for its field agents, who can then access a taxpayer's records via modem. The IRS expects agents will be able to do the job with only one field visit and not have to go back for further information and followup.

Smart Cards

Financial institutions, telephone companies, software firms and other businesses in the U.S. are getting ready to take another step in the continuing convergence of information and finance—the expanded use of "smart cards" to perform a variety of financial functions. Smart cards differ from conventional credit or ATM cards in that they can carry large amounts of information, using an embedded microchip.[104] A smart card could be used, for example, to download funds from the cardholder's bank account directly onto the card itself. Because this in effect makes the card a new form of cash, authorization of individual point-of-sale transactions would not be necessary. The same card could also carry detailed information about the holder's health insurance coverage; for most routine procedures, health care providers could be paid directly from the card. The Smart Card Forum—a 115-member consortium of financial institutions and others with an interest in applications of smart card technology—are now working to develop common standards and protocols.

Smart cards have the potential to reduce the need for branch banks to deliver services; they also reinforce the importance of central processing facilities. Customers would be able to download "cash" at home via a screen phone or a PC. The midnight trip to an ATM would no longer be necessary. Pension payments, Social Security, and unemployment and welfare benefits could also be transmitted electronically onto smart cards.

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[5] Companies could pay as much as $100,000 for dedicated systems, not counting the cost of office space for the rooms. There were other disadvantages as well. Users had to schedule time in the rooms. In addition, cameras were not controlled by the viewers, which limited their ability to participate.

[6] "Smarter Yet and Smarter," *New Scientist*, October 1994, pp. 41-43.

Distributing Electronic Information

Distribution technologies allow electronic information to be switched and routed to particular places or uses. For example, electronic data interchange protocols allow documents or other data to be transmitted between users. Other technologies include Internet communications and e-mail; modems, including high-capacity cable modems; store and forward technologies, such as call forwarding systems; local and wide area networks; data compression technologies; voice mail and answering machines; pagers; wireless communications and computing; and automatic call routing systems.

Electronic Data Interchange

Broadly defined, electronic data interchange (EDI) involves the transmission of data and information electronically from one computer to another.[105] This information can be in a variety of forms, including data sets, forms and applications, funds, and letters. For example, in the insurance industry most transactions use standard contracts with the unique policy information summarized on one page. Electronic exchange of this information could streamline underwriting and issuing policies. In banking, electronic funds and invoice transfers are increasing. For example, EDI Banx is an electronic payment system developed recently that allows companies to transfer payments and remittance data electronically to vendors and suppliers. Similarly, the need to read utility meters may be eliminated with technology that transmits meter information directly to computers, which in turn could debit customer bank accounts.

Telephone Technologies

Development of new software and hardware applications in telecommunications have created a number of new uses for telephones, enabling more distributed work. For example, new digital call distribution systems and distributed computing make it possible to distribute phone service functions that previously had to be in more central locations. Call routing technologies allow calls from a wide geographic area to be routed to available offices, enabling companies to centralize service facilities and better manage the flow of calls. Remotely accessed voice mail and call forwarding better enables remote work. In recent years, innovations such as digital call distribution systems, telephone keypads, and screen phones have enabled banks, brokerage firms, and mutual funds to broaden the range of services that clients can access by phone. In addition, new number assignment technologies allow temporary assignments of Internet and other addresses to people who are on the road, making it easier to work off-site. Software-defined phone networks enable much wider adoption of dedicated lines, enabling easier access for interoffice calls.[106] Finally, the rapid growth in toll-free 800 service has meant that an increasing number of companies can inexpensively serve customers throughout the country or even the world. In the late 1980s, AT&T included about 60,000 numbers in its nationwide 800 service "public" listings directory.[107] In 1995, so many companies have 800 numbers there is a looming shortage of available new numbers.

Internet and Online Applications

New systems that allow information to be easily transmitted and obtained remotely by computer

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[7] U.S. Congress, Office of Technology Assessment, *Electronic Enterprises: Looking to the Future* (Washington, DC: U.S. Government Printing Office, 1994).

[8] Leland Johnson, "Advances in Telecommunications Technologies That May Affect the Location of Business Activities," Rand Note N-3350-SF, Rand Corporation, 1991.

[9] Ibid.

are growing. Electronic mail systems have grown significantly, as has Internet use. Some companies use these and other systems to maintain close linkages among personnel. In addition, recently a number of firms have begun offering merchants software that will allow customers to make online credit-card purchases via the Internet.

Transmitting Electronic Information

Transmission technologies facilitate transmission of electronic information between two places. Atmospheric transmission includes: satellites, cellular systems, microwave relay systems, and radio and TV transmission. Terrestrial systems include cable, fiberoptics, and Integrated Services Digital Network (ISDN).

Wireless Technologies

Radio-frequency-based wireless technologies, including phones, computing, faxes, and other electronic devices are becoming more widespread.[108] Cellular telephones use switching and coded radio broadcast to localized cells, offering mobility in densely populated areas. The proposed low-earth-orbit satellite systems now in development would use switching and satellite broadcast, expanding mobility to remote areas of the world.

Telecommunications

The U.S. telecommunications infrastructure is international in scope and is evolving as both the delivery system and applications advance. In the last decade, there has been widespread deployment of a nationwide and international system of high-speed, high-capacity fiberoptic cable. Moreover, prices of telecommunications have fallen dramatically in inflation-adjusted dollars. For example, from 1972 to 1986 ordinary telephone service (MTS) rates fell between 44 and 36 percent when adjusted for inflation.[109] Similarly, revenues per minute for international calls fell from $2.25 per minute in 1975 to $1.18 in 1988 in real dollars.[110] As a result of falling prices and increasing quality, usage has increased significantly. For example, between 1975 and 1988, international telephone minutes from the United States increased by an annual average of 23 percent.[111]

In addition, within most major metropolitan areas, advanced telecommunications technologies, including fiberoptic lines, are available to most large users (see chapter 7). Advanced packet switching, ISDN, and other services allow transmission of digital signals. Broadband services to the home will allow increased work to be done from home, in part by enabling instant access to remote computers.

INFORMATION TECHNOLOGY AND SPATIAL PATTERNS

Historically, cities have arisen and grown as centers of transactions and commerce, largely because of the need for physical proximity among firms, suppliers, and customers. Agglomerations of people, infrastructure, and industry allowed for efficient production, transport, and distribution of goods and services. By allowing activity to be physically farther apart, yet functionally still close, advances in technology, particularly new transportation modes (e.g., train, electric trolley, cars and trucks), helped shape the first industrial city and the mass production metropolis. Today, new technologies, particularly information technologies, are creating closer connections between economic activities, enabling them to be physically farther apart. As a result, these technol-

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[10] U.S. Congress, Office of Technology Assessment, *Wireless Technologies and the National Information Infrastructure*, OTA-ITC-622 (Washington, DC: U.S. Government Printing Office, July 1995).

[11] Johnson, op., cit., footnote 8.

[12] Ibid.

[13] Ibid.

ogies are central to the reshaping of the post-industrial metropolis.

Three factors determine the extent to which widespread diffusion of these advanced technologies will alter the location of industry and employment: 1) the degree to which functions can be cost-effectively transformed into electronic flows facilitated by telecommunications; 2) the degree to which these new activities still require spatial proximity to suppliers, customers, competitors, and other units in the firm, and 3) the degree to which other urban advantages remain important.

There are a number of factors that determine the degree to which functions can be conducted through telecommunications and information technology (IT). Because many services involve some transmission or manipulation of physical things (machines—auto repair; food—restaurants; hair—barbers), their location continues to be bound by the location of their customers. Some functions may be automated, for example, by technologies allowing self-service check-in and check-out in hotels. In these cases, the services would remain close to the customer, but employment would drop.

However, even for functions that involve production of goods or exchange of physical items with the customer (e.g., wholesaling, check processing), the information share of these functions is increasing, enabling many of these functions to be enhanced or carried out by IT and telecommunications. For example, 30 years ago information in most offices was on paper and transferred physically, requiring filing clerks, messengers, and even sometimes operators of pneumatic tubes to shift paper around in large offices. Today, a small but growing number of offices are moving to computer-based systems for virtually all information. Electronic imaging allows data to be transmitted electronically rather than by paper. For example, by using PC-based databases, analysts at the Internal Revenue Service expect to be able to respond more effectively to irregularities in claims without searching out physical files and seeking advice from managers. Similarly, in some insurance companies, centralized customer information files containing the history of customer interactions with the company allow one customer service representative to see the customer's entire history with the company.

Developments in computing technologies, database access, and telecommunications have increased the share of services that can be conducted without the direct involvement of customers, or at least without requiring their physical presence. For example, the rise in use of credit cards and 800 telephone service means that a growing number of customer service functions are now conducted over the phone from centralized customer service centers. On the whole, information technology appears to be leading to a shift from transactions and learning based on both face-to-face communication and goods shipment to one based on cheaper electronic forms of communication (see table 4-1 .)

The effect of greater numbers of electronic transactions appears to be a loosening of spatial linkages between firms and their suppliers, customers, competitors, and other units within the firm. Historically, because of the need to exchange goods, information or people cheaply and easily, many firms located in cities, creating what econo-

TABLE 4-1: Types of Linkages Between Business Operations

Linkage	Means
Face-to face	In-person meetings and interaction
Voice and video	Video conferencing and video phones
Voice	Telephone, voice mail
Electronic data	E-mail, fax, electronic data interchange
Physical mail	Postal service, overnight mail
Goods shipment	Conventional freight movement

SOURCE: Office of Technology Assessment, 1995.

mists term agglomeration economies.[112] The cost and difficulty of cooperation and communication increased over distance. Now industries performing routine functions but located in urban areas because of the need to transport or display physical goods (for example, back-office operations of some wholesale banks) might, through application of IT, be freed of the need for proximity. Similarly, industries requiring frequent face-to-face contact (for example, architects in design teams) might now be able to communicate through electronic means such as e-mail and video telephones, and be able to locate in suburban rather than central city locations.

This new wave of technology also enables greater economies of scale, particularly in the service sector, and these are reordering the spatial distribution of activities This is true in part because of the adoption of ever larger and more complex equipment in sectors such as freight transportation and wholesale trade. More importantly, information technology reduces the constraints of distance on business operations, letting business serve a wider number of locations and an increased number of customers from a single location. By removing the production of the service from a large number of local sites, each with limited output, these applications offer many companies increased economies of scale in production.[113] As a result, the communities in which these functions locate enjoy more employment, often at the expense of other areas.

For example, in some financial services, such as credit card payment processing and international money transfers, automation has created new economies of scale, with dominant providers concentrating routine activities in a few very large processing centers. American Express, for example, does all of its credit card processing in three large facilities, and has announced plans to consolidate into just two. Similarly, in rail freight, new information technologies allow rail control operations to be centralized in one facility that controls a company's trains throughout the nation. In wholesale trade, information technology and new practices reduce order transmittal and processing time and provide a larger window for transportation time, allowing facilities to consolidate and serve a larger area from one location.

Although these technologies are leading to consolidation, they also allow many of these operations to act more like switching centers than centralized production centers, and could permit workers to do the work from a widely distributed number of cites. In large part this is because, just as information technology reduces the importance of distance between the company and its customers and suppliers, it also reduces the importance of distance in links between the workforce and the company.

There are several examples of this. Computers and telecommunications enable people to telecommute from home or at a telecommuting center, even though the company they work for is in a centralized location. Similarly, new phone routing technologies allow phone operators and other customer service representatives to work at home and have calls automatically routed to their numbers. In Phoenix, Arizona, customer calls for transit route information go to a central number and are routed to workers at their homes, who access transit schedules from home terminals. In another example, in the last decade a major midwestern bank centralized all customer service calls to individual branches to its facility in the downtown of a large city. By using sophisticated call distribu-

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[14] Agglomeration economies refer to the advantages gained by firms from spatial concentration in places with other firms and workers. Two types of agglomeration economies are noted: 1) localization economies, which refers to advantages to a particular industry through locating near other similar industries (e.g., auto makers in Detroit); and 2) urbanization economies, which refers to advantages across a number of industries due to spatial proximity (e.g., access to larger labor pools).

[15] Between 1977 and 1991, the average firm size in the service sector increased 19 percent, while average firm size in the goods sector declined 20 percent (U.S. Department of Labor, Bureau of Labor Statistics, unpublished data, 1994). Some individual service sectors increased even mor—efor example, financial services, 34 percent; airlines, 38 percent; and legal services, 49 percent.

tion technologies, even though the calls still come to one central number, they are now routed to the first available representative, and all the representatives are back in branches. The wholesale trade and distribution industry is evolving from a stock system where warehouses hold large amounts of goods, to a flow system, epitomized by cross-docking, where distribution centers hold goods only for minutes or hours before sorting them and reshipping them to new destinations. Broadly defined, these systems are consistent with distributed work, where work is not necessarily performed at one location.

Finally, where localization economies are weakened by advanced information technologies and telecommunications operations are, at least in theory, free to locate virtually anywhere, including in rural locations. Regional economic theory suggests that as the localization type of agglomeration economy becomes less important, firms will move to areas where land and labor are cheaper. These models, according to most scholarly work on technological change and location, have been largely applied to the manufacturing sector. Yet, there is reason to expect that they should also apply to services. Because IT enables them to maintain closer contact with others (e.g., suppliers, customers) over a greater distance, we would expect to find that many service activities disperse from centralized, high-cost locations.

However, many operations may still locate in high-cost metropolitan areas. Large metros continue to provide advantages for industry, including large and varied labor markets, frequent and cheap air transportation, large consumer markets, and availability of repair and technical services—what economists call urbanization economies. For example, metros like Phoenix, Atlanta, and Kansas City are home to a large number of back-office operations of banks and insurance companies that formerly were located in places such as New York and Los Angeles. And though the variation in telecommunications infrastructure is rapidly diminishing between metropolitan areas as mid- and small-size metros get widespread fiber-optics and other advanced telecommunications services, these services are not likely to be widely available in rural areas in the next 10 years.

Yet, to a great extent, how technological change will spatially reorder economic activity will depend upon the type of function involved. Because the nature of linkages differ depending on what is being done (e.g., moving goods versus moving information, face-to-face contact versus electronic contact), the next sections of this chapter examine several different functions. These are front office (customer interaction), routine back office (no direct customer interaction), goods production and distribution, and complex back office.

Front Office Functions

Historically, the location of a large share of service employment was dictated by local market demand. Branch banks, retail stores, customer service centers, and other consumer functions were widely distributed to serve local demand. For example, retail stores and many personal services (e.g., barbers, auto repair) usually located where their customers were, although mail order catalogues allowed customers in remote locations to buy goods. Developments in computing technologies, database access, and telecommunications have increased the share of services that can be conducted without physical proximity to the customer, although functions involving some transmission or manipulation of physical things are likely to be bound by the location of their customers.

These customer access technologies have allowed a number of functions to be centralized out of neighborhood or local sites. For example, many banks have moved loan processing and other functions out of local branches to centralized customer service centers, often without face-to-face contact with the customer.[114] Telephone technologies have also made it increasingly possible to locate

[114] In the 1970s, many banks sorted and sent checks to their customers. Now this function is done in centralized check processing centers.

telemarketing and other phone functions in distant locations. For example, Omaha and San Antonio are centers for a large number of telemarketing firms.[115] Similarly, when residents of London call to inquire about processing city parking ticket fines, the calls are processed in a small city in Northern England.

Many of these functions will now be accessed by consumers directly, often from home. Thus, major banks, software companies, and information service companies are all gearing up for what they expect to be a major new market in distribution of financial services via the information superhighway. The transition away from traditional local retail structures and toward direct customer access seems likely to continue, as customers grow more comfortable handling a wider range of financial transactions without face-to-face contact.

Routine Back Office Functions

The functions that can be farthest apart spatially are generally those that are the most routine, the most information-based (as opposed to involving the physical transfer of goods or paper), and the least customer-oriented. Back office work, or routine work not directly dealing with customers, makes up a large share of this work. Historically, large-scale back office functions were behind the front office, usually in the central business district (CBD). This was true for several reasons. First, the CBD was the best place to assemble a large number of workers because of public and private transportation advantages. Second, the large volume of paper and personal transactions required proximity with both front office and back office managerial and professional functions. The back office was like an assembly line where paper was processed and information added at certain places (the way parts are added to a car during assembly).[116]

Because the linkages between routine back office functions and customers and other firms are relatively limited, they have been somewhat more footloose than front office or managerial and professional back office work. Moreover, the routinized nature of the work has meant that information technologies were applied early, facilitating the spatial decentralization of work. The growing share of information in digital form able to be easily transmitted electronically, along with effective intrafirm communications, has meant that many back office functions can more easily be physically separated from front office and complex back office work with small losses in overall efficiency. In addition, information technology is one factor in the growth of average firm and establishment size in the service sector, making it easier for companies to split off routine functions from more complex functions and put each in its optimal location.[117]

Information technologies are enabling a larger share of back office work to be physically separated from where paper is processed or people interact. For example, the U.S. Postal Service is testing optical character readers (OCR) to read addresses on mail, which is then bar coded and automatically sorted to its appropriate substation. Addresses the reader cannot recognize are digitally photographed and transmitted to a computer screen where a person manually types the address into a terminal.[118] In Washington, D.C., OCR sorting takes place at the central mail facility, but the manual address entry is done in Greensboro, North Carolina, where wage rates are lower.[119] Workers view images of letters as they are sorted

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[115] "Business Services," *Business Facilities*, Febuary 1995, pp. 18-22.

[116] Mitchell L. Moss, "The Information City in the Global Economy," paper presented for the Third International Workshop on Innovation, Technological Change and Spatial Impacts, Cambridge, England, 1990.

[117] U.S. Department of Labor, op. cit., footnote 15.

[118] Bill McAllister, "Automated Sorter Wins Letter Carriers' Praise," *Washington Post*, April 1994.

[119] "Neither Rain, Nor Snow, But Bad Info?," *Washington Post*, July 22, 1994.

in Washington and enter correct addresses, which are in turn electronically transmitted back to be bar coded on the piece of mail.[120]

Goods Production and Distribution

Processing goods involves four main components: production, transportation, distribution, and sales. Within production, it is worthwhile to distinguish between technologically advanced, complex production and more routine production. The development of mass production technologies has allowed decentralization, both within this country and overseas, of a considerable share of routine production. Many manufacturing firms have spun off low-skill assembly and warehousing functions to low-cost regions, in part because telecommunications facilitates communication between physically distant headquarters and these branch facilities.[121] In contrast, as manufacturers shift to more flexible production and move further back on the product cycle, localization economies become more important, favoring core locations closer to markets, suppliers, and a skilled, adaptable workforce.[122] In addition, high-technology industries are more likely to locate in metropolitan areas.[123] The creation of these technologically-based production complexes, referred to by some as "technopoles," is driven in part by the increasing need for technologically-based manufacturers to interact on a close basis with suppliers, customers, competitors, and other institutions (including universities and research institutes).[124] This need for agglomeration economies means that most are in metropolitan areas.

Within wholesale trade and distribution, information and telecommunications capabilities allow firms to deliver goods much faster than before, allowing in turn a consolidation of distribution facilities. These larger distribution facilities tend to locate outside the core of large metropolitan areas in areas with lower land and labor costs. Similarly, technological change allows freight transportation functions to consolidate and serve wider markets from fewer areas.

Complex Office Work

Even though information technology builds linkages in "cyberspace" that at least weaken, if not substitute for, physical space, not all functions are amenable to such ethereal linkages. Many functions, though supplemented by information technology linkages, still depend upon face-to-face proximity. These are more complex functions that are non-routine in nature, and are usually largely undertaken by managers, professionals, and executives in industries such as accounting, law, consulting, R&D, and corporate and regional headquarters offices. In addition, innovation and development of new products and services is a non-routine function that in most industries is predominately a metropolitan function—in many cases, an urban core function. Information technology appears to be bringing about an increase in the share of more complex functions and

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[120] These facilities can also located in distressed urban areas if the costs of living are low enough, and if, in some cases, incentives are provided. For example, the City of Gary, Indiana, is using HUD funding to construct a 20,000-square-foot building to be leased to the Postal Service for use as such a remote encoding facility.

[121] Allan J. Scott, *Metropolis: From the Division of Labor to Urban Form* (Berkeley, CA: University of California Press, 1988).

[122] Ann Markusen, "Sticky Places in Slippery Space: The Political Economy of Postwar Fast Growth Regions," paper presented at the Harold Innis Centenary Conference on the Spatial Constitution of Economic Activity, University of Toronto, Sept. 1994; also David L. Barkely and Sylvia Hinschberger, "Industrial Restructuring: Implications for the Decentralization of Manufacturing to Nonmetropolitan Areas," *Economic Development Quarterly*, vol. 6, No. 1, 1992.

[123] In addition, manufacturing sectors traditionally classified as market-oriented, that reduce costs by locating near customers, are also likely to locate in metropolitan areas. These include, for example, newspaper printing, sand and gravel production, and recycling operations.

[124] Manuel Castells and Peter Hall, *Technopoles of the World* (New York, NY: Routledge, 1994).

employment by changing labor requirements, product and service offerings, the product (and service) cycle, and the innovation process.[125]

Traditional localization economies of clusters of firms in similar industries continue to be important for these non-routine and more innovative functions. Although information technology is increasingly being used in these activities, it does not substitute for close physical proximity or face-to-face contact, but supplements it due to the complex and highly varied nature of the interactions and information being transferred. Face-to-face interactions are still critical in many industries and functions. In some industries, such as accounting and consulting, professionals usually meet in the offices of their clients. In contrast, in industries such as banking and legal services, which still tend to be concentrated in urban cores, clients usually meet in the service provider firms.[126]

IMPACTS OF NEW TECHNOLOGY ON RURAL, URBAN, AND SUBURBAN ECONOMIES

Predicting the future is difficult. New and powerful information and telecommunications technologies continue to be developed and their impacts on industrial and residential location are still evolving. However, based on the analysis of individual industries (chapters 5 and 6), and individual worker telecommuting (chapter 7) and the location of telecom infrastructure (chapter 7), it is possible to see how advanced technologies are changing the locational patterns of individuals and industries, and, on the basis of this, to predict how these changes are likely to affect metropolitan economies in the United States over the next 10 to 20 years.

Urban/Rural Growth

Information technology and telecommunications are making the location decisions of an increasing share of the economy less dependent upon face-to-face contact and close proximity with customers, suppliers, and competitors. In large part, this reduced dependence and concomitant rise in a company's ability to be "footloose" with respect to location invites speculation about the radical decentralization of jobs out of metropolitan areas.

Indeed, there are many examples of either back office or consolidated front office functions locating overseas. For example, several U.S. insurance companies have followed New York Life's lead in establishing life insurance processing operations in Ireland. They benefit from relatively low wage rates for well-educated workers with mathematical and computer skills, and a lower employee turnover rate.[127] Some have proposed that shopping malls and office complexes have their closed circuit TV cameras monitored in real time by low-cost labor in Africa.[128]

Some argue that higher skill functions will also be increasingly conducted electronically from overseas locations. Yet so far this appears to be confined to a few specific functions, particularly computer programming. For example, Motorola has established computer programming and design centers in India, China, Singapore, Hong Kong, Taiwan, and Australia.[129] Similarly, the number of computer programmers working in India for companies located in the United States has

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[125] National Academy of Sciences, *Information Technology in the Service Sector* (Washington, DC: National Academy Press, 1994).

[126] William B. Beyers and David P. Lindahl, "Competitive Advantage and Information Technologies in the Producer Services," paper presented at the American Association of Geographers meeting, 1994, San Francisco, CA.

[127] Richard McGahey, Mary Malloy, Katherine Kazanas and Michael Jacobs, *Financial Services, Financial Centers: Public Policy and the Competition for Markets, Firms and Jobs* (Boulder, CO: Westview Press, 1990), p. 231.

[128] N. Bannister, "Networks Tap Into Low Wages," *The Guardian*, Oct. 15, 1994.

[129] Keith Bradsher, "Skilled Workers Watch Their Jobs Migrate Overseas," *New York Times*, Aug. 28, 1995, p. A-1.

grown. This is consistent with locational patterns in programming, which has been done off-site for a large number of industries. As discussed below, however, this does not signal the beginning of an overseas migration of skilled U.S. jobs.

In addition, some functions locate in smaller towns of the United States. For example, Rosenbluth Travel, one of the largest travel agencies in the nation and headquartered in Philadelphia, moved its reservations center (which employs 200 people) from downtown Philadelphia to Linton, a small town in North Dakota, largely to save on labor costs but also because of concerns about labor quality. Functions that require relatively lower skills and a high percentage of clerical workers, such as telemarketing, where operating costs must be kept to a minimum, and which have limited travel needs and limited needs for other services, are more likely to locate in smaller places.[130]

Yet, in spite of the notable examples of some jobs going overseas or to rural areas, technological change is not likely to lead to widespread export of jobs or to a rural renaissance like that of the 1970s. There are several reasons why. First, much of the work that goes overseas is relatively routine and low-skilled and is most amenable to elimination by automation. For example, much of the manual processing of grocery store coupons is conducted in Mexico. However, new technologies and bar coding on coupons may allow coupons to be scanned and the information automatically sent electronically to the manufacturer for reimbursement, eliminating these manual data entry jobs. Similarly, in 1981 American Airlines moved its ticket processing center from Tulsa to Barbados. However, if ticketless travel becomes widespread, many of these jobs would be eliminated.

Second, firms may not want to lose control of operations and may worry about security of operations. This is especially true in banking and credit card operations. Realistically, the range of functions that can be transferred overseas is probably limited. It would not make sense, for example, to send domestic payment transactions overseas simply to reduce labor costs. Indeed, representatives of a major U.S. bank interviewed indicated that the bank is planning to consolidate in the U.S. certain data processing activity it now performs overseas.

Third, customer service is becoming more important. For example, in insurance, most companies want to co-locate claims processing and customer service.[131] As a result, firms are hesitant to place these functions overseas where there may be problems with language, accents, cultural attitudes, and skills, all of which would make it harder to establish a rapport with customers.

Even though information technology is making it easier for work to be done at a distance, at least in the foreseeable future many operations will locate in metropolitan areas, albeit usually suburbs and mid-size metros. There are a number of important reasons why.

1. Technology allows many service functions to gain greater economies of scale. Many companies are establishing "central utility" offices, each of which carries out specific functions. In the past, many service companies created separate profit centers where each product had its own center. Now many firms are trying to consolidate operations, in part to be able to "cross-sell" and get better staff and equipment utilization rates. The recent increase in integrated data systems that contain complete customer records accessible by customer name or ID number increases the ease of cross-selling. In addition, as firms reduce middle managers, remaining managers have increased spans of control

[130] Ranald Richardson and Andrew Gillespie, University of Newcastle upon Tyne, "Advanced Communications and Employment Creation in Rural and Peripheral Regions: A Case Study of the Highlands and Islands of Scotland," paper presented at the Information and Telecom Tectonics conference, Michigan State University, Mar. 21, 1995.

[131] "Trends in Insurance Company Location — and Relocation," New York: Moran, Stahl, and Boyer, 1994.

and are responsible for more operations. Dispersing these operations spatially makes it more difficult to manage them. Similarly, new technologies are allowing freight transportation and distribution functions to consolidate in smaller numbers of sites.

These consolidated centers are usually located in metropolitan areas. For example, when Aetna Insurance consolidated its 55 claims adjustment centers to 22, virtually all of the 23 closed offices were located in smaller cities, and the remaining 22 were in larger metropolitan areas. Similarly, a major bank that currently does loan processing out of 92 local branches plans to establish two central loan processing centers, both in large metropolitan areas. A credit card company is considering consolidating from eight locations for credit card processing, including credit analysis and marketing, into one center in a major metropolitan area. Mergers also stimulate consolidations and closures. For example, a major East Coast insurance company recently selected a site for a new data center that would consolidate operations now located at a half-dozen sites around the country—several of them facilities the company had inherited when it acquired a number of smaller carriers in smaller cities. Nike's distribution centers are located in Portland, Oregon, and Louisville, Kentucky.

As a rule, larger offices and facilities are in larger cities, while smaller cities house smaller offices.[132] In deciding which branch facilities to close in a consolidation, firms are often hesitant to close larger branches, since they would need to lay off large numbers of valued employees and hire and train others in the smaller, expanding office. As a result, the more common pattern is to close smaller offices in smaller cities and towns, and build up larger offices in metropolitan areas. In addition, because of downsizing, many firms have excess space in metropolitan areas that can be filled through consolidation. For example, an East Coast insurance company located its new data center in a midwestern city because the largest of the several data processing facilities it planned to consolidate was already located in this city.

2. Metropolitan economies have larger, more diverse, and more skilled labor markets, which gives firms access to a sufficient number of qualified personnel.[133] Many firms attach as much importance to the availability of qualified personnel as they do to cost, for both non-routine and routine functions. Indeed, one leading relocation consultant says, "Workforce availability is the number one factor in locating back offices. Cost is number two." However, these factors do not remain fixed over time. For example, because of the rapid growth in back office jobs in Wilmington, Delaware, by the late 1980s, banks that had built new back office facilities there were expressing concern about their ability to find qualified personnel.[134] In addition, as technology restructures work

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[132] The larger the metropolitan area, the larger the size of the producer service firm. Andrew J. Kremenec and Roger Cohn, "Business Services Within a System of Cities," paper presented at the 22nd annual meeting of the Mid-continent Regional Science Association, Chicago, May 31, 1991, cited in William Testa, "Producer Services: Trends and Prospects for the Seventh District," *Economic Perspectives*, Federal Reserve Bank of Chicago, vol. XVI, No. 3, May/June 1992.

[133] A number of large corporations have moved their information services departments out of expensive central city or large metropolitan locations to medium-sized metros. A major reason for not moving to smaller or rural areas is the difficulty of attracting highly skilled information technology employees. Jim Daly, "How To Staff IS" *Forbes ASAP,* 1995, pp. 26-29.

[134] Gi-Yong Gang, Corporate Restructuring and Urban Economic Development Policy: Delaware Back Office Strategy and the Wilmington Metropolitan Area (University of Delaware, unpublished Ph.D. dissertation, Fall 1993), p. 125.

and automates many routine jobs, many jobs are becoming more skilled.[135] In fact, managerial and professional employment grew from 22 percent of total employment in 1972 to 30 percent in 1994.[136] As a result, the increasing share of services with information-based employment means that metropolitan locations are important.

3. Since there are more customers in larger metropolitan areas than in smaller ones, firms choose to expand in larger metros to minimize distance from the customers. The delivery of services through face-to-face contact from a large central place is more economically efficient than from a smaller place. Similarly, even though goods distribution is undergoing consolidation, the need to be near large numbers of customers means that it is not going to rural areas.
4. Many firms are reluctant to locate back office operations in places with poor access. As one bank executive noted, they want to keep operations within a two- or three-hour drive, since they want to be able to drive out and back in a day to "kick the tires." This is part of the reason for the rise of back offices in places like Albany, New York, Wilmington, Delaware, and other cities close to large metros such as New York and Philadelphia. Access is also a factor leading to many back office functions locating in places with good air travel. Staff, in particular sales staff, need to travel to customers, while corporate management needs to be able to fly in to inspect facilities. Because corporate decisionmakers fly so much, air access is often important in location decisions. Metros have an advantage because they are usually served by more and cheaper flights and by more jets and fewer propeller planes. Many firms, for example, have limited their search to metropolitan areas to which major airlines offer direct, point-to-point jet service from their headquarters. Airline deregulation appears to have strengthened air transportation from large metropolitan areas hosting hub airports. Similarly freight transportation and distribution relies on infrastructure (ports, intermodal facilities, air express) usually located in metropolitan areas.
5. A firm might want to locate an operation that processes large volumes of paper or collects funds, rather than just data—processing credit card remittances, for example, or mailing monthly statements to mutual fund shareholders—near a major regional postal facility, most of which are located in metropolitan areas. However, if electronic commerce becomes widespread this factor will become less important.
6. Metropolitan areas offer an environment conducive to innovation and learning, which, as technology increases the importance of continual product and service development, is an advantage to many more firms. Innovation is also more likely to occur in communities or regions marked by vigorous competition among a multiplicity of local firms than in places where one or just a few firms are dominant; and in places where large numbers of sophisticated, demanding buyers are concentrated.[137] Moreover, rapidly changing technologies and markets mean that interfirm cooperation is increasingly important, and this cooperation is enhanced by locating in large and mid-sized

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[135] Thierry Noyelle, *Beyond Industrial Dualism: Market and Job Segmentation in the New Economy* (Boulder, CO: Westview Press, 1987). p. 81.

[136] U.S. Department of Labor, Bureau of Labor Statistics, unpublished data, 1995.

[137] Michael E. Porter, *The Competitive Advantage of Nations* (New York: Free Press, 1990), pp. 154-157; Annalee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, MA: Harvard University Press, 1994).

metropolitan areas.[138] This is just as true of the financial community in Wall Street as it is of the microlectronics industry in Silicon Valley. Such competitive conditions have long been characteristic of major financial centers like New York and Chicago. The concentration of wholesale banking and investment banking firms in New York City, for example, has helped make New York the leading center of innovation in global finance.

Inter-Metropolitan Differences

Consistent with historical patterns, new information and telecommunications technologies are making more economic functions footloose, at least with respect to the choice of metropolitan areas in which to locate. These technologies are making it easier to locate many operations in any region of the country, which is likely to lead to increasing factor-price equalization between regions. Historically, some regions had monopolistic advantages stemming from agglomeration economies, location near natural resources, transportation, and most recently from an advanced telecommunications infrastructure. However, as information technology allows more functions to be done at a distance or to be consolidated, these competitive advantages are likely to lessen, and lower-cost regions, providing they have sufficient external economies (e.g., air travel, transportation, labor force) are likely to grow. Moreover, as discussed in chapter 7, widespread diffusion of an advanced telecommunications infrastructure, at least to the top 50 to 100 metros, will further reduce the inherent advantages of the largest places. The advantages once held by some higher-cost metropolitan areas is likely to decline and lead to concentrated dispersal to a larger number of metropolitan areas. However, this dispersal is highly selective and uneven, and not all places will be able to succeed, particularly those places that have not managed the transition to the post-industrial metropolis. Places whose economic base remains in declining activities, particularly older manufacturing and traditional services, are likely to continue to experience economic hardships.

Once technology enables more locational freedom, the search by firms for lower-cost locations is likely to continue to reshape regional employment patterns, in part leading to higher rates of growth for many lower-cost smaller and mid-size metros.[139] For example, wages are almost one-third (32 percent) higher in large cities over 500,000 inhabitants than in smaller places.[140] According to one study in 1991, locating a 300,000-square-foot facility that employs 1,000 clerical and operating personnel in the Phoenix area rather than San Francisco would save $6.35 million annually—just in space and payroll costs. Between New York City and Tampa the differential is even greater—$11.25 million per year (see table 4-2). Such cost differences were a significant factor in Salomon's choice of Tampa as a site for its new back office complex. The average annual salary of Salomon's back office staff in New York City was $39,000, compared to $23,600 in Tampa.[141] Consistent with these patterns, some Sunbelt areas that have grown rapidly during the past decade, such as Phoenix and Dallas, have seen some of their cost advantage disappear.

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[138] Saxenian, ibid.

[139] For example, Beyers found that there was a relative shift of professional service employment toward more medium-sized places and away from the largest metro areas. William B. Beyers, *The Producer Services and Economic Development in the United States*, (Washington, DC; Economic Development Administration, 1989).

[140] Edward Glaeser and David C. Mare, "Cities and Skills" unpublished manuscript, Harvard University, 1994.

[141] Columbia Business School, "Salomon Brothers," unpublished case, 1994.

TABLE 4–2: Cost Comparison Among Selected Metropolitan Areas

Metro area	1992 population (million)	1991 office lease rate (per s.f.)	Average clerical salary 1991
New York City	19.7	$39.25	$22,500
Los Angeles	15	28.00	22,200
Chicago	8.4	34.50	19,700
San Francisco	6.4	24.50	22,800
Dallas-Ft. Worth	4.2	18.00	19,500
Miami-Ft. Lauderdale	3.3	30.00	18,400
Phoenix	2,3	20.00	17,800
Tampa-St. Petersburg	2.1	21.75	16,500
Kansas City	1.6	19,00	18,100
Columbus	1.4	20.50	17,600
San Antonio	1.4	13.50	16,600
Salt Lake City	1.1	18.00	16,700
Albany	0.9	16.50	21,500

SOURCES. U.S. Department of Commerce, Bureau of the Census, Metropolitan *Area Data Book, 1994;* and *Fortune, Nov* 4, 1991

This means that many operations that seek to reduce costs will not locate in historically high-cost metros such as New York, Boston, Los Angeles, and San Francisco, but instead will locate in less expensive metros, many in the mid-parts of the country. In fact, geographic centrality aids operations, by reducing average air travel distance, and enjoying a central time zone. Geographic wage and other cost differentials will continue to encourage office relocation to low-cost regions until an equilibrium is reached or approached.

Finally, if localization economies are weakened by advanced information technologies and telecommunications, urbanization economies and diseconomies may become more important. Large metros continue to provide advantages for industry, including large labor markets, frequent and cheap air transportation, and availability of repair and technical services. Advantages for individuals include high-quality medical care, cultural and educational institutions, and a large and diverse labor market. At the same time, the diseconomies of urbanization include high costs of living and doing business, crime, pollution, traffic congestion, and lack of access to open spaces. The interplay between economies and diseconomies of large metros may play a more important role in shaping the future of metropolitan areas.

As, or perhaps because, technologies allow more locational freedom, development may be becoming more uneven, with places that made the transition to the post-industrial metropolis (see chapter 3) doing well, while places that have not, continuing to decline.[142] Places with the advantages described above—including a skilled, moderately priced labor force; low diseconomies (e.g., crime, congestion, and environmental pollution); an industrial base of advanced innovative companies; and high quality of life—will continue to do well. In contrast, places without these advantages are likely to continue to lose out, and risk a continuing cycle of decline as reduced advantages (both public and private) lead to reduced economic

[142] IT and telecom appear to be leading to similar patterns of uneven development in the United Kingdom as well. See John Goddard, "New Technology and the Geography of the UK Information Economy," in John Brotchie, Michael Batty, Peter Hall, and Peter Newton, *Cities of the 21st Century: New Technologies and Spatial Systems* (London: Longman, 1991).

growth, which in turn reduces advantages even more.

In an era of rapid technological change, metropolitan areas and cities that succeed—grow in population, jobs and incomes—will be places that have successfully managed to adapt to the new technology system. In contrast, metros, cities, or parts of cities that will not or cannot adapt run the risk of being left behind to face stagnation or decline. Adaptation of people, institutions, and the built environment will be important to urban core survival (see chapter 9).

Central City Prospects

Many core city economies have grown in the last 15 years, but others have either stagnated or lost employment. As discussed in chapter 3, much of the revival of central cities in the 1980s was due to dramatic growth in producer services on the one hand, and increased foreign immigration on the other. Yet, the perception has grown that American cities, particularly the urban cores of many large metropolitan regions, are in trouble, and may not be sustainable over the long term, drifting downward in spirals of joblessness and business failure, revenue shortfalls and declining services, crime, racial strife, and ungovernability, with middle-income families leaving while the wealthy wall themselves off in protected enclaves.

Technological change is likely to continue to impact urban cores. By letting more of the economy be operated at a distance, it threatens the economic well being of many central and inner cities, and inner, older suburbs of metropolitan areas. The historic dominance of the central city is giving way to a much more dispersed pattern of growth in which economic activity is spread throughout the metropolitan areas in other nodes and centers (what some term "edge cities"). Yet, this growth is uneven in most places. Some parts of the metro, usually a select group of outer suburbs and even exurban locations, are growing fast and becoming home to fast-growing companies, while other parts, particularly many parts of the central city and inner suburbs, are suffering from job loss, disinvestment and poverty. Nevertheless, there are a number of important changes that are facilitated by technology.

The New Metropolitan-Wide Economy

First, it is clear from looking at urban settlement patterns in the late 20th century that the model of the core city as home to most of the productive capacity in the metropolitan area no longer describes most metropolitan areas. Today, as industry has become spread throughout the metro region in large agglomerations, the metropolitan area as a whole is the functioning economy (see table 3-4).

One result of, and cause of, the rise of metropolitan-wide economies is that technology is enhancing the locational freedom of firms within metropolitan areas. At one time, most core cities had historic advantages stemming from agglomeration and reduction of travel that compensated for their high costs. However, technological change and other factors are reducing the privileged position of the core, in some sense making it one of several "edge cities" within the metropolis.[143] By making the spatial location decisions of firms less relevant, technology has accentuated the tendency of many industries for jobs to follow people. Quality of life as well as cost become more important factors. As a result, the traditional monopoly of center cities as the location for many firms is likely to evaporate. Central cities increasingly have to compete on other factors, including cost, niche markets (such as tourism), and amenities.

Weakened Central City and Inner-Suburb Economies

There are a number of technological factors that will put the economies of central cities, particularly outside the central business district, and inner

[143] For example, see Aydan Kutay, "Effects of Telecommunications Technology on Office Location," *Urban Geography*, vol. 7, No. 3, 1986, pp. 243-257.

suburbs at risk. First, as discussed above, technology is reducing the importance of distance for many functions, particularly more routine functions. As a result, firms have the freedom to find lower-cost locations with cheaper land, buildings and labor. These are often in outer suburban or exurban locations or in mid- and smaller-size metros. Moreover, such locations provide firms an opportunity to avoid the diseconomies of crime, traffic congestion, and air pollution endemic in many urban core areas. In addition, because technology also leads to consolidation in larger facilities, and in some cases requires new and larger facilities, many routine goods and services industries are locating in the outer suburbs or exurban and satellite areas at the edge of metros, where larger and cheaper parcels of land are available.

Technology also enables a greater share of "non-traded" or "residentiary" functions to be centralized and moved. As a result, many of the jobs that cities and inner suburbs could rely on because of local spending (e.g., branch banks, local phone service centers, insurance agents), are likely to disappear, having been centralized and located either in other regions or in outer suburban jurisdictions. In large part this is caused by the shift from local service delivery to distribution of products from regional or even national service centers, a practice that favors lower-cost locations outside older urban areas. Places that cannot capture these or other new functions will be at risk of decline.

These technological and economic trends suggest that the non-central business district portions of many central cities and their inner suburbs will continue to be the weakest part of metropolitan economies for at least the next two decades, and that their relative competitive position will get worse without economic development policies.

Core Specialization: Innovative and Complex Service Functions

In addition to weakening many core economies, technological change and other factors contribute to a restructuring of urban core economies, particularly in the central business district, as places containing more specialized functions employ people with higher skill and education levels. As routinized work moves out of central cities, the economic base is increasingly shaped by more complex, higher-end office work, including managerial and professional functions. There are several reasons for this.

First, while technology allows work to be routinized, and hence moved, it also supports, especially in the services, the continuous creation of new products. For example, beginning in the late 1970s, U.S. financial institutions began to move beyond the automation of routine processes and to use computer technology to create new products and services—a process that continues to this day. This is important because, if product cycle theory applies to services, it suggests that innovative functions tend to be done where they were developed. Just as manufacturing establishments producing new goods tend to be located in more urbanized areas,[144] innovative functions in services tend to be located in the larger urban areas. Innovative activities in established centers usually have greater access to the specialized skills, detailed market knowledge and support services needed for the development and introduction of new products and services. Many innovative firms continue to need the kind of stimulating and supportive environment in which they first arose.[145] In addition, established service centers may also provide the best location from which to access potential customers for new services.

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[144] R.D. Norton and J. Rees "The Product Cycle and the Spatial Decentralization of American Manufacturing," *Regional Studies*, vol. 13, 1979, pp. 141-151.

[145] This is not to say that there are no innovative small firms in rural areas, but rather that within companies that are multi-locational, innovative functions tend to be located in metropolitan areas.

Second, the rise of globalization, in both manufacturing and services,[146] has meant that a larger share of the U.S. economy is devoted to command and control functions. These include headquarters of multinational companies as well as large producer service firms (e.g., legal service, consulting, engineering) with clients across the globe. These high-level functions are naturally attracted to a small number of global cities, including New York, San Francisco, and Los Angeles.

Finally, even though managerial and professional offices continue to disperse throughout the metropolitan area, many are still concentrated in central cities because these locations facilitate face-to-face communications. As Richard Meier wrote: "The need for face-to-face contact offers perhaps the best explanation for the strong attraction retained by the urban center."[147] For example, functions such as law, corporate banking, securities trading, and professional services (e.g., accounting, advertising) are more concentrated in central areas of large metropolitan areas than other firms (see table 3-4). These operations have a high percentage of managerial and professional workers and require the support of large banks, law firms, accounting, advertising, and courier and postal services on a regular basis.[148] Their need for frequent outbound and inbound travel nationally and internationally reinforces their presence in large metropolitan areas.

In spite of the importance attached to face-to-face contacts in binding offices to the central business district, little empirical work has been done. One study, now 15 years old, of firms in downtown Toronto sheds some light on differences in contact between sectors.[149] The sectors with the greatest number of face-to-face linkages were corporate banking and legal services. In contrast, life insurance had a very low level. These data are consistent with locational patterns of these industries in the last 20 years (see chapter 3).

Yet, as discussed above, a number of new technologies at least conceptually have the potential to reduce the importance of spatial proximity in communication. For example, portable computing and phones, e-mail and Internet connections, fax, and video phones all make communication over distance easier. Potential new technologies such as ubiquitous computing, high-definition displays, and high-speed and high-capacity communications will accelerate this trend. While these technologies make it easier and cheaper to communicate over distance, there are at least two reasons to think that these technologies may not substitute for a large share of face-to-face needs.

First, the extent to which these technologies can replicate face-to-face communication is not clear. Such communication has not only richness and contextual advantages, but also includes informal, "water cooler" conversations, and meetings over lunch. Technology developers are working on devices to overcome these limitations, such as video phone systems that randomly call other group members for informal, spontaneous chats, and ways to allow users to enter "hallways" for conversation on e-mail. As work groups gain more comfort with these systems, they may be willing to use them over a distance. However, to date, the ability of these systems to foster productive relationships at a distance has not been proven. In addition, relatively little is known about how organizational learning occurs. As more functions and sectors in the economy adopt flexible production modes and continuous innovation strategies, organizational learning becomes in-

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[146] U.S. Congress, Office of Technology Assessment, *International Competition in Services*, OTA-ITE-328 (Washington, DC: U.S. Government Printing Office, July 1987).

[147] Richard L. Meier, *A Communication Theory of Urban Growth* (Cambridge, MA: MIT Press, 1961), p. 64.

[148] Thomas Black, *The Changing Office Workplace* (Washington, DC: Urban Land Institute, 1990).

[149] G. Gad, "Face-to-Face Linkages and Office Decentralization Potentials: A Study of Toronto," in P.W. Daniels (ed.) *Spatial Patterns of Office Growth and Location* (New York: John Wiley, 1979, pp. 277-323).

creasingly important. The extent to which this can occur in distributed settings is not clear.

Second, some industries and functions may be more willing to use these systems and decentralize than others, probably depending upon the extent, nature and criticality of communications, and the extent of cost competition in the industry. Professionals such as doctors, lawyers, architects, engineers and scientists, who depend upon face-to-face communications, may be especially resistant. One anecdote illustrates that proximity may continue to be important. An attorney in a mid-sized Washington, D.C., law firm recently moved to a more spacious and plush office at the other side of the building, requiring a short walk to the rest of her colleagues. After about two weeks of feeling "isolated" the attorney asked to return to an office next to her colleagues. It is not likely that any kind of technology advance, at least in the next decade, will overcome the need for proximity in these situations.

These technologies do appear to facilitate communications between groups located in different central locations. For example, Xerox is using an e-mail and video conferencing system to facilitate cooperative R&D efforts among groups of scientists and engineers around the world. Similarly, consulting firms such as Arthur Anderson use Lotus Notes to communicate and work cooperatively among its offices worldwide. In both these cases, the workers involved are in central locations (e.g., Palo Alto, New York).

Core Specialization: Industrial Niches Based on Flexible Specialization

The predominant effect of technological change is toward dispersion of activities, particularly the more routinized ones. However, technologies may also create specialized niche functions, which, if they do not give urban core areas an edge, at least may help compensate for their disadvantages of cost, congestion, etc. Many of these niche functions are related to innovation, flexibility, speed of delivery and response, and other factors, often described as flexible specialization. Yet, even if these opportunities become economically and technologically feasible, they are likely to remain a niche function, targeting specific markets.

Within manufacturing, there are several important developments that could help urban cores at least retain manufacturing employment. First, increases in recycled products, in part brought about because of better technologies for recycling and reuse, can provide urban areas with markets for some processes. By locating in cities, recycling industries are locating close to the natural resource because urban areas already produce large amounts of recyclable waste. Second, the increasing importance of design and innovation can provide important niches for some urban manufacturing. For example, New York's role as a center for arts and design spawns customized manufacturing that relies heavily on the design component. Finally, the growth of computer- integrated manufacturing (CIM) and other flexible technologies appears to reduce optimal facility size, allowing smaller sites to be profitably used (see chapter 6). This reduces land and building costs, reducing pressure to migrate to areas with lower-cost land; thus, locating within the confines of urban factories and warehouses becomes more feasible.

Within distribution, some specialized opportunities are emerging. For example, there may be opportunities to develop smaller distribution facilities serving more concentrated markets in central-city locations. Hospitals in some cities, for example, have moved to a "stockless purchasing system" —one of the more aggressive applications of just-in-time distribution. As more businesses and institutions implement just-in-time and direct-replenishment supply programs, opportunities to locate relatively small, specialized distribution centers in or near central cities should increase.

In freight, the next decade could see smaller facilities in or near central cities that are designed to handle short-haul and specialty cargo. In intermodal rail and truck freight, the short-haul economics will make sense only if the truck trips at either end are short as well. This argues for keeping termi-

nals as close as possible to customers—and if short-haul service attracts enough volume to justify them, for multiple terminals, which may be located in central or inner city rail yards.

Urban Economies and Skills

Technology will likely continue to lead routine work and goods-related work to disperse from the core, and at the same time concentrate highly skilled professional and managerial jobs in the core. In addition, technology is creating many more skilled jobs regardless of location. As a result, there is a growing mismatch between the location of the new skilled economy and the large and rapidly growing population of lower-skilled and often minority residents in urban cores.

In many industries future jobs will on average be more skilled. For example, as the insurance industry uses more technology and less labor, the skill requirements of their labor force increase. Not only are organizations leaner, they must respond faster and they must complete tasks correctly the first time. In flat organizations there is no place to refer difficult questions, catch errors, or develop successors through on-the-job training. Employers expect technical proficiency in operational aspects of the business. Moreover, in many service sectors, many lower-skill office jobs are disappearing and in their place are more complex customer service and back office jobs. Customer service employees are increasingly required to have the right personality to respond to customers, have the right speech patterns, be able to solve problems on the spot, and have a lot of product knowledge. In addition, perceived or actual work ethic differences can play a role.

Business responses echo this change. One bank executive from a large midwestern city noted: "We are thinking about moving more routine work out of the city since labor costs are high, and getting good-quality labor is hard. The graduates of the public schools are very bad, and as a result, we need to retrain people to read, write, and communicate." In a 1991 survey of financial services CEO's conducted for the New York City Partnership, 82 percent of those surveyed said that the quality of entry-level workers was either "extremely important" or "somewhat important" in their choice of locations for their operations—and 71 percent said they believed the quality of entry-level workers in New York City was worse in 1991 than it had been five years earlier.[150]

As a result, cities face a challenge in how to bridge what appears to be a growing gap between the skills required for employment in advanced services concentrated in urban cores, and the limited skills that many young big-city residents bring to the job market.

Urban Infrastructure and Buildings

Because new technologies are changing the organization of work and the nature of production processes, the potential for a mismatch between infrastructure developed for the mass production metropolis and the infrastructure needs of the post-industrial metropolis is significant (see chapter 9).[151] Much of the urban redevelopment efforts undertaken by core cities in the 1980s was to adapt urban infrastructure and buildings designed for industrial and goods-handling functions to fit the needs of an information-based services economy. However, these mismatches are likely to continue for two reasons. First, because technological change threatens to reduce economic activity in some urban cores, there is likely to be increased vacancy and underutilization of the built environment, including infrastructure and buildings. In part, this is driven by the fact that fast-growing industries in both manufacturing and services are increasingly located in the suburbs. Moreover,

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[150] Price Waterhouse, "Survey of New York City Executives in Six Industry Sectors," (New York: *New York City Partnership, Growth Strategies Project*, December 1991), p. B:4.

[151] Richard Barras, "Technical Change and the Urban Development Cycle," *Urban Studies* 24, 1987, pp. 5-30.

while the practice of office "hoteling" is unlikely to be adopted for more than a small share of office functions, it could serve to reduce office demand, particularly in urban cores (see chapter 7).

The changing nature of demand for infrastructure is also likely to lead to underutilization. For example, one reason for the high rates of business suburbanization is that facilities in the suburbs are usually more readily adapted to current technology. In some service sectors, buildings that can easily be reconfigured, especially to accommodate fiberoptics and other wiring, are increasingly important. In many older buildings it is difficult to wire for computers and telephones and to change wiring. Similarly, old retail downtown stores with narrow fronts and deep backs make less sense with today's greatly reduced inventories. Just-in-time delivery (JIT) allows for different store shapes. Many new back office "transaction factories" in the services require a large floor plate in large horizontally laid-out buildings, in contrast to the high-rise office complexes in the core. Freight transportation and distribution facilities increasingly require larger facilities, which are more available in the suburbs. Also, the move to a flow system in wholesale trade through practices like cross-docking, requires new configurations of buildings quite different from older, smaller, multi-level, urban warehouses (see chapter 6). Manufacturing increasingly requires smaller facilities, continuing the trend that makes many large factories obsolete. Physical infrastructure also sometimes does not accommodate new technology. For example, the trend toward larger trucks will further erode the already-tenuous position of many older cities as regional or national distribution centers. Bridges, tunnels, and arterial highways in these cities were in many cases not designed to accommodate trailers as large as those in use today, let alone even larger vehicles.

Outer Suburban and Exurban Prospects

Over the next two decades many outer suburbs of metropolitan areas will continue to be the healthiest part of the metropolitan economy and the strongest parts of the national economy. Job growth is likely to continue, in part driven by relocations out of the central city and inner-suburbs, but also by faster rates of expansion. Suburban jurisdictions housing this growth will by and large enjoy fiscal health. However, they may be hard pressed to find the resources to pay for the expansion, especially if they do not make new development pay all the associated public costs (e.g., roads, schools). (See chapter 9.) These will be places that will need little or no assistance from state or federal governments to promote development. Residential development is likely to continue to expand at the peripheries of most metropolitan areas, leading to increased urban sprawl and lower-density developments. These trends in business and residential location, as discussed in chapter 8, are likely to exacerbate a number of problems, including outer suburban traffic congestion, consumption of open space, and increased gasoline consumption.

Business Suburbanization

The locational freedom gained by advances in intrafirm communications technology will likely lead to a further dispersal of firm activities, with an increasing share of routine and even non-routine back office activities in the suburbs. There are a number of factors that lead business to choose suburban locations.

First, though rent gradients may have declined in the last two decades, in most cities central city office rents, land costs, and parking costs are still higher than in the suburbs. For example, in Philadelphia, base rents for class A office space in Center City are about $20 per square foot, compared to $12 to $15 in the suburban edge cities of Great Valley, King of Prussia, or Conshohocken. Yet, this cost differential appears to be evening out as demand for central city space slackens. In some cities, costs in the central city are cheaper than many premium suburban locations. For example, the preferred office locations for many companies in Atlanta are those on the north side side, even though they command premium rents. Suburban sites also often offer campus-like rural environments.

Second, taxes are often higher in central cities. For example, in Philadelphia, taxes and maintenance costs are at least $1 per square foot higher in Center City. Moreover, some cities levy a wage tax. Philadelphia's current wage tax is 4.96 percent for city residents and 4.31 percent for suburban residents. Suburban employers routinely recruit workers by mentioning that even at the same salary they will have more take-home pay from the new job than from their old job in the city.

Third, as many core cities adjusted to a more service-oriented economy, the demand for skilled office workers increased, driving up wage rates in the city. Often city residents, and particularly minority residents, accustomed to blue collar jobs did not have the skills needed for the white collar jobs available. The suburbs, on the other hand, provided a pool of college-educated women interested in returning to work, particularly to jobs with more flexible hours and shorter commutes.[152] By moving offices to the suburbs, employers could fill positions faster and at lower wages. Increasing suburban labor force participation rates narrowed this differential during the 1980s, but many employers did relocate during that time. Now, the issue is not labor cost, but labor quality, as employers continue to question the performance of many center city schools and doubt that the essential skills can be found among city residents. As technological advances continue to raise the skill requirements in many industries, employers are more likely to find suitable employees in the suburbs. Moreover, many service workers already live in the suburbs and therefore prefer suburban office locations as well. Location in the suburbs minimizes commutes for many workers, especially middle- and higher-level workers.

Fourth, there has also been a shift in what real estate means to corporate images, and suburban locations have become more amenable to administrative functions. Historically, many companies used large office buildings as a way of projecting corporate image. At the turn of the century, many banks and insurance companies built monumental, imposing office towers to convey to customers images of security and financial soundness. Later, office towers became images of modernity and prosperity. Transamerica's corporate headquarters is the well-known pyramid building in San Francisco. At 527 feet, the Traveler's Tower in Hartford was visible from much of the Connecticut countryside. I.M. Pei's design made the still-taller John Hancock Tower in Boston a famous building even without the notoriety of its collapsing windows. However, such considerations seem to have lessened considerably. For example, one reason for Sears' decision to build the Sears Tower, the tallest building in the world at the time, was to enhance its corporate image and obtain the advertising good will from it. However, when the Sears Merchandise Group moved to a campus-like location in suburban Hoffman Estates, it abandoned the Sears Tower.

Residential Dispersion

Residential dispersion to the outer suburbs and exurban areas is also likely to continue, if not accelerate. Forces driving this include cheaper land in these peripheral locations, which means more affordable and larger houses and allows more Americans to live in low-density residential settings. Technological change is facilitating this.

Because technology is enabling increased business suburbanization, greater numbers of workers can live even further out in exurban locations and still commute to jobs at the edge of metropolitan areas. As the number of workers telecommuting increases, residential dispersion is likely to increase even more (see chapter 7). Most of these telecommuters, however, will not be telecommuting from home five days a week. Rather they will be telecommuting perhaps two to three days a week from home, or from telecommuting centers

[152] For example, see K. Nelson, "Labor Demand, Labor Supply, and the Suburbanization of Low-Wage Office Work," in *Production, Work, and Territory,* Alan Scott and Michael Storper (eds.) (Boston, MA: Allen Unwin, 1986).

at the edge of metropolitan areas. As a result, workers will still have to live in or near metropolitan areas so as to commute to telework centers or to their offices in metros. Thus, reduced work time in central offices is not likely to lead to significant deconcentration of population to rural areas far from metropolitan areas. However, because an increasing proportion of workers will commute fewer days to central locations, they can choose to live in houses farther from urban cores.

Another force affecting dispersal will be the length of the work week. If productivity significantly improves because of new information technologies, the work week might drop to four days a week. Already, many companies let workers work four days per week, with longer hours per day. Commuting only four days a week to central locations would slightly increase the ability to live farther out. Finally, advances in intelligent transportation systems should reduce congestion and commuting times, allowing even more residential choice (see chapter 7).

Technological Change and the Location of Information-Based Service Industries

5

Over the past 20 years, information-based service industries have become an important component of the U.S. economy. For example, increased employment in most central cities in the 1980s was driven by the rise of producer services.[1] [2] A key question today is whether producer services will follow manufacturing out of the central city. In large part, technology has allowed manufacturing to decentralize, and is playing a similar role in freight transportation and wholesale distribution (see chapter 6). Many argue that technology will do the same for producer services.

The application of new information technologies is transforming the operations of many of the functions in information-based service industries, potentially leading to significantly new locational patterns. This chapter examines the impact of technological change on the locational patterns of six industries: financial services, insurance, securities trading, telecommunications, professional services, and data processing. In 1994, these industries employed approximately 8.4 million workers see (table 5-1).

FINANCIAL SERVICES

Since the 18th century, the delivery of financial services—the creation, management, lending, borrowing, trading, and investment of money—has been one of the most important economic functions of America's cities. But in the last 20 years, advances in in-

[1] Marie Howland, "Producer Services: Will They Follow Manufacturing Out of Urban Centers?," *Economic Development Commentary,* vol. 15, No. 3, 1991.

[2] This section is based in part on a report prepared for the Office of Technology Assessment on financial services. Hugh O'Neill. *Real Places and Virtual Money* (New York, NY: Appleseed, March 1995.)

TABLE 5-1: Employment in Selected Sectors, 1994

Industry	SIC Codes	Employment
Telephone Communications	481	860,000
Banking	60, 61	2,542,000
Securities trading	62	493,000
Insurance	63, 64	2,180,000
Selected professional services		2,095,000
Legal	81	950,000
Accounting	8721	515,000
Engineering	8711	630,000
Data processing and preparation	7374	233,000
TOTAL		**8,400,000**

SOURCE. U.S. Department of Labor, Bureau of Labor Statistics, Employment and *Earnings* (Washington, DC: Bureau of Labor Statistics, May 1995)

formation and communications technology have altered the geography of finance. Some functions long associated with major financial centers have been progressively decentralized; others now take place on a global scale; and some seem to have escaped the boundaries of space altogether, as transactions that once took days of face-to-face interaction to finalize are now conducted by clicks of a mouse. The changes in finance brought on by the twin revolutions in information and communications have affected the financial services industry in America's cities in complex ways. While older cities have lost some routine processing functions, advances in technology have reinforced their importance as centers of international finance and financial innovation. Strength in these areas could be a source of continued growth, even as many routine functions continue to migrate to lower-cost locations.

Banking can be roughly divided into three functions: 1) back office retail and wholesale, 2) front office retail (e.g., branch banking), and 3) front office wholesale (e.g., corporate banking). Technology affects all three functions, but its locational impacts have been felt most strongly in back office retail functions.

■ Routine Back Office Functions

The earliest applications of computer technology in financial services involved the relatively straightforward automation of existing work. But managers soon began to see that computers offered opportunities not just for automating existing routines, but also for broadening the range of activity that could be routinized, and in turn automated. In addition, technology, combined with liberalized regulations on interstate banking, allowed banks to become larger, and in the process created large back office functions that could be organizationally, and even physically, separated from corporate headquarters functions.

Back office functions include check clearing, remittance processing, credit card processing, and wholesale banking processing. Telecommunications and information technology have allowed the former three processes to be routinized and physically separated from other bank functions. While back office wholesaling functions have remained closer to front office functions, new technology may weaken the linkage.

In many cases, this separation has resulted in migration of routine processing operations away from high-cost urban areas. This relocation away from major financial centers—to areas with lower labor costs, less expensive office space, and in some cases lower taxes—has been one of the most visible and most commonly noted impacts of technological change on the location of financial services.[3] These new locations have included new suburban sites, or even more remote locations in smaller metropolitan areas.

In some cases, such as credit card payment processing and international money transfers, automation has also created new economies of scale, with dominant providers concentrating routine processing activities in a few very large processing centers. American Express, for example, does all its credit card processing in three large facili-

[3]The most popular example involves Citibank's movement in 1981 of much of its credit card processing activity from Huntington, NY (Long Island) to Sioux Falls, SD. Similarly, a number of other cities have emerged as back office centers, including Phoenix, AZ, Omaha, NE, and Wilmington, DE.

ties, and has announced plans to consolidate into just two. Chase, the world's leading provider of international money transfer services, processes all such transactions in just two locations—Brooklyn, New York, and Bournemouth, England.

In addition, as the trend toward disaggregation of financial functions has progressed, the facilities of third-party processors have also become an important element of the financial services industry processing infrastructure. These third-party processing activities are dispersed in many locations that are often far removed from the country's leading financial centers. For example, First Data Corporation, the world's leading third-party processor of bank credit card transactions, has facilities in 17 metropolitan areas throughout the U.S. (see table 5-2).

TABLE 5-2: U.S. Locations of Processing Facilities of First Data Corporation Subsidiaries (Number of facilities in each metropolitan area in parentheses)

Omaha, NE (2)	Sioux Falls, SD
Los Angeles, CA	Lynchburg, VA
Atlanta, GA	Washington, DC
Baltimore, MD	Boston, MA (3)
St. Louis, MO (2)	Providence, RI
Kansas City, MO	Dallas, TX
Philadelphia, PA	San Francisco, CA (2)
Charlotte, NC	Phoenix, AZ (2)
Tulsa, OK (2)	

SOURCE: First Data Corporation.

While credit card processing often takes place in small or mid-sized metros or suburbs of larger metros, a large number of banks process checks in downtown locations, including BancOne in Phoenix, First Chicago in Chicago, PNC in Philadelphia, and NationsBank in Baltimore. For example, First Chicago has a large back office operation in the Loop for remittance processing (processing checks sent to corporate bank customers). There are several reasons why check processing has remained centralized. First, clearing checks rapidly is essential, both because of Treasury Department rules and the need to debit other banks quickly in order to gain extra days of interest. As a result, many check processing facilities locate near the main postal distribution center, which is normally in or near the downtown. In addition, downtown locations in cities with Federal Reserve Regional Banks are optimal, since banks take checks to the Fed to trade with other banks. Finally, in many cities, banks collect checks from their branches in the afternoon, and driving into the city is easy and central.

However, continued technological progress, coupled with changes in regulatory requirements, could change the geography of these processes. For example, financial institutions since the late 1980s have been using digital image processing systems for a variety of purposes-to create, store and transmit high-quality images of original documents such as checks, credit card charge slips, stock certificates, claim forms, or virtually anything else. Notable examples include replacement of paper files with digitized images; and American Express use of imaging technology to reproduce charge slips on its monthly billing statements.

New technologies in check processing may affect the location of facilities. Currently, when banks receive a check drawn on another bank they send it to a central processing facility, which encodes the amount on the check, which in turn sends it to the paying bank, which then sends it back to the customer. Because this is an expensive process, banks are exploring technology to reduce costs.[4] Image technology processes electronic images of checks rather than the checks themselves. Transferring images instead of the checks themselves may influence location, since the facilities will no longer have to be in areas with good mail and overnight air service.

[4]Thomas B. Steiner and Diego B. Teixeira, Technology in Bunking: Creating Value and Destroying Profits (New York, NY: Business One/Irwin, 1990), p. 49.

TABLE 5-3: Location of Selected Bank Back Office Operations

Bank	City	Number of Jobs
First Interstate	Phoenix, AZ	220
Security Pacific	Phoenix, AZ	700
Discover Card Services	Phoenix, AZ	1,200
Chase Manhattan	Phoenix, AZ	2,000
Chase Manhattan	Brooklyn, NY	4,600
Citibank	Sioux Falls, SD	3,500
American Express	Salt Lake City, UT	850
Bankers Trust	Jersey City, NJ	1,400
CitiCorp	Tampa, FL	600
Selected banks[1]	Wilmington, DE	13,560

SOURCE: Office of Technology Assessment, 1995

[1]Based on calculations by Gi-Yong Yang and Robert Warren, "Beating the World System? Back Office Agglomeration as an Urban Economic Strategy, " paper presented at the Annual Meeting of the Urban Affairs Association, March 1994

Image processing still requires bringing checks to central locations for scanning, but the images could be sent to a remote location for further processing (e.g., manually encoding checks, comparing check amount with bill, crediting the amount). For example, a major credit card company uses an automatic check reader and power encoder to read checks and encode them. Checks the machine cannot accurately read are imaged and sent over wire to workers who see the picture of the check on their screen and type in the amount, which is in turn sent back to the encoding machine for magnetic check encoding. In this case, the workers are next door in another room, but the technology could enable workers to be off site. Similarly, electronic check presentment, by which banks receiving a check drawn on another bank transmit an image of the check rather than the check itself, could reduce the need for check processing to be in central locations downtown.

In theory, it would be possible to use image technology to support distributed work, even cottage work, through images sent directly to terminals in the worker's home. However, while technically feasible, banks are likely to resist home work because of the security safeguards that sensitive information demands.

With some notable exceptions, such as Citibank's move to Sioux Falls, most U.S. financial firms have located their customer service facilities, data centers, and routine transaction-processing operations (with the exception of check processing) in mid-sized or larger metropolitan areas-places like Charlotte, Tampa, Dallas-Fort Worth, Salt Lake City, and Phoenix (see table 5-3.) The choice of these areas reflects the high priority given to an adequate labor force and, to a lesser extent, good air transportation access. The sites chosen for such facilities, however, are usually in suburban communities within these regions, or on the outskirts of their central cities. Relatively few cities have succeeded in attracting back office operations other than check processing to older downtown areas.

While some retail back office functions have tended to migrate away from central city locations, wholesale back office functions, with a few exceptions, have stayed closer to corporate front offices, in part because they have been slower to automate and routinize functions which still involve the physical transfer of paper and are very time-sensitive. In addition, in some lines of business that are particularly sensitive, or particularly risky, or that require highly specialized knowledge—such as currency trading—those functions may remain closely tied to major financial centers, even as they take on a more routine character.

For example, Shearson and Irving Trust located new processing facilities in Manhattan. Bankers Trust moved its back offices to Jersey City, just across the Hudson from Lower Manhattan financial district, and Paine Webber went to nearby Weehawken, New Jersey. Similarly, First Chicago opened two support facilities during the 1980s—both in its home city. There are of course exceptions. In 1983 J.P. Morgan located a new operations and data processing center in the suburbs of Wilmington, Delaware. However, because of the closer ties between corporate front and back office functions than is the case in retail banking, older cities have so far managed to hold onto much of the back-office activity associated with whole-

sale finance activity and some more sophisticated types of third-party processing. However, new image technologies may make it possible to move some of the wholesale back office functions that have so far been kept close to downtown.

New Retail Functions

Historically, retail banking has served as a residentiary economic function, providing jobs in the local area in direct relation to local demand. However, retail banking is undergoing significant changes. For example, for many routine bank transactions, automatic teller machines have replaced face-to-face encounters with bank employees. Home banking is likely to reduce them even more. Other technologies such as direct deposit, electronic funds transfer, and debit cards all reduce retail branch employment.

In addition, bank branches have become less and less important in the delivery of all kinds of retail banking services. Many products, such as mortgages, are now distributed through centralized service centers, often without face-to-face contact with the customer; loan officers and other customer service personnel answer telephones and access loan processing software and other information electronically.

For example, 15 years ago, the Bank of America provided a wide range of consumer and small-business services at more than a thousand branches. After a series of consultant studies documented the inefficiencies inherent in this approach, the bank began a far-reaching overhaul of its California retail division. By the mid-1980s, 130 branches had been closed. The number of branches that took consumer loan applications was reduced to 150.[5] Middle-market commercial lending was taken out of the branches, and consolidated in 46 corporate loan offices. Processing of home mortgage applications was also removed from the branches, and concentrated in 48 home loan centers; and mortgage servicing was centralized in a single facility. This restructuring led to the elimination of 9,000 retail-division jobs. Similarly, Signet Bank has consolidated its loan approval process into two hub offices in Richmond, Virginia, and Columbia, Maryland (an outer suburb of Washington).

A generation ago, small-town banks and neighborhood branches, often designed to suggest a cross between an ancient temple and a medieval fortress, were for most Americans the archetypal brick-and-mortar manifestation of the country's financial system. Today, the structure that would best symbolize their connection to that system would be an unseen, anonymous building in a remote suburban office park, occupied by a credit card processing operation or a mutual fund telephone service center. The shift from local service delivery to distribution of products from regional or even national service centers has tended to favor both lower-cost locations outside older urban areas and suburban locations near mid-size and large metropolitan areas. The transition away from traditional local retail structures and toward direct customer access seems likely to continue, as customers grow more comfortable handling a wider range of financial transactions without face-to-face contact. Citibank reports that in 1987, 73 percent of U.S. households surveyed said they preferred to conduct financial business through face-to-face contact; by 1994, those preferring such contact had declined to 52 percent.[6]

Corporate Banking

Technologies have helped routinize some production and at the same time remove many front office retail functions from local areas, allowing both to be more locationally flexible. However, for three reasons, technologies appear to have re-

[5] Richard Vietor, "Bank of America and Deregulation," in Samuel L. Hayes (ed.) *Financial Services: Perspectives and Challenges* (Boston, MA: Harvard Business School Press, 1993), p. 182.

[6] Catherine Allen, "Smart Cards and Financial Services: Overview and Legal Implications," presentation to the American Bar Association Consumer Financial Services Committee, Park City, Utah, January 1995.

inforced the urban and central city position of corporate banking.

First, advances in communications and computer technology have allowed financial services firms to gain access to more, better, and more timely information. These advances have greatly reduced the cost and increased the speed of international financial transactions, and have made possible the development of new techniques for managing the risks involved in lending, borrowing and investing across national borders. Opportunities for globalization that new technologies offer have reinforced the important role that major cities play as centers of financial innovation. For example, foreign banking activity in the United States still remains highly concentrated in a few large cities. America's major financial centers—most notably New York—have also been able to maintain their preeminent position in international finance, despite rapid technology-driven growth in global financial services. While New York thus remains unrivaled among U.S. cities as a world financial center, other cities are also participating in the growth of global finance. Los Angeles, Chicago, Miami, and San Francisco all have significant concentrations of foreign banking activity, with Los Angeles in particular benefiting from the growth of trade with Asia, and Miami from its role as a gateway to Latin America.[7]

Second, technology has facilitated the creation of a whole new range of financial products. Beginning in the late 1970s, U.S. financial institutions began to use computer technology to support the creation of new products and services—a process that continues to this day. Early examples of new products made possible by computer technology include adjustable-rate mortgages, money market accounts, and cash management accounts. As the process of technological innovation accelerated, so did the introduction of new products. Between 1977 and 1982, for example, the Bank of America's retail division introduced five new products for depositors; between 1982 and 1983, it introduced 18.

In contrast to routine processing functions, most financial institutions keep the development and launching of new products and services closely tied to headquarters. And just as innovation has become more important to the competitive position of individual firms, so the role of leading cities as centers of innovation (such as New York, Charlotte, Chicago, and San Francisco) has become more important to their role in the financial services sector. Firms located in established centers usually have easier access to the specialized skills, detailed market knowledge, and supportive services needed for the development and introduction of new products and services. Established financial centers may also provide the best location from which to access potential customers for new services.

New product development often requires highly specialized skills—such as the ability to model how a new type of security will perform under a variety of conditions—that may not be readily available outside the leading financial centers. Moreover, those who develop and launch new products often require the assistance of other specialists—experts in banking and securities law, market research or risk management, for example. Such expertise is usually found most readily in areas where the financial services industries are already concentrated. So are the formal and informal sources of information—from meetings of trade and professional associations to conversations at the gym or local watering hole—that help to foster continuous innovation. For all of these reasons, much of the activity related to innovation in finance is likely to remain concentrated in just a few major cities.

Third, most corporate banking functions remain in the central business district (CBD) because agglomeration economies are more

[7] In 1993, 87 percent of the 965 foreign bank branches and offices in the U.S. were located in nine cities. These are in order of size, New York, Los Angeles, Chicago, Miami, San Francisco, Houston, Atlanta, Washington, DC, Seattle, and Boston. *American Banker,* Apr. 12, 1994, pp. 12-37.

important to these wholesale and more non-routine functions. They require a concentration of highly specialized knowledge, and ready access to up-to-the-minute information. They need an infrastructure of supporting facilities and services both within individual firms or institutions and in the community at large—international legal and accounting expertise, access to satellite connections, major international airports. Moreover, firms often seek to syndicate bank loans or new securities issues, or otherwise bring partners into their deals. This process works most efficiently when the principal players are concentrated in one location downtown.

INSURANCE[8]

With good reason, Morton Keller's 1963 history of life insurance companies observed: "Few artifacts of this corporate age are more impressive than the buildings of large life insurance companies. Their local offices stand in a thousand communities. Regional headquarters share the skylines of a dozen American cities; Hartford, Boston, and Philadelphia house major firms." These buildings were monuments, intended to be as lasting as the companies themselves. In 1995, however, though home offices of many of the long-established giants remain, many of their employees are elsewhere. Once considered a stable employer, the insurance industry is now undergoing continual re-engineering. Technology is one of a number of factors contributing to dramatic changes in the organization and location of insurance work. As a result, the presence of large insurance offices in American cities can no longer be taken for granted. As company managements search for more efficient combinations, they will locate facilities in new places and hire new employees.

The insurance industry employs almost 2.2 million people: 536,000 by property-casualty insurance companies, 833,000 by life and health insurance companies, and nearly 665,000 by insurance agencies, brokers, and service organizations. This employment can be roughly divided into three functions: 1) routine back office (e.g., underwriting and claims processing); 2) front office retail (e.g., insurance agents, claims adjusters, customer service); and 3) more complex back office (e.g., marketing, administration, and investment). Technology is affecting all three functions, but, like financial services, its locational impacts are being felt most strongly in back office retail functions.

Routine Back Office Functions

As the insurance industry grew in the 1950s and companies serving the entire country began to develop, many companies established decentralized organizational structures to be close to the customer. For example, during the 1950s Prudential pioneered the decentralization of home office operations. Part of their reason for decentralizing into a regional management system was that "the very distances which mail, notices, inquiries, and premiums had to travel would be appreciably cut down," and regional centers could provide swifter service within its territory. Moreover, insurance records were kept in paper form, requiring relatively close proximity between the records and personnel such as underwriters and agents. In the late 1950s, the president of Connecticut General insurance stated, "Our processes resemble light manufacturing, but rather than assembling metal, wood, or plastic objects, we assemble pieces of paper." Thus, minimizing distance and time that both mail and insurance personnel had to travel was a key in the decentralization of the industry.

During the 1980s, insurers introduced database management systems to collect interrelated data, minimize data redundancy, allow updates regardless of the data's physical storage location, and enhance recoverability and security. The typical insurer is now midway in conversion to a relation-

[8] This section is based in part on a report prepared for the Office of Technology Assessment. Robert Gibbons, *The Changing Location of the U.S. Insurance Industry: The Role of Technological Change*, May 1995.

al database will allow access to complete customer information regardless of line of business.

Online access to policy and claim files has weakened the traditional need for proximity in insurance operations. Optical scanning and imaging technology also has great potential to reduce paperwork barriers to distributed work since virtually all information could be online. Scanning is widely used now to process policy applications and premium collections, and as the cost decreases, scanning could be applied to claims processing as well. Finally, more companies are increasingly relying on phone and mail to communicate with policyholders. Branch offices serve less purpose when a telephone call accomplishes the same task, whether it is over 20 miles or 2,000 miles.

For example, Aetna recently put a large share of its policies on databases accessible by PC anywhere in the Aetna system. Because of this, they were able to consolidate a number of operations that had historically been more dispersed. For example, they reduced 55 branch claims offices to 22, and shrank underwriting centers by a similar amount. The result is that there is less need for face-to-face contact between company employees in claims processing. Claims processors can tap into underwriting computer files when they process claims. In addition, agents and field adjusters can communicate electronically with the claims office through fax machines, e-mail, and modems linked to portable computers.

A principal motivation for such consolidation is to achieve economies of scale and save money, particularly on overhead such as buildings, management, and support staff, and to spend a greater share of resources on operations.[9] For example, CIGNA is consolidating four offices in Florida into one in Tampa. Allstate is undergoing a gradual consolidation of 28 policy processing centers into three centers in Charlotte, Dallas, and Columbus. After considering Orlando and Nashville, CNA decided to centralize policy processing in Reading, Pennsylvania. Reading's advantages included low costs and easy access to population centers of the Northeast, and a well-educated labor force. Similarly, Travelers established two centers processing personal lines of insurance in Knoxville, Tennessee, and Albany, New York. Both are cities where costs are low and where Travelers already had offices (see table 5-4).

In fact, within the space of a few years, seven insurance companies established new operations in Albany, creating about 6,700 new jobs. None of these facilities were located in downtown Albany, however. One was in an essentially suburban area just inside the city limits; and the others were located in outlying communities such as Colonie, North Greenbush and Malta.[10] These suburban areas can more readily provide the large-floorplate, relatively low-cost-space firms want, as well as easier access by auto. While insurance offices are relocating to lower-cost cities, and usually to suburban locations near them, they are also closing many small field offices. Sales offices and claims offices in many small towns everywhere are disappearing.

Front Office Functions: Agents, Claims Adjusters, and Customer Service

The insurance business, particularly property-casualty insurance, has three types of front office operation: marketing, claims, and customer service. These are the parts of the industry traditionally located closest to the customer. However, technology and industry reorganization may be changing this, allowing more work to be done in centralized service centers.

Insurance companies use two main systems to reach customers with their products—local agents and direct response (e.g., direct mail, media ad-

[9] "Trends in Insurance Company Location — and Relocation," Moran, Stahl, and Boyer, New York, 1994.

[10] Kevin O'Connor, "Back Office Operations Located in the Capital Region" (Albany, NY: Center for Economic Growth, 1994), unpublished memo.

TABLE 5-4: Selected Relocations or Movement of Operations of Insurance Companies

Company	Initial location	New location	Date
Intra-Metropolitan			
General Re	New York City	Connecticut suburbs	1970s
NAC Reinsurance	New York City	Connecticut suburbs	1970s
Chubb	New York City	New Jersey suburbs	1970s
Crum & Forster	New York City	New Jersey suburbs	1970s
Fireman's Fund	San Francisco	Suburbs	1982
Colonial Penn Property and Casualty	Philadelphia downtown	Suburbs	1980s
Fidelity Mutual	Philadelphia downtown	Suburbs	1983
Penn Mutual	Philadelphia downtown	Suburbs	1980s
Aetna Claims Center	Philadelphia downtown	Suburbs	1990s
Life of Georgia	Atlanta downtown	Suburbs	1985
TransAmerica P&C	Los Angeles downtown	Woodland Hills, CA	1988
Inter-Metropolitan			
Hanover Insurance	New York City	Worcester, MA	1968
Royal	New York City	Charlotte, NC	1986
Liberty Mutual	Boston	Portsmouth, NH	1980s
TransAmerica Life	Los Angeles	Kansas City, Charlotte, NC	1994
TIG Insurance	Woodland Hills, CA	Dallas, TX	1994

vertising). Local agent distribution systems are expensive and because of increased cost competition in the industry, insurance firms are trying to find ways to reduce agent functions or in some cases bypass them altogether. Technology is playing a key role. For example, just like ATM machines, automated kiosks in places such as shopping centers may prove to be cost-effective distribution channels for routine lines of personal insurance. Similarly, a number of insurers are now experimenting with online marketing. For example, using CompuServe, Continental offers 48-hour quotes for personal auto and homeowners insurance, as well as online claims reporting and policy changes. The introduction of home electronic commerce is a threat to the independent agent system, as customers would have greater ability to communicate directly with regional offices about policies and claims.

Direct response functions are also growing. The largest direct response insurer is USAA, but others include TIAA, GEICO, and Colonial Penn. In addition, many companies are establishing centralized customer service centers. For example, many insurance companies, including Aetna and Prudential, have established a toll-free number for direct loss reporting. When a caller calls a nationwide number, the telephone switch identifies the area code of caller and automatically routes it to a regional office that services the claim. The centralized customer service and processing centers that are emerging in personal lines can operate efficiently from any location with the necessary telecommunications infrastructure and a suitable labor pool. As a result, front office insurance employment is likely to be less evenly distributed according to population, and instead be concentrated in centers in metropolitan areas.

In contrast, much commercial insurance business still requires periodic personal interaction among policyholders, agents, underwriters, managers, and reinsurers. They may communicate more frequently by fax or telephone, but they still expect occasional personal encounters, and still need locations close to their customers. Serious property and liability claims often require on-site inspection, while life and health insurance claims can be handled from a central location.

Complex Back Office Functions

There are a number of more complex insurance functions that have tended to locate in head or regional offices. These include marketing management, some underwriting, claims management, accounting and statistical, legal, actuarial, top management, investments, and computers and software support. However, unlike some industries, such as banking, where the need for face-to-face functions is more important, localization economies in these complex insurance functions appear to be less important. Insurance companies have less need for face-to-face interactions with other companies, either their competitors to cooperate on deals, or their suppliers. In large part, this is because much of the industry involves processing information, as opposed to crafting deals.

The biggest factor explaining home office locations in the industry is inertia. The home offices of most insurance companies are still near where the company began. Companies have expanded into new buildings and larger quarters, but only a small minority have moved across state lines. Regulatory implications add to the costs of moving to another state, but local connections and established facilities usually sufficed to keep companies where they were.

However, as cities became more crowded, insurance companies began to reconsider the cost of big downtown offices. These cost pressures were especially apparent in the most costly cities (e.g., New York, San Francisco, and Boston). Rising costs prompted insurers to relocate not only thousands of routine back office jobs out of these cities, but to also consider moving managerial and professional jobs out as well (see table 5-3).

There have been several major moves. Royal Insurance, a fixture in Manhattan for years, relocated its home office to Charlotte, North Carolina, in 1986 to cut its operating expenses. It paid generous relocation benefits plus the acquisition costs of the new facility in Charlotte, plus all the other expenses related to the relocation, from the proceeds of the sale of its building in Manhattan. With the move, its annual property taxes declined from $2.3 million to $1.2 million, and utility costs from $2 million to $600,000. Similarly, when Transamerica Property & Casualty was acquired by TIG to become TIG Insurance, management moved from the Los Angeles suburbs to the Las Colinas area of Dallas, reducing its rent from $30 per square foot to $16.

SECURITIES TRADING AND INVESTING

The securities trading and investment industry has undergone shifts similar to other information-based service industries. Selling functions were distributed around the country close to customers, while back office and trading and investment functions were concentrated in the downtowns of the largest cities, particularly New York. Both these patterns have changed, in part due to the introduction of information and communications technology.

Retail Functions

New communications technologies have given rise to new modes of delivering financial products and services. In recent years, innovations such as digital call distribution systems, telephone keypads and screen phones have enabled banks, brokerage firms and mutual funds to broaden the range of services that clients can access by phone.

The mutual fund industry has revolutionized the way financial products are distributed. In the late 1970s, companies such as Fidelity, Vanguard and Dreyfus began to recognize the possibility of adopting direct marketing techniques to the sale of mutual funds, allowing them to escape their dependence on retail stock brokers. Mass-media advertising, direct mail, and telephone sales have become the industry's principal means of distribution. Dreyfus, for example, still has 20 retail outlets of its own in major cities around the country, but makes by far the greatest share of its sales through direct marketing. Products are distributed nationwide from just two centers, and ongoing

contact with investors is maintained through a single, nationwide telephone service center in Uniondale, Long Island. Fidelity similarly serves customers nationwide from a facility near Dallas, and Vanguard from suburban Philadelphia. Moreover, online brokerage accounts are rapidly growing, allowing investors to place "buy" and "sell" orders from a PC at home.[11]

Back Office Functions

In contrast to banks and insurance companies, the securities industry has tended to keep its automated back office operations closely tied to headquarters. For example, in New York, the largest firms all developed processing facilities in Manhattan—although usually not at the same site as their headquarters. Some firms have moved, however, to suburban locations. For example, the Securities Industry Automation Corporation used to provide its computerized clearing and reporting services from a facility in lower Manhattan, but now is located in Metrotech, an office complex in downtown Brooklyn. Paine Webber moved its operations from Manhattan to nearby Weehawken, NJ. However, relative to banks, automation was for many securities firms a new phenomenon.

Nevertheless, some data centers have migrated. Dean Witter located its principal data center in Dallas, and Charles Schwab located its major data center in Phoenix. In addition, a few companies have moved other back office functions. In 1988 Salomon chose Tampa as the location for its principal back office facility.[12]

Trading and Investment Functions

Historically, securities trading and investment has been a face-to-face enterprise, largely concentrated in urban downtowns. Technological change is reinforcing this, but also potentially threatening it. First, information technology has facilitated the creation of such new products as stock index futures, derivatives, and synthetic securities. Moreover, one of the most important financial market trends of the past decade—securitization, or the conversion of all kinds of assets from home mortgages and credit card receivables to commercial real estate into securities that can be bought and sold—would not have been possible without the use of sophisticated computer programs. In the mutual fund industry, intense competition for the individual investor's dollar has fueled a continuing spiral of new product introduction; between 1985 and 1990, the 20 leading mutual fund companies in the U.S. introduced more than 500 new funds.[13] As in banking, these innovative activities tend to be located in the downtowns of central cities of major metropolitan areas.

However, advances in information and communication technology as well as the standardization of real-time market information and research available online have the potential to change this.[14] For example, SEC electronic filing requirements for companies have meant that researchers and stock analysts don't have to be in the core to gain the information. Moreover, the advent of computer and high-speed telecommunications technology made possible the creation of an ever-widening range of options for investors to buy and sell securities without going through the established exchanges. The National Association of Securities Dealers Automated Quotation System (NASDAQ), launched in 1971, triggered the rapid growth of the "over-the-counter" market.

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[11] According to one estimate there are almost 625,000 online brokerage accounts and this is expected to reach 1.3 million by 1998. Vanessa R. O'Connell, "Brokerage Firms are Moving Into Cyberspace." *Wall Street Journal*, July 6, 1995, p. C-1.

[12] Columbia Business School, "Salomon Brothers," unpublished case, 1994.

[13] Erik R. Sirri and Peter Tufano, "Competition and Change in the Mutual Fund Industry," in Samuel L. Hayes (ed.), *Financial Services: Perspectives and Challenges* (Boston, MA: Harvard Business School Press, 1993).

[14] John E. Bodenman, "Dispersal of the Institutional Investment Advisory Industry in the United States, 1983-1993," paper presented at the American Association of Geographers Annual Meeting, Chicago, Illinois, Mar. 17, 1995.

Automation of trading systems has the potential to both reduce trading employment and allow it to relocate. For example, Bernard L. Madoff Investment Securities handles about 5 percent of the daily trading volume of stocks listed on the New York Stock Exchange. But rather than going to the floor of the Exchange, the trades are routed through Madoff's own proprietary trading system. An even more revolutionary system was launched in 1991 by the Arizona Stock Exchange, which handles only a fraction of one percent of the volume of shares traded each day on the New York Stock Exchange, but does so in a completely automated way. At a prescribed hour, participating firms and institutions can post bid and asked prices for blocks of a specific stock. The system then arrays bids and offers into textbook-style demand and supply curves; the price at which the curves intersect is the price at which trades are executed. Systems like Instinet allow large institutional investors to trade directly with one another, without using an exchange, broker, or dealer at all.[15] According to an earlier OTA study, "electronic trading systems may be the stock exchanges of the future."[16] If so, these systems will come into direct competition with today's face-to-face markets.

Finally, as in other information-based industries, technology is facilitating consolidation. In securities, institutional investment management firms account for an increasing share of investment transactions, rising from 20 percent in the 1960s to approximately 80 percent today.[17] Traditionally, New York has been home to most of these firms, but in the last decade, firms in San Francisco, Los Angles, and Boston have gained share.[18] Because of increased access to information electronically, these firms are able to more widely disperse. But this dispersion out of New York has not been scattershot in nature; rather, it could be described as concentrated dispersal, where the industry is dispersing to a larger number of sites, but these are generally in central cities of a moderate number of major metro areas.[19]

TELECOMMUNICATIONS

The telecommunications industry is in the middle of a transformation from a set of regulated utilities to that of a more competitive and high-tech market, and in this transformation the large telephone companies are reorganizing and looking to cut costs and increase labor and capital productivity in every part of their businesses. These companies are therefore cutting and relocating workers in the face of increasing competition, enabled by new technologies that allow more centralization and control of activities.[20] Because of these parallel trends and the lack of data, it is not always clear which areas have fared better or worse through this transformation. Rural areas, however, have clearly lost telecom employment due to this transformation.

Part of what is driving this downsizing is the geographic rationalization of the industry. Fol-

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[15] United States Congress, Office of Technology Assessment, *Electronic Bulls and Bears: U.S. Securities Markets and Information Technology*, OTA-CIT-469 (Washington, DC: U.S. Government Printing Office, September 1990), p. 46; Securities and Exchange Commission, Division of Market Regulation, *Market 2000: An Examination of Current Equity Market Developments* (Washington, DC, January 1994), pp. II:11-13.

[16] U.S. Congress, Office of Technology Assessment, *U.S. Banks and International Telecommunications*, OTA-BP-TCT-100 (Washington, DC: U.S. Government Printing Office, October 1992), p. 25.

[17] Bodenman, op. cit., footnoote 14.

[18] Ibid.

[19] Ibid.

[20] For example, since August 1993, Bell Atlantic announced cuts of 5,600 jobs; AT&T announced cuts of up to 15,000 jobs over two years; US WEST announced it would cut 9,000 jobs over three years. Since 1990, employment in Telecphone Communications has dropped from 913,000 to 858,000 in 1994. (U.S Bureau of Labor Statistics, *Employment and Earnings*, March issues, and *Supplement to Employment and Earnings*, August 1989 and August 1992.)

lowing divestiture, the Regional Bell Operating Companies (RBOCs) varied nationwide in their technical and managerial operations. State regulations also varied: some states (for example, in the Northeast) required separate operating companies in each state, while others (such as in the South and West) were more tolerant toward multistate operations. The different RBOCs acted as different companies with their own organizational structures. Many RBOCs are therefore only now reorganizing to consolidate their sub-regional operations left over from pre-divestiture days. For example, while Bell Atlantic Pennsylvania now operates as one business in the state, before deregulation it operated as three companies in three regions in the state.

Employment in the telecommunications industry can be divided into three areas: 1) routine front and back office (e.g., operators, billing and repair inquiries, customer service); 2) non-routine front office (e.g., repair, maintenance, and marketing); and 3) complex back office.

Routine Front and Back Office

Call completion and directory assistance may be considered routine tasks, as well as customer-service personnel functions such as billing or changes in service. Similar tasks aimed at particularly important business customers or involving advanced services, however, may require considerable technical expertise and problem-solving. Nevertheless, many of these activities such as marketing can be standardized in ways that make them more routine than other activities.

The telephone companies have automated many customer service and other functions by using new call processing equipment, and transferring inquiries to large megacenters via the industry's own telecom infrastructure. Automated call management (ACM), voice mail, and interactive voice response (IVR) equipment allow telephone companies to play recordings to callers, accept touch-tone or voice inputs, and triage calls in complex ways. Calls can be transferred to the next available assistant and even across time zones as the need requires. These applications are linked to other technologies. For example, centralized billing allows customer service representatives to call up information on the customer's account and process it in real time. In most telecom companies 10 years ago, customer service representatives had to access paper records; now any service representative in the company can gain online access to any customer record. Much of the call-completion, directory assistance, and customer service functions are automated and computer-assisted, so that workers in those positions do not have to be located near the customer and are not limited by a local paper-based record keeping system. Most companies are moving to computerize all records.

The technology as well as the reorganization of the industry has led most companies to create larger, centralized customer service centers. These centers are usually specialized in five activities: call completion operators, directory assistance, network management, customer service representatives (for ordering, billing, and queries), and accounting and billing. Companies are centralizing into megacenters in order to gain economies of scale—trimming employees and other costs. In addition, a smaller number of managers can more easily manage consolidated functions. As companies downsize management, remaining managers have increased spans of control, making management of dispersed offices more difficult.

Consolidations of consumer and small business centers are more common, since these activities are more routine and less sensitive than those for large customers. For example, NYNEX reorganized more than 133 offices for their customers into seven regional centers. Ameritech is consolidating 83 consumer and small business sales and service centers to 21 locations. US WEST announced plans in 1993 to consolidate its customer service workers from 563 sites into 26 centers, including Denver, Phoenix, Minneapolis, Seattle, Salt Lake City, Boise, Omaha, and Portland. GTE has operations widely dispersed across the U.S., but has consolidated its operator megacenters to only five locations: Erie, Pennsylvania; Lexington, Kentucky; Winsfield, Missouri (located out-

side of St. Louis); California; and Hawaii. Bell South has three network management centers in suburban sites in Atlanta, Nashville, and Charlotte. These were consolidated from previous operations distributed throughout its nine-state region. Bell South's consumer customer service centers are more distributed, however, including 14 in Georgia alone.

Long distance providers have also consolidated operations. AT&T has six megacenters for its residential customer service line, several more for small businesses, network management, and call-completion operations. Relatively new competitors such as Sprint and MCI built megacenters into their networks from the beginning, locating them in lower-cost regions of the country. Sprint, for example, has centers located at Jacksonville, Florida; Dallas, Texas; Kansas City, Missouri; Phoenix, Arizona; and Winona, a small city in Minnesota.

As companies consolidate operations, the general trend, as in other industries, is to expand larger operations, usually located in mid-size and larger metropolitan areas, and close smaller ones, usually located in smaller towns. As a result, between the cuts in employment and the relocation to megacenters, rural areas have lost workers to urban areas.

Before central electromechanical switches, many operators for the former Bell system worked out of their homes with mechanical patchboards. Today, after a series of centralizations, the telecom industry could once again return to home work, completing the cycle of centralization and decentralization. Interestingly, such a decentralization would be enabled by the same technology that enabled the current centralization. That is, calls and information could be transferred to virtually anywhere, whether to a central megacenter or to dispersed homes or telework centers. In contrast, the original decentralized homeworkers were limited to the neighborhoods they were serving by the technology of the time. Since many of the activities are already monitored by computer, oversight of employees in a common location may not be necessary and many tasks could therefore be performed at home or in telework centers. Telework is particularly attractive for filling off-shift positions as companies turn more toward 24-hour service, as well as for ordinary routine and non-routine workers. Such a pattern of decentralization would allow companies to gain the benefits of centralization (e.g., economies of scale of operations, centralized customer access) with the benefits of decentralization (lower space utilization costs and lower wages).

Non-Routine Front Office

The telecom industry must locate many workers where its plant is located and where it can market and support high-profile customers. Marketing includes customer sales, especially business marketing. Plant operations include installing and maintaining the local telecommunications infrastructure, engineering, network administration, testing, and other tasks associated with the switches and the main trunk lines. Roughly one-third of the jobs in telecommunications are plant-related jobs involved in the production, construction, and maintenance of equipment and lines.

New technologies are altering the number and location of plant operation jobs, and are likely to reduce the number of jobs in this area. A Department of Labor 1990 forecast note that the greatest relative decline in employment for the industry will be for installers and repairers as a result of such technological improvements as fiberoptics, digital switches, modular equipment, quick-connect features on cables, and the off-loading of many tasks to the customer.[21]

In addition, technology allows many of these functions to be performed remotely. In the past, installers wired buildings and homes, and had to

[21] U.S. Department of Labor, Bureau of Labor Statistics, *Outlook for Technology and Labor in Telephone Communications*, Bulletin 2357 (Washington, DC: U.S. Government Printing Office, 1990).

go into the field for most of the diagnostics and repair. Today, installers perform many functions remotely at the central office. Much of the network management, including troubleshooting and adding new features, can be supervised and performed in remote locations.

There are a number of technologies that enable this. The most striking is the digitization of internal telephone operations, which allows providers enormous flexibility in the management of their systems. Digitization means that voice communications are converted from analog signals coming into the switching office to binary ("on/off") signals, which usually are converted back to analog before they reach the other user. Yet another development in digitization and switching leads to the centralization of the operating system software. This development, called "advanced intelligent network" (AIN), eliminates the need to replace the software in all the (standardized) switching equipment—itself a costly process. Instead, the carrier can change the software in only certain central "nodes" within a region. The effect of the developments in digitization is a net decrease in installation and maintenance using analog switching equipment.[22] Remote switches, for example, can be controlled through larger switches at central facilities, removing the need for on-site personnel.

Automation of system troubleshooting allows computers to diagnose problems so that humans do not have to intervene. If there is a break in a fiberoptic transmission line, for example, a computer in the command center can detect the interruption, re-route all following transmissions through new paths, and narrow down the possible failure modes. In many cases, a failure in a switching facility can be identified, and a technician is sent only to replace or repair the part. In the past, local technicians were on call to identify and repair such problems. For example, Pacific Bell has successfully tested a circuit box technology that can determine if trouble in phone lines is in the customer's home or on the outside line for which the company is responsible, significantly reducing the number of repair visits.

One result is the growth of network management centers. These centers monitor local switching and switching between company facilities, manage emergency routing, monitor weather and disaster information, diagnose network problems, and so forth. Since metropolitan areas contain the bulk of telecom customers, the decrease in plant-related workers may indicate a net decrease in these occupations in metro areas. However, rural areas may be even harder hit, because the big providers may perceive that such workers are better placed in metro areas where they can gain efficiencies by responding to a wider region. For example, US WEST and GTE are both selling and swapping many rural territories to create contiguous or more densely populated territories.

Complex Back Office

Corporate operations include planning, accounting and finance, procurement, information management, legal services, and so forth. These operations are almost always located in major metropolitan areas, and often in downtown locations. The headquarters of the RBOCs and major long-distance providers are all located in large metropolitan areas, and most are in central business districts. For example, Bell Atlantic (Philadelphia), Bell South (Atlanta), US WEST (Denver), Pacific Telesis (San Francisco) and AT&T (New York) are all located in the central business districts of these cities. Some others, such as MCI (Arlington, Virginia) and Southwestern Bell (Irving, Texas), are in edge cities of large metropolitan areas.

PROFESSIONAL SERVICES

In the last two decades, professional services (e.g., legal, accounting, engineering, computers) have grown significantly, particularly in metropolitan

[22] Anthony Ramirez, "GTE Says It Will Cut 17,000 Jobs," *New York Times*, Jan. 14, 1994, p. D1.

areas and central cities. Some sectors, such as legal services, appear to have been important components of central business district revitalization. Other sectors, such as computer services, appear to have contributed to the increase in suburban office growth.

Much of the work in services such as law, architecture, accounting and consulting involves individualized, non-routine craft work. Many employees are "front office" professionals—lawyers preparing individual cases, accountants auditing accounts to produce financial statements, consultants producing reports. These functions are impossible to automate, but technology, such as the personal computer, can increase efficiency. For example, in 1986, 7 percent of attorneys had computers on their desk, while 76 percent had them in 1993.[23] Back office support includes clerical and para-professionals jobs.

Because of the non-routine and complex nature of these functions, professional services are still overwhelmingly located in metropolitan areas. In 1985, producer services, (including professional services) accounted for 20 percent of employment in metropolitan areas, but only 9 percent in non-metropolitan areas.[24] Law firms, especially large firms, are predominately located in central cities of large metropolitan areas. For example, in 1989, 59 percent of employment in the largest 492 law firms was in nine central cities of the largest U.S. metropolitan areas.[25] Seventy-four percent of software industry employment is in the top 25 metropolitan areas.[26]

There are several reasons for this concentration in metropolitan areas. First, firms want to be near clients. One survey of legal, architectural and engineering, and management consulting firms found that face-to-face conversations with clients or in-person delivery of documents was a principal way of delivering services to clients.[27] For example, the accounting firm of Ernst and Young has offices in almost 200 U.S. cities because of the need to be close to their clients—largely businesses. Accountants must visit clients and in some cases spend considerable time on their premises going through financial records for auditing and tax work.

Second, a high percentage of firms (legal, 83 percent; accounting, 76 percent; and engineering, 77 percent) collaborate with other service firms and institutions in producing their services.[28] The importance of collaborative work within law firms, and also interactions with clients, courts, and other law firms, has led law firms to concentrate in metropolitan areas. Moreover, legal work involving litigation must maintain close linkages with district and federal courts, while legal work related to financial transactions maintains linkages with banks, both of which are located principally in central cities of metropolitan areas.

In addition, unlike banking and insurance sectors, professional service firms are less likely to move support and back office functions to separate locations outside the CBD. For example, lawyers want support staff nearby since the staff directly support legal work, unlike back office work in insurance and banking, which processes transactions. However, some accounting firms have moved some back office functions such as computing facilities to suburban locations.

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[23] Larry Hirschhorn and Bob Gutman, "The Future of Law Firms," report prepared for the Office of Technology Assessment, 1994.

[24] William Beyers, "Trends in the Producer Services in the USA," in *Services and Metropolitan Development* ed. P.W. Daniels (New York: Routledge, 1991).

[25] Barney Warf and Chand Wije, "The Spatial Structure of Large U.S. Law Firms," *Growth and Change*, Fall 1991.

[26] Edmund A. Egan, "Spatial Concentration and Networking in the U.S. Computer Software Industry," paper presented at the 1994 Association of Collegiate Schools of Planning Conference, Tempe, AZ, Nov. 4, 1994.

[27] William B. Beyers and David P. Lindahl, "Competitive Advantage and Information Technologies in the Producer Services," paper presented at the American Association of Geographers meeting, 1994, San Francisco, CA.

[28] Ibid., p. 40.

There are four technological developments in professional services that could affect location. First, an increasing share of work and information is in electronic form, making it possible for professionals to do some remote working. In law, online or CD-ROM legal research allows firms to access legal information without having to maintain expensive law libraries. In addition, law firms are also increasingly using image technology to enter legal documents into a computer format, producing significant savings on document search time. Many clients are now transmitting documents to legal firms electronically. Court documents are increasingly being filed electronically.[29] Similarly, accounting firms are experimenting with image technologies that would allow documents to be accessed by computer. In theory, as these technologies reduce paper transactions in favor of electronic ones that enable online access to documents and information, these firms should be able to work from more remote locations or to facilitate part time telecommuting by attorneys and accountants. Conversely, these linkages could make it possible for centralized professional service firms to serve clients that are more dispersed. For example, as corporations decentralized to suburban areas, law firms remained generally concentrated in urban cores, in part because they could communicate with clients through phone, overnight mail, and fax.

Second, expert systems can improve productivity in some sectors, particularly in the more routine segments. For example, computers can mechanize and automate relatively simple work such as estates and trust. Expert systems are also emerging that make legal knowledge available to novice legal practitioners. Whether this will enable lower-skilled legal staff (e.g., legal secretaries) to do more legal work is unclear.[30] In addition, it is possible that knowledge-based systems could be used to outsource the production of some legal documents.[31] These "document houses" are likely to locate in urban areas, although not necessarily in the core, to be near expert legal and computing personnel. This could reduce locally-based legal employment, which tends to do more routine legal work.

Third, information networks and shared work systems are increasingly allowing professionals to cooperate on work in different locations. For example, the accounting firm Price Waterhouse uses Lotus Notes to allow personnel from different offices to work collectively on one project. Similarly, DuPont is developing an information network for its 50 outside legal firms so that outside and in-house counsel throughout the country can draw upon a common database of filings, briefs, research documents, and strategy notes.[32] Similarly, scientists and engineers are using such tools to collaborate across distances. "Virtual" experimental communities or "collaboratories" that permit real-time interaction among researchers have also emerged.[33] For example, Xerox has created an internal research group of researchers in Britain, Los Angeles, Rochester, and Palo Alto to cooperate on a particular technical problem that Xerox earlier had not been able to address because the expertise to do so was distributed among these four sites. The researchers communicate via video conferencing and e-mail. Even though most professional services employees are still located in metropolitan areas, they can now cooperate with

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[29] For example, the State of Maryland has introduced a program to encourage lawyers to file all court documents electronically (*Government Technology*, July 1995).

[30] *ABA Journal*, September 1993, p. 88.

[31] Hirschhorn and Gutman, op. cit., footnote 23.

[32] Ibid.

[33] U.S. Congress, Office of Technology Assessment, *International Partnerships in Large Science Projects*, OTA-BP-ETI-150 (Washington, DC: U.S. Government Printing Office, July 1995).

clients and others located in other metropolitan areas.

Simiarly, the increased use of electronic mail and fax, and the expected growth in telephone and video conferencing, are making communication between clients and professionals easier. Because such technologies make it easier to communicate, they may allow increased movement of these activities out of high-cost central business districts to suburban sites. However, because these services are unlikely to replace direct contacts with clients when client interaction is required, many functions located in metropolitan areas to serve a regional client base are unlikely to move to new areas.

DATA ENTRY AND PROCESSING

The computer services industry, including data entry and processing, employed 233,000 people in 1994 in routine tasks such as keying of mailing lists and receipts and more complex tasks such as payroll and tax return processing.[34] While about 78 percent of the population lived in metropolitan areas in 1987, over 95 percent of data entry and processing employment in the U.S. was in metro areas, most of it providing non-routine processing and entry.[35]

Although most data entry and processing employment is located in metro areas, routine data entry jobs are more concentrated in exurban and rural areas and developing nations, since they consist of more labor-intensive, low-skill data entry tasks, especially when labor cost is a key factor and contacts with clients are routine. Firms generally are able to communicate with clients largely through mail and courier services to obtain hard copy, which they in turn enter into the computer. Companies then return data either by telephone line (larger companies) or by mailing computer tape or disks (smaller companies). Generally, firms in urban areas are not competitive in data entry because of the high labor costs. Rural areas in the U.S. are generally competitive in work that requires a quick turnaround, while overseas locations such as Barbados and Jamaica, where wages are about half of rural U.S. wages, compete in work that does not require immediate response. More complex work, which makes up the bulk of data processing work, occurs largely in metropolitan areas, in large part because of the need for close communication with clients.

Technological change is likely to reduce the amount of routine work, while increasing its overseas share, and increase the proportion of work that is complex, and done largely in large and midsize metropolitan areas. First, improvements and cost reduction in image technologies are eliminating the quick turnaround advantage currently held by rural firms and allow overseas locations to be competitive. Images of documents increasingly will be able to be sent cheaply to offshore locations for data entry. Jamaica, for example, has invested in image transmitters and satellite transmission, and has access to digital switching and fiberoptic circuits to the United States. Second, new technologies are displacing manual data entry tasks. For example, developments in optical character recognition technology (OCR) have the potential to reduce manual data entry. Moreover, point of transaction data entry will reduce subsequent manual data entry. Finally, as routine data entry operations become more automated, data entry firms are offering more specialized services, such as tax preparation and consulting and software development.[36] As firms do more of these functions, they choose metropolitan locations, in part to be close to clients, but also to attract more skilled labor.

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[34] This section is based on Marie Howland, "Technological Change and the Spatial Restructuring of Data Entry and Processing Services," *Technological Forecasting and Social Change*, vol. 43, 1993, pp. 185-196.

[35] Ibid.

[36] Ibid.

Technology and Location of Freight Transportation, Distribution, and Manufacturing Jobs

6

Innovations in transportation and production technology have significantly affected the spatial distribution of the goods sector and have led to decentralization of activities away from older urban cores. Many believe that in contrast to services, particularly information-based services, the manufacturing, transportation, and distribution sectors are less affected by the current revolution in information technologies. However, new information, transportation, and production technologies are in fact contributing to the decentralization of these sectors. Much of the goods production, transportation, and distribution jobs that core cities have depended upon will continue to decentralize to outer suburban and exurban areas and to lower-cost, smaller and mid-size metropolitan areas. Yet, for some operations, particularly those involving more flexible and smaller-scale production and distribution, technology appears to be providing urban core areas with some niche functions.

The goods sector is particularly important for urban economies because the jobs often more closely match the skills of residents. The migration of manual labor jobs—whether in manufacturing or in service sectors such as transportation and wholesaling—has meant that most are located in the suburbs or smaller metros. This chapter examines how technological change has affected the location of three industries: freight transportation, wholesale trade, and manufacturing (see table 6-1).

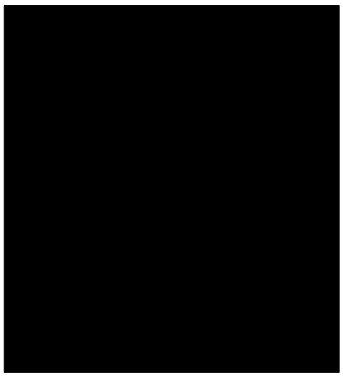


TABLE 6-1: Employment in Manufacturing, Transportation and Distribution (Employment in thousands)

	1994
Manufacturing	18,472
Railroads	241
Trucking	1,564
Courier service	285
Water transport	167
■ Marine cargo handling	54
■ Other	113
Air Cargo	202
■ Air couriers	108
■ Other carriers	94
Freight services	171
Total freight transport	2,389
Public warehousing	127
Wholesale trade	6,229

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings,* July 1995; and DR1/McGraw Hill, U.S. *Freight Transportation Forecast to 2003* (Alexandria, VA: American Trucking Association Foundation, April 1995).

FREIGHT TRANSPORTATIONI

Since colonial times, American cities, as centers of trade and transportation, have been central to the nation's economy. From New York in the age of the Erie Canal and the clipper ships, to Chicago and Kansas City in the railroad age, to the rise of Los Angeles and Seattle as centers of Pacific Rim trade, cities have been made and remade by changes in patterns of trade and in the technologies of transport. The next decade will be no exception, though it may not witness changes as dramatic as the birth of the trans-Atlantic jet or the beginning of the container revolution. Nevertheless, technological innovations will continue to affect the location of freight transportation, as well as the number and character of employment opportunities in America's cities.

Freight transportation consists of three main activities: 1) loading and unloading transportation vehicles at docks, ports, depots, and airports; 2) transporting the goods in vehicles (ships, rail, truck, airplane); and 3) freight services (e.g., freight forwarders). Historically, employment in all three areas tended to be located in urban areas, primarily because the infrastructure, particularly of ports and rail yards, and later airports, was there. Moreover, freight was also dispersed regionally, with most major coastal (ocean and inland) metros having their own ports, most metros having their own airports, and a large number of cities having truck and rail depots and transfer points. New technologies in freight have changed and will continue to change the spatial location of freight activities, particularly unloading and loading, both within metropolitan areas and between regions.

Within metropolitan areas, changes in the technologies of goods movement and distribution have shifted these activities from central city locations to the periphery, driven by considerations of cost, access, and land availability. This trend is likely to continue, for several reasons. First, as transport vehicles and handling equipment become larger and more capital intensive, facilities need larger and cheaper parcels of land. Second, traffic congestion and infrastructure restrictions limit the ability of many of the larger trucks and trains to enter core cities, or make it more difficult to regulate their access.

Competition for freight transportation and distribution is expected to intensify between regions. In part, this is due to increasing concentration and consolidation of shipping and of rail and air freight, as new information technologies allow control and scheduling from centralized locations, and as freight infrastructure becomes more capital intensive. Increasing capital intensity means a

[1]This section is based on a report prepared for the Office of Technology Assessment on freight transportation. Hugh O'Neill. "The Impact of Technological Change on the Location of the Freight Transportation Industry" (New York, NY: Appleseed, July 1995).

smaller number of more advanced facilities can handle larger throughputs more economically. Widespread deregulation of freight transportation has also increased competition and contributed to the spatial reordering of the industry.[2]

The days are gone when all that was needed to gain a freight job was a strong back and a willingness to work hard. With the adoption of more expensive and complex equipment, large numbers of lower-skilled urban workers can no longer easily be employed in freight handling. Moreover, future advances in technology are likely to require even higher skill levels.

Shipping and Ports

There are four main technological trends in shipping: increased containerization, larger ships, more advanced port infrastructure, and application of information technology to tracking goods movement. The development of the container was a major change.[3] Even though containerization is already widely used, the range of products shipped through containerization is expected to grow as container technology is adapted to handling a wider variety of goods. Container ships are expected to increase in size as shipping companies seek to realize the economies of scale that containers make possible. The first generation of container ships typically carried 600 to 800 boxes; by the late 1970s, ships carrying more than 2,000 TEUs (20-foot equivalent units) were common. By 1990, ships with a capacity of 4,000 TEUs were plying the world's major trade routes, and some analysts expect that the cost-per-ton-mile of shipping containers in 5,000 TEU vessels will fall to levels comparable to that of bulk shipping. In addition, shipping companies and terminal operators now use computerized vessel stowage and terminal layout programs to plan the loading and unloading of cargo. Computerized preparation and processing of cargo release documents, in some cases using voice recognition systems, helps speed the movement of trucks into the terminal and back out again. These trends are concentrating shipping in even fewer ports, and encouraging the location of newer port facilities away from urban cores.

Port Consolidation

Prior to the container revolution, central-city ports along the Atlantic, Gulf and Pacific coasts and, to a lesser extent on the Great Lakes, handled most of the nation's cargo trade. Their proximity to major markets minimized the need for inland transportation. Steamship lines usually called at ports in all the major markets, since moving the cargo by sea was usually easier and cheaper than unloading and repacking it for shipment by land.

With the advent of containerization, the shipping industry's requirements changed dramatically. Ports that handled smaller cargo volumes often found it difficult to finance the large up-front investment required to handle containers. As the shift from break-bulk carriage to containerization took hold, older, smaller ports on the East and West coasts lost traffic to new container ports in places such as Port Newark/Elizabeth, New Jersey, Oakland, Los Angeles and Long Beach. Containerization also affected the balance of trade between eastern and western ports. It was only with the advent of containers that true intermodal movement—relatively easy movement of boxes from ships to rail, and then to trucks for final delivery—became possible. The introduction of doublestack trains made "mini-landbridge" service—rail transport of containers from West Coast ports to East Coast markets—increasingly attractive. Minibridge routing was faster and allowed

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[2] M. Kuby and N. Reid, "Technological Change and the Concentration of the U.S. General Cargo Port System: 1970-1988," *Economic Geography*, vol. 68, 1992, pp. 272-289.

[3] Shipping goods by container has meant a dramatic increase in goods handling productivity. As a result of containers, terminal handling costs declined from 55 percent of the cost of international shipping to 15 percent. Paul W. Chilcote, "The Containerization Story," in Mark J. Hershman, *Urban Ports and Harbor Management* (New York: Taylor & Francis, 1988), p. 130.

carriers to avoid the Northeast's higher-cost ports, which helped offset the higher line-haul cost of minibridge.

With stack trains carrying a rising flood of Asian goods to East Coast markets, East Coast ports—including New York, Philadelphia, and Baltimore—saw their share of the nation's maritime trade decline. Atlantic Coast ports handled 61 percent of the country's maritime trade in 1962; their share declined to 40 percent by 1987. Over the same period, the Pacific Coast ports' share rose from 13 to 46 percent.[4] Ports on the Gulf Coast also saw their share of maritime trade decline, as shippers and carriers often found it more cost-effective to serve this part of the country via rail connections to the major load centers. The rise of efficient intermodal service linking ships to trucks and rail also dealt a severe blow to maritime traffic on the St. Lawrence Seaway and the Great Lakes; by 1990, the Great Lakes ports combined share of America's maritime trade had declined to less than 1 percent.

For several reasons, the trend toward larger container ships will reinforce the concentration of maritime trade in a limited number of large "load center" ports. First, the economics of large ships favor limiting the number of port calls a vessel makes; fewer calls mean shorter transit times, better utilization, and more "turns" per ship. Larger ships, moreover, naturally favor ports that consistently generate enough traffic to keep them filled. The proliferation of large ships will also require substantial investments in the ports that serve them. Ships carrying 5,000 TEUs or more require drafts of 46 or even 50 feet. Ports that require extensive (and expensive) dredging, such as Newark/Elizabeth and Oakland, could be at a significant disadvantage relative to those whose harbors have greater natural depth (e.g., Seattle).

Since the value of lower ocean transit costs can be negated if containers wind up sitting on the ground for several days, shipping companies and terminal operators have an incentive to invest in equipment to expedite the movement of large volumes of containers—such as a new generation of faster, more powerful cranes. However, given the cost of such equipment, they also have an incentive to limit the number of locations in which its installation is necessary.

Finally, the relentless shift from break-bulk to containerized cargo will reinforce the trend toward concentration that is driven by larger ships. The decline of break-bulk will leave smaller ports with fewer opportunities to specialize in the handling of non-containerized niche cargoes such as automobiles, coffee, and cocoa.

Decrease in Central City Port Activities

Container-ships need linear berths, backed up by broad expanses of open land, rather than old-fashioned finger piers. As new container facilities were developed on the periphery of major port cities, once-bustling inner-city piers declined. In some cities they were converted to other uses; in some they were left to decay.

No city offers a better example of the intra-regional impact of containerization than San Francisco. Dominant in West Coast maritime trade since the days of the Gold Rush, the city's economy was built around the cargo piers that framed its waterfront. But despite its maritime roots, San Francisco was slow to grasp the implications of the container revolution. While the Port of Oakland, its competitor across the bay, invested heavily in a new container terminal in the 1960s, San Francisco continued to invest in its break-bulk terminals. By 1979, Oakland was handling 10 times

[4] Scott Campbell, "Increasing Trade, Declining Port Cities: Port Containerization and the Regional Diffusion of Economic Benefits," Helzi Noponen, Julie Graham, Ann R. Markusen (eds.), *Trading Industries, Trading Regions: International Trade, American Industry and Regional Economic Development* (New York, NY: Guilford Press, 1993), p. 221.

the container volume handled in San Francisco. In the following decade, the value of Oakland's cargo traffic quadrupled, while that of San Francisco fell by 35 percent.[5]

Across the continent, developments in New York paralleled those in the Bay Area. The finger piers flanking Manhattan and the Brooklyn waterfront were ill-equipped to handle containers. Marine cargo traffic quickly shifted to newly built container terminals across the harbor, in Newark and Elizabeth, New Jersey.[6]

Increased containerization could put at risk some smaller urban core facilities that have managed to survive by handling break-bulk niche cargo. Since the mid-1980s, for example, New York's South Brooklyn Marine Terminal has had no business other than handling break-bulk shipments of cocoa. Loss of its cocoa trade would probably mean the end of maritime activity at South Brooklyn.

Perhaps most importantly, the transition to larger ships will favor those areas that offer direct access to rail service and to interstate highways. Because these ships are so large, and unloading and transport speed at the next stage is so critical, locations that cannot offer such service are likely to wither. Moreover, as discussed below, the rise of double-stack trains serving ports means that cities served by a single rail line with clearances too low to accommodate double-stack trains will suffer. Similarly, locations with poor highway access will also lose market share. At least a few older cities are likely to lose the last vestiges of their role as working cargo ports.

Air Cargo and Airports

Just as technological change redefined the geography of the maritime industry, so has it contributed to a redistribution of air cargo activity. In this case, however, the result has been to disperse air cargo activity across a larger number of hubs and gateways, rather than to concentrate it. This dispersion has been fueled by the significant growth in air cargo itself, in part because of the rapid emergence of integrated all-cargo carriers after Congress deregulated the air cargo industry in 1977. By 1987, a half-dozen integrated carriers—Federal Express, UPS, Emery, Airborne, Burlington, and CF Air—had carved out a powerful position in the domestic air cargo business. The volume of cargo they handled grew by more than 400 percent in just a decade; their combined employment grew six-fold. Their combined fleet grew from 59 jets in 1977 (most of them small) to 402 a dozen years later (two-thirds of them 727's and DC-8's).

Information technology has been essential to the rise of the integrated air cargo carriers, and in particular to the growth of small package express services. The rapid delivery and high reliability these companies offer would be impossible without aggressive use of technology throughout their operations. The use of sophisticated information systems to manage the delivery of packages "end to end" led to the rise of integrated carriers such as United Parcel Service and Federal Express. UPS, for example, pioneered the use of "delivery information access devices" or DIADs—hand-held computers that allow drivers to input information about a shipment into the company's computer system at the point of pick-up or delivery. In addition, bar-coding has made it possible for the express carriers to automate some of the sorting that occurs at their primary and secondary hubs. It also allows them to track the movement of packages through their networks, and to share this information with their customers.

Regional Patterns

Just as with other modes of transport, the increasing importance of air cargo has contributed to the emergence of such new centers of national and international commerce as Memphis, Miami, and Louisville (see table 6-2). Initially, all of the integrated carriers pursued a similar strategy—es-

[5] Ibid.

[6] B. Warf and L. Kleyn, "Competitive Status of U.S. Ports in the Mid-1980s," *Maritime Policy and Management*, vol. 16, 1989, pp. 157-172.

TABLE 6-2: Integrated Air Cargo Carriers' Primary Hubs, 1987

Federal Express	Memphis, Term.
United Parcel Service	Louisville, Ken.
Emery-Purolator	Dayton, Ohio
Airborne Express	Wilmington, Ohio
Burlington Express	Ft Wayne, Ind.
CF Air	Indianapolis, Ind.

SOURCE Office of Technology Assessment, 1995

tablishing hub-and-spoke systems for collection and distribution of packages, and making intensive use of information and communications technology to manage the flow of cargo in real time. All of them chose airports in or near the Ohio Valley and the Mid-South for their primary hubbing operations. Hubbing out of this region was efficient because its central location minimized the distance to most of America's people and businesses. Moreover, the cost of doing business in this region was considerably lower than it was in older air cargo centers such as New York, Chicago, and Los Angeles.[7] Most of these sites also offered access to the large work force required to support the integrated carriers' labor-intensive hubbing operations. The number of people UPS employs in its Louisville hubbing operations (about 13,000) is greater than the number of active longshoremen at all East Coast ports combined.

The growth of the two largest integrated carriers was so rapid, however, that by the mid- 1980s it was becoming clear they could not continue to channel nearly all their air traffic through Memphis and Louisville. The next step in the evolution of the system was a series of regional hubs. Federal Express established regional operations in Oakland, Indianapolis, and Newark, New Jersey; UPS, in Philadelphia and Ontario, California.

Just as advances in information technology have made possible the integrated carriers' complex hubbing operations—as well as the high-speed, highly reliable service immortalized in FedEx's tag line about "absolutely, positively" getting there overnight-so is information technology making possible a network of regional hubs. The ability to maintain central control over information-and the ability to make transactions appear seamless to customers, regardless of how they are routed—"is a prerequisite for the decentralization of operations. Advances in information technology make it possible for carriers, transportation managers, and shippers to centralize control of information, even as they decentralize operations.

Even with rapid expansion of regional hubs, air cargo operations have remained in metropolitan areas largely because the major airports handling passenger traffic are there. However, recently there has been increased interest in all-cargo airports. Such airports, in theory, would not have to be located in high-cost metropolitan locations. For example, the state of North Carolina has plans for a 15,000-acre complex combining an all-cargo airport and an industrial park, called Global Transpark, to be located in Kinston, a rural community in the state's economically distressed eastern region.

However, the concept of all-cargo airports has generally met with considerable skepticism in the air cargo industry, particularly proposals to locate new cargo airports in rural areas that do not generate any substantial air cargo of their own.[8] In 1991 about 50 percent of all cargo was carried in the bellies of passenger planes; and Boeing's annual aviation forecast projects this will increase to 58 percent by 2005. Relatively few cities or regions generate enough freighter traffic to sustain a separate facility. Moreover, airlines that provide both belly and freighter service-such as KLM and

[7] Peter Spaulding, "Reinventing the Air Cargo Wheel," *Portfolio*, Autumn, 1988, pp. 21-22.

[8] Considerations such as these led the FAA in 1991 to conclude that: " ....cargo will remain concentrated at very busy airports near major population centers where there is ample capacity available to shippers in the baggage holds of airliners.... Efforts to develop regional air cargo airports at other locations will involve considerable expense and financial risk." Department of Transportation, Federal Aviation Administration, *A Feasibility Study of Regional Air-Cargo Airports,* August 1991, p. 7.

Lufthansa—much prefer to have the two types of flights serviced by the same cargo terminal facilities, rather than duplicating facilities at separate passenger and cargo airports. And even all-cargo carriers such as Federal Express have a strong incentive to share basic airport infrastructure such as runways, roadways, and utilities with passenger airlines. The fact that most cargo activity occurs at late-night and early-morning hours, when passenger traffic is light, reinforces the logic of such sharing. Finally, cargo terminals at smaller airports may not have the volume of traffic needed to justify investment in complex automated systems.

Nevertheless, the recent success of Rickenbacker International Airport in Columbus, Ohio, and the beginnings of air cargo service at Alliance Airport in Fort Worth, suggest that cargo airports can work in some circumstances. Perhaps the most important is that the region the facility will serve already have a substantial traffic base, or at least be well-positioned to generate new traffic; these regions are usually larger and mid-size metropolitan areas.

Decentralization to Outlying Airports within Metropolitan Areas

Metropolitan airports have become major centers of goods movement and distribution, but these activities generally takes place either at outlying locations within the central city, or in the outer suburbs. In metropolitan areas that have both older, smaller downtown airports and larger, newer (that is, post-World War II) airports farther out, air cargo and related distribution activity tend to be concentrated at the larger facilities—at Kennedy rather than LaGuardia, Dulles rather than National, O'Hare rather than Midway, Dallas-Fort Worth rather than Love Field. Newer airports, such as Alliance and Denver, are even farther from the urban core.

Moreover, in some cases the growth of cargo handling and distribution at these airports has attracted support-service businesses, such as freight forwarding and customs brokerage, that had previously been concentrated in downtown areas. In 1970, 79 percent of all employment in this industry in the New York metropolitan area was concentrated in Manhattan, but by 1986 Manhattan's share had declined to 31 percent. Nearly half of the region's freight-forwarding and customs brokerage jobs were located in the area around Kennedy Airport, in Queens and Nassau counties.[9] Chicago has seen a similar migration from downtown to suburban areas near O'Hare.

Railroads

Although the major railroads will continue to make investments to increase the capacity of older intermodal terminals in or near central cities, a substantial share of the growth in longhaul intermodal traffic could be shifted to very large terminals built on greenfield sites on the fringe of major metropolitan areas. There are a number of innovations in rail service that are contributing to this decentralization.

First, though most train cars have not increased in size, they can haul more freight, largely because of double-stack container trains—trains that haul containers on specially designed rail cars that are slung lower than conventional cars and permit stacking of one container atop another.[10]

In addition, in a continuing effort to compete with conventional trucking services, railroads and intermodal companies are developing technologies aimed at making rail intermodal service more competitive at distances under 800 miles. A number of innovations reducing the time spent in

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[9] Cathy Lanier, "The Nature of Trade-Related Services in the New York-New Jersey Region and the Influences on Their Location," Port Authority of New York and New Jersey, October 1990, p. 21.

[10] Double-stack service has grown rapidly since its introduction just over a decade ago. In April 1984, American President Companies started the first regular service, with just one train per week from Los Angeles to Chicago. By early 1995, about 250 double-stack trains per week were linking 86 metropolitan areas in the U.S., Canada and Mexico. Gerhardt Muller, *Intermodal Freight Transportation*, 3rd edition (Landsdowne, VA: Eno Transportation Foundation/Intermodal Association of North America, 1995), p.71.

BOX 6-1: Information Technology and Railroad Operation Location

Burlington Northern opened the James J. Hill Center, located on a 350-acre campus in Fort Worth, Texas, in April 1995. The new complex, which will ultimately employ about 870 people, is replacing seven regional dispatch centers that had previously managed the flow of traffic over BN's 22,000-mile network,

At its heart is a single 45,000-square-foot room, dominated by nine 18-by-24-foot screens, on which are displayed constantly changing real-time maps of the railroad's operations. They show where trains are, whether they are on-time, and weather conditions throughout the system. Individual dispatchers monitor train operations both on computer screens and by voice contact with train crews; a dispatcher in Fort Worth can type instructions into the system that will result in a switch being thrown a thousand miles away. Other specialists watch over BN's signaling systems, keep track of power consumption, and manage the deployment of personnel.

Burlington Northern planned the Hill Center with plenty of room for expansion. The railroad is now considering centralizing its marketing operations in the same location. '

[1] Jack Burke, "BN Inaugurates Network Operations Center," *Traffic World,* May 1, 1995, pp. 36-37

transferring cargo from one mode to another have helped spur the growth of intermodal traffic. Several equipment manufacturers have developed vehicles that can travel both on rails and on the highway. The only version that has seen any extensive commercial use to date is called the RoadRailer. It is, in effect, a highway trailer to which a specially designed set of rail wheels can be attached.

Rail operations have also benefited greatly from the development of real-time information systems that monitor the movement of equipment, deploy it more efficiently, and keep track of its performance. Today, all of the major railroads manage their operations through automated train control systems, or ATCS. These systems are often managed from a single nerve center. The newest of these is Burlington Northern's operations center in Fort Worth, opened in April 1995 (see box 6-l).

Decentralization of Operations

After several years of sustained growth in long-haul intermodal traffic, and with growth expected to continue during the next decade, many of the nation's railroads are scrambling to increase the capacity of intermodal terminals in major metropolitan areas. In some cases, this has meant modernization and expansion of older rail yards located in or near the central city. CSX Intermodal, for example, is now expanding its terminal in Little Ferry, New Jersey—less than 10 miles from midtown Manhattan—by about 80 percent.[11] Conrail has sought to speed the flow of traffic through its South Kearney, New Jersey, terminal-the busiest intermodal rail facility on the East Coast—by expanding its gate complex and making more extensive use of automation. 12

However, several carriers have chosen a different strategy—very large intermodal terminals at

[11] "speed at the Tracks," *Via,* Port of New York-New Jersey, March/April 1995, p. 27.

[12] John H. Perser, "Intermoal Terminals of the Future will Offer Myriad of Choices, Demand Careful planning," Traffic World, April 18, 1994, p. 37.

greenfield sites on the periphery of major metropolitan areas. In 1994, the Santa Fe Railway opened a 575-acre terminal near Alliance Airport, on the outskirts of Fort Worth. The terminal has three tracks, each 6,000 feet long, with truck lanes in between; Santa Fe officials say the terminal has a capacity of 300,000 container lifts per year. The new facility replaces three smaller Santa Fe yards in Dallas and Fort Worth. Santa Fe has also built a new 269-acre terminal in Willow Springs, Illinois, to relieve congestion at its Corwith Yard in Chicago; and Norfolk Southern is developing a new 800-acre terminal west of Atlanta.

Although there is still considerable room to increase the capacity of older intermodal terminals by speeding the flow of traffic, greenfield sites could prove increasingly attractive as the volume of long-haul traffic rises. New yards on such sites can be designed from scratch to maximize the efficiency of intermodal operations much more easily than retooling a yard originally designed for box cars. Long parallel tracks such as those at Santa Fe's Alliance facility make it possible to work several mile-long double-stack trains simultaneously without breaking them down. Roadways and terminal gates can be designed to move trucks in and out more quickly; and outlying sites often permit truckers to avoid the street and highway congestion that characterizes the metropolitan core. Finally, in some cities it is difficult to move double-stack trains in and out of rail yards, due to low bridge heights.

Trucking

One of the main changes in trucking has been the increase in the size of trucks. In 1984, most new trailers manufactured in the United States were 48 feet long; only about 1 percent were longer. By the early 1990s, the most common length for new trailers was 53 feet.[13] Fourteen states had enacted legislation allowing 57-foot trailers on some highways. The width of trailers permitted on the interstate system was also increased from 96 to 108 inches.

Decentralization of Trucking

The past several decades have seen a shift in the trucking industry away from the city center. This trend reflects a number of other changes that have occurred in the economy of metropolitan areas. In port cities, for example, drayage companies have tended to follow maritime activity to new container facilities away from the downtown waterfront. The shift of manufacturing away from central cities has also led to a shift in trucking, as firms followed their industrial customers to outlying areas. Ready access to interstate highways has also been a factor in truckers' location choices. Land costs are also important, particularly for less-than-truckload carriers, who need terminals for breaking down and consolidating shipments.

The trend toward larger trucks will further erode the already-tenuous position of many older cities as regional or national distribution centers. Bridges, tunnels and arterial highways in these cities were in many cases not designed to accommodate trailers as large as those in use today, let alone even larger vehicles. Much of New York City, for example, is already off-limits to 102-inch-wide trailers; other cities, including Philadelphia and Boston, also strictly limit access by large trucks. In many cases, truck shipments bound for New York City are delivered to terminals in northern New Jersey, then transferred across the Hudson in smaller "straight trucks."

Urban Core Freight Niches

Although the trend is for continued dispersion of freight activity to lower-cost metros and to outlying areas within metros, there are three areas where urban cores may continue to play a role. First, while many freight services, particularly air freight, have moved to the suburbs, other freight services have remained downtown. In part, this is because of the proximity to other firms in down-

[13] Gerhardt Muller, op. cit., footnote 10.

town locations. Second, many freight terminals have sunk costs of infrastructure in urban areas, making it expensive to move. For example, Conrail has just introduced a new generation of container stackers—the world's largest—at its Croxton Yards facility in New Jersey, just a few miles west of midtown Manhattan. Such large-scale physical investments exert inertia to stay in these locations. Similarly, large ports have invested in container cranes, electronic processing systems, and land-based infrastructure. In addition, in some cities where the large freight airport is still close to the urban core, these cites continue to provide jobs. For example, New York's Kennedy airport, with a total land area of 5,000 acres, has plenty of space available on which to develop air cargo facilities.

Third, just as specialty and flexible manufacturers appear to have competitive niches in urban cores, so too do specialty freight carriers. As a result, the next decade could see smaller facilities in or near central cities that are designed to handle short-haul and specialty cargo. In shipping, a new generation of faster, smaller vessels now being developed might complement very large container ships by providing feeder service from smaller ports to large load centers. In addition, because they need not aggregate the massive volume of cargo required for economical operation of very large container-ships, smaller, faster vessels could operate more effectively in "point-to-point" service. Whether smaller, faster vessels—such as those now being developed by FastShip Atlantic—can succeed in capturing a significant share of America's maritime trade remains to be seen.

In intermodal rail and truck freight, the short-haul economics will make sense only if the truck trips at either end are short as well. This argues for keeping terminals as close as possible to customers, and if short-haul service attracts enough volume to justify them, for multiple terminals. For example, the "Iron Highway" system that CSX Intermodal will begin testing this summer between Chicago and Detroit will use an existing 10-acre yard in Chicago.[14] Because they provide a roll-on, roll-off system, Iron Highway terminals will not need elaborate and expensive lifting equipment; they will, however, emphasize moving trailers in and out quickly. Whether new forms of intermodal service can be truly competitive with trucks at distances of 300 to 500 miles remains to be seen. Even if it succeeds, short-haul intermodal is likely to remain a niche service, targeting specific markets. But it could provide some small-scale opportunities in central cities—and could offer central-city shippers some new opportunities for moving their goods.

Finally, not all types of trucking have declined in central cities. In New York, for example, even as trucking companies serving the city's shrinking manufacturing base were declining, courier services linked to the city's services sector were expanding. The high value of the goods carried by these companies, and the premium placed on timely delivery, make it easier to justify the high cost of New York City terminal space. UPS, for example, has several terminals in the city, including one on the lower west side of Manhattan.

WHOLESALE TRADE AND DISTRIBUTION[15]

The spatial distribution of wholesale employment has remained decidedly metropolitan over the last 25 years, with the share of employment in metro areas hovering around 88 percent (compared to 82 percent for all U.S. employment). However, like freight transportation, goods distribution is undergoing technological change that could lead to relocation or consolidation of facilities in

[14] The Iron Highway is a train of articulated rail cars that, when linked, form one continuous surface. This "highway" makes it possible for conventional tractors to pull trailers directly on and off the train, using sliding ramps.

[15] This section is based on a report prepared for the Office of Technology Assessment on wholesale trade and distribution. Amy Glasmeier and Jeff Kibler, "Turning Stocks into Flows: The Effects of Technological Change and Transportation Deregulation on the Location of Wholesale Employment in the U.S.," July 1995.

lower-cost areas away from urban cores. Information and telecommunications capabilities allow firms to deliver goods much faster than before, allowing in turn a consolidation of distribution facilities. Regional competition for distribution business is likely to intensify, as the trend toward consolidation puts this activity in play. Moreover, as technologies enable faster and more responsive delivery and as distribution facilities get larger, they will tend to locate outside the core of large metropolitan areas.

Technological Change

The wholesale trade industry is in the midst of a technological revolution that is speeding up the flow of goods and moving the wholesale industry from a system of stocked warehouses close to population and industry centers, to one of fewer larger-scale distribution centers serving large geographic areas. Much of this change is made possible by information technology, which allows goods to be moved quickly to where they are needed. There are several important technologies.

Electronic data interchange (EDI), or computer-to-computer information interchange, significantly improves the amount, timeliness, and quality of data transfer. Companies communicate order shipment information with vendors, suppliers, transportation carriers, and customers.[16] EDI can compress time for the wholesaler and facilitate a more flexible distribution system. Moreover, through EDI, demand can be communicated in real time from the point of need to the point of supply, enabling wholesalers, distributors, and manufacturers to react more quickly to demand. Use of EDI in public/contract warehouses is expected to double by the year 2000.[17]

If EDI links the transactions of firms, bar coding is how information is exchanged. Bar coding is improving logistics and inventory control by improving data collection accuracy, reducing receiving operations time and data collection labor, and integrating data collection with other areas.[18] Companies can assign items more quickly to the warehouse, warehouse personnel can prepare orders more rapidly, deliveries are more accurate and timely, and there are fewer claims to process. A warehouse receiving area equipped with a bar-code system can check in 300 cartons per hour, compared to 120 cartons per hour manually.[19] Future innovations in bar coding will allow greater amounts of information to be stored in ever smaller spaces and will dramatically reduce administrative and order preparation time. The use of bar coding and scanning systems is expected to rise from 15 to 81 percent by the year 2000.[20]

A third major area of technological change is mechanization of distribution facilities, commonly through a conveyor system. Warehouse automation is expected to climb from 17.8 percent in 1990 to 54.7 percent by the year 2000.[21]

These technological changes have facilitated the development of new practices, including the development of "just-in-time" (JIT) delivery systems where goods are delivered to their destination at the time and in the quantities that they are needed. Just-in-time systems demand that suppliers and transport providers deliver materials fast,

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[16] John J. Coyle, Edward J. Bardi, and John C. Langley, *The Management of Business Logistics*, 5th edition (St. Paul, MN: West Publishing Company, 1992).

[17] Arthur Anderson and Company, *Facing the Forces of Change 2000*: *The New Realities in Wholesale Distribution.* (Washington, DC: Distribution Research and Education Foundation, 1994), 244 pp.

[18] A bar coding is a series of black and white bars of varying width, whose sequence represents letters or numbers. This sequence is a code that computer-controlled electronic scanners can translate into information such as shipment origin and destination, product type, and price.

[19] Coyle, Bardi, and Langley, op. cit., footnote 16.

[20] R.V. Delaney and B. La Londe, *Trends in Warehousing Costs, Management, and Strategy* (Oak Brook, IL: Warehousing Education and Research Council, 1993).

[21] Arthur Anderson and Company, op. cit., footnote 17.

frequently, and with a high degree of reliability. Right behind JIT, in the retail apparel industries, came Quick Response (QR) where the manufacturer and retailer share point-of-sale data from the retailer's cash register to coordinate the flow of inventory from plant to store. For example, K-Mart has adopted a Quick Response program with its vendors. The percentage of goods shipped using QR/JIT is expected to increase almost threefold, from 14.4 percent in 1994 to 39 percent in the year 2000.[22]

Another new approach is "cross-docking," a practice pioneered by Wal-Mart. In cross-docking, shipments of goods arriving at a warehouse or distribution center are not put into storage at all, but are instead immediately broken down and reorganized for re-shipment to other destinations. A warehouse operated by an apparel retailer, for example, might during the course of single morning receive shipments from a dozen manufacturers, break them down and recombine them for distribution to a hundred stores before the end of the day. Today, only the most sophisticated distribution centers have such systems; during the next decade, they will become increasingly common.

Regional Concentration of Distribution Functions

These new technologies and practices allow wholesale distributors to serve several urban markets from a centralized distribution facility. New information technologies and practices allow products to be delivered to the customer much more quickly than before. Moreover, the declining real cost, increased reliability, and increased speed of many forms of transportation (particularly integrated, all-air cargo operations), mean that distributors do not need to be close to the final customer. These changes are making it possible for distributors to remain functionally close to customers, without being geographically close. Finally, automation is leading to consolidation since facilities must be larger to support dedicated automated equipment and achieve economies of scale.[23] For example, it is much easier and less expensive to operate sophisticated warehouse systems in three locations than in 12. By consolidating distribution facilities, companies cut costs and improve quality control, without sacrificing customer responsiveness.[24]

Over the past decade, firms in many industries have consolidated their logistics function. Fifteen years ago, most consumer-packaged goods companies operated 10 to 15 stocking locations. Today, most have consolidated operations in five to seven locations (see table 6-3). National pharmaceutical and medical products distributors, for example, previously operated up to 90 locations; today, the three major distributors have between 45 and 48 facilities, with plans to consolidate further to between 30 and 35 locations.

Some firms have concentrated their operations in just a few (or even just one) large distribution center. Nike, for example, ships shoes and apparel to retailers throughout the country through three distribution centers—a 400,000-square-foot facility (for shoes) near its Beaverton, Oregon, headquarters, and two in Memphis (with a combined total of 1.4 million square feet of space) handling apparel and shoes, respectively. Distribution operations for The Limited, a major apparel retailer, are even more centralized, with more than 3,500 stores nationwide supplied from a single, massive distribution center near its Columbus, Ohio, headquarters. In addition to its proximity to headquarters, Columbus offered a central location, frequent double-stack intermodal service from the West Coast, air cargo facilities,

[22] Ibid.

[23] W. Copacino, "Back to Market-Based Warehousing," *Traffic Management*, vol. 32, No. 10, October 1993, p. 29.

[24] Robin Pano, "Pull Out the Stops in Your Network," *Transportation and Distribution*, August 1994, pp. 38-40.

TABLE 6–3: Recent Examples of Distribution Consolidation

Company	Business	Consolidation
AT&T	Wireless communications equipment	Consolidated international distribution from Columbus, Denver and Oklahoma City in a new 250,000-square-foot facility in Columbus.
Canon	Copiers, fax machines	Consolidated five regional warehouses into one national distribution center in Memphis in 1993.
Nike	Athletic Shoes and Apparel	Consolidating 31 distribution centers into a single center in Lakdaal, Belgium.
Dress Barn	Apparel retailing	Moved from four warehouses in New Jersey and Connecticut into a new 51O,OOO-square-foot distribution center in Suffern, NY.

SOURCE Office of Technology Assessment, 1995.

and easy access to the interstate highway network. [25]

For U.S. cities and regions, this change in distribution patterns has profound implications. If facilities no longer have to be physically close to the customer to be functionally close, companies can be much more selective about the locations from which they distribute. Distribution increasingly becomes an "export" function--one for which regions must compete—rather than a component of each region's local service sector.

What factors will drive regional competition for distribution activity? The variables taken into account in classical warehouse site selection analyses—proximity to markets and to sources of goods, land, and labor costs—will still be relevant. [26] But as firms more strongly emphasize cycle-time compression and reliability of response, other factors are likely to become more important. For companies that ship many of their products on a just-in-time basis, proximity to an air express regional hub may be essential; others may require easy access to a double-stack intermodal terminal. Winners in this competition are likely to be regions that offer the best combination of access to large markets, frequent and extensive multimodal transportation service, good local access to transportation hubs, a first-class telecommunications network, a high-quality labor force, and competitive costs—and that have a coherent strategy for developing distribution business.

Increasingly, these are likely to be in smaller or mid-sized metropolitan areas in the 100,000 to 250,000 population range. For example, Sioux Falls, South Dakota, is a small metropolitan area with a growing cluster of distribution operations, including those of Nordic-Track and Gateway 2000. The cost of operating a 350,000-square-foot, 225-employee distribution center is $2 million to $2.5 million less in Sioux Falls than in metropolitan Minneapolis or Chicago, even after the higher cost of shipping into and out of Sioux Falls is taken into account. [27]

■ The Increase of Distribution Functions in Peripheral Areas

During the past two decades, most of the growth in warehousing and distribution has occurred on the periphery of America's metropolitan areas. For several reasons, this trend is likely to continue, driven by the technologies and operational prac-

[25] Apogee Research, Inc. Case Studies of the Link Between Transportation and Economic Productivity (Bethesda, MD: January 1991), p. 34.

[26] Coyle, Bardii and Langley, op. Cit., footnote 16, p. 429.

[27] Tom Andel, "Market Reach Grabs Shippers," Transportation and Distribution, June 1995, p. 54.

tices described above, combined with increasing consolidation.

First, information technology and new practices reduce order transmittal and processing time and provide a larger window of transportation time, allowing facilities to locate in peripheral areas of metros with lower land and labor coststwo large components of warehouse costs.

Second, traditional wholesaling buildings in the urban core are often not suitable for automation, regardless of cost. Thus, one major effect automation may have on the wholesale industry is the abandonment of many older, multi-level, urban warehouses, since in most cases it is more cost-efficient to build a new facility. Also, automation, along with EDI and bar-coding technology, is used in most cross-docking facilities, which are structured very differently from traditional urban warehouses.

The ideal modern warehouse is designed to maximize efficient material handling and storage. These structures are single-level facilities with high ceilings. The high ceilings, along with racking systems, provide efficient upward storage. The internal layout is designed for one-way flow of product, with the inbound and outbound functions at opposite ends of the building.

In general, older urban warehousing structures are multi-leveled and have lower ceilings than modern facilities. Many in the industry believe that, in most cases, renovating older urban warehouses is not cost-effective because of the extreme structural changes required for these buildings to be operationally efficient.

Even with cross-docking, which can be implemented in lower volume and smaller facilities, there are likely to be problems converting older urban warehouses. An efficient cross-docking operation requires a structure with a number of shipping and receiving doors. In addition, internally, the building must be designed to allow the unidirectional flow of product. Many urban structures have an inadequate number of dock doors, and are not designed for a flow-through system.

The increasing average size of warehouses and distribution facilities, driven by consolidation, leads to decentralization because larger parcels of land are needed. In central cities or close-in suburbs, especially in the more urbanized areas of the Northeast, it may be difficult to find suitable large sites. Even where sites are available that can support large, modern distribution facilities, high land costs provide a powerful incentive to locate on the metropolitan fringe.[28]

Finally, because facilities are being transformed into distribution hubs, a single-level, highly automated cross-docking facility is best located in areas of low congestion with access to major transportation routes. These are often in the outer suburbs. Moreover, the continuing evolution of the trucking industry will also work against older central cities as locations for distribution centers. Since most distribution facilities are at least partly dependent on long-haul trucking for both receipt and shipping of goods, their owners naturally want to take advantage of any measures that might reduce trucking costs. This means that locations offering unrestricted truck access will be more attractive than locations to which the largest trucks—whether as a result of regulatory restrictions or as a result of infrastructure limitations—do not have access. Companies planning to develop large distribution centers will thus tend to prefer sites with direct access to highways (usually interstates) on which very large vehicles—trailers more than 53 feet long, or more than 13.5 feet high, as well as doubles and triples—are permitted to operate.

However, just as with intermodal freight terminals, there may be opportunities to develop smaller distribution facilities serving more concentrated markets in central-city locations. Hospitals in some cities, for example, have moved to a "stockless purchasing system"—one of the

[28] Ann Strauss-Weider, "The Changing Face of Regional Warehousing," *Portfolio*, Summer 1989, p. 32.

more aggressive applications of just-in-time distribution. Very little material is kept on the premises; the hospital-supply contractor makes several deliveries to each hospital it serves during the course of a day. The contractor may "pick and pack" specific items not just for individual departments within a hospital, but even for specific closets and supply bins.[29] This system relieves hospitals of inventory and storage costs, and of the need to manage an internal distribution system. However, the need to make multiple deliveries each day, and the need to be able to respond quickly in emergencies, means that there are advantages to the distributor in being located close to the hospitals it serves. One of New York's leading medical supply companies, for example, now serves New York City hospitals from a distribution center in the South Bronx; and two other supply companies are now contemplating the establishment of similar facilities in the city. As more businesses and institutions implement just-in-time and direct-replenishment supply programs, opportunities to locate relatively small, specialized distribution centers in or near central cities should increase.

In addition, in some cases, however, ingenious designs can lead to innovative reuses of urban warehouses. For example, Space Technology, Inc. is renovating urban facilities to achieve functional warehouses. In Long Island, New York, the company is using a patented technology called the E-Z Riser to raise the roofs of urban structures. To solve the problem of lack of facilities for cross-docking and throughput distribution, some real estate entrepreneurs are using innovative marketing techniques that undertake feasibility studies and offer design plans for reuse of large vacant urban properties. Clark Properties, a St. Louis-based real estate company, is in the business of renovating urban industrial property. One such renovation was an abandoned General Motors plant. "This plant was transformed into the 160-acre Union Seventy Center, a self-contained industrial park with major warehousing and distribution operations. The Union Seventy Center represented a renovation of three million square feet of space. Clark Properties estimates that it will return 3,000 jobs to the St. Louis area. It already has attracted three major carriersJ.B. Hunt, Schneider National, and North American Van Linesall of which made Union Seventy Center their St. Louis terminal."[30] Large abandoned factories with good transportation access may provide an opportunity for some older central cities to attract some distribution jobs.

MANUFACTURING

Much has been written about the decline of manufacturing in older regions and cities in the United States. Starting first in New England in the mid-1970s, and spreading next to the industrial Northeast and Midwest in the late 1970s and early 1980s, metropolitan areas increasingly faced the wholesale restructuring and decline of older mass production industries, including steel, autos, lumber and wood products, oil and gas, and textiles. In addition, much manufacturing production moved from the old urban environments of the Frostbelt to the new cities and suburbs of the Sunbelt; in many cases, manufacturing left America altogether, exported to low-wage developing nations.

There are a number of technological reasons for the decentralization and deconcentration of manufacturing employment.[31] First, improvements in transportation have aided decentralization. Much manufacturing originally located in cities because of accessibility to energy, ports, railroads, markets, and, via waterways and rail, raw materials. Modern shipping technology, commercial aviation, interstate highways, and large

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[29] Apogee Research, Inc., *Case Studies of the Link Between Transportation and Economic Productivity* (Bethesda, MD, January 1991), p. 21.

[30] E. J. Muller, "Urban Logistics," *Distribution*, vol. 91, No. 4, April 1994, pp. 68-70.

[31] Manufacturing includes a wide range of diverse industries with different locational patterns. This chapter focuses largely on discrete goods producers (e.g,. automobiles, textiles, electrical equipment) and not on process industries (e.g., chemicals, petroleum, paper).

refrigerated trucks obviated industry's need to remain in the city, so that other factors, including labor and land costs, came into play in location decisions. In particular, the interstate highway system meant that manufacturers could choose from a larger selection of places. Also, as firm size grew and manufacturers were more likely to sell to many cities, the importance of the central city as the point of easiest access to the city market diminished.

Second, changes in production technology affected plant location. In the early and mid-part of this century, widespread electrification meant that factories could locate virtually anywhere in the United States and have access to electricity. Later, mass production technologies meant large plants with production laid out on one level. The old three- or four-story city plant was not appropriate to mid-20th century industrial production. For example, in the New York City region, factories built before 1922 averaged 1,040 square feet, increasing to 2,000 square feet between 1922 and 1945, and after the war to 4,550 square feet.[32]

In addition, as industries matured and reached the end of their product life cycle, manufacturing decentralized. According to product life cycle theory, products go through stages from innovation, to growth, to standardization.[33] In its early entrepreneurial and innovative stages, industry often requires design, engineering, inventive, and financial talents more likely found in the city. In the second stage of development, highly skilled urban workers with craft and technical know-how refine the product and begin production in small batches for small markets. But once production is standardized and mechanized and aimed at mass markets, a moderately skilled or even unskilled workforce can do the job. This last stage implies dispersal to where land, labor, and energy are less costly than in the city.[34] Moreover, as firms substituted capital for labor, more capital-intensive firms were able to secure needed labor in less populated areas.

Yet, for two reasons, technological change in manufacturing has not meant a movement away from metropolitan areas altogether. First, high-technology industries have concentrated more in urban areas, although largely in the suburbs. Second, technologically advanced enterprises are more likely to locate in urban areas, in part to be near suppliers, skilled workers, and other sources of innovation.

High-Technology Industries

Employment in high-technology industries, such as electronic equipment makers, aircraft, semiconductors, telecommunications equipment, and instruments, has grown much faster than in low-technology industries. High-tech manufacturing is more concentrated in metropolitan areas than lower-tech industries.[35] In 1982, 88.6 percent of high-tech employment was located in metropolitan areas.[36] For example, Barkely found that high-technology manufacturing grew faster between 1975 and 1982 in metropolitan areas than in nonmetro, and within metros, the suburban counties of large metropolitan areas grew the fastest.[37] Within large metropolitan areas, high-tech industries appear to be more suburbanized than low-tech industries (see table 3-5). Moreover,

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[32] Robert Fishman, *Bourgeois Utopias: The Rise and Fall of Suburbia* (New York: Basic Books, 1986), p. 196.

[33] U.S. Congress, Office of Technology Assessment, *Technology, Innovation, and Regional Economic Development,* OTA-STI-238 (Washington, DC: U.S. Government Printing Office, 1984).

[34] John Rees and J. Norton, "The Product Cycle and the Spatial Decentralization of Manufacturing," *Regional Studies*, vol. 13, 1979, pp. 141-151.

[35] OTA, *Technology, Innovation and Regional Economic Development*, op. cit., footnote 33.

[36] David L. Barkley, "The Decentralization of High-Technology Manufacturing to Nonmetroplitan Areas," *Growth and Change*, Winter, 1988.

[37] Ibid., p. 17.

innovative high-technology industries were even more likely to grow faster in metro than non-metro areas.[38]

Flexible Production Manufacturing

In the last 15 years much has been written about computer-integrated manufacturing (CIM).[39] A central feature of all components of CIM is the integration of computer-based information technologies into the production system. There are a number of technological components involved: 1) design and engineering technologies, including computer-aided design/computer-aided manufacturing (CAD-CAM), including digital CAD; 2) fabrication machinery, including computer-numerically controlled machines and robots; 3) automated materials handling, including automated storage and retrieval systems and automatic guided vehicles; 4) automated sensors, in particular for inspections and testing; and 5) communications systems, including Local Area Network (LAN) systems to communicate within the plant and with suppliers and customers.[40] These technologies allow firms to produce in more flexible ways than standardized mass production. Computer-aided manufacturing helps firms achieve efficiencies normally associated with long, dedicated production runs, but with shorter production runs. This kind of production is well-suited to small innovative firms that are involved in dense supplier and cooperative networks.

Relative to firms using less advanced technologies, flexibly specialized firms are more likely to be in metropolitan areas.[41] There are a number of reasons for this. First, flexible technology systems depend on the availability of sophisticated design and engineering talent, which is often found within metropolitan regions. Moreover, these firms often need to be near customers. For example, one study of manufacturing found that the New York City region was more oriented to small and medium-sized firms capable of quick turnaround on customized products.[42] Second, as FMS systems are adopted, the ratio of fixed costs (e.g., machines, software programming) to variable (e.g., labor, power) increases. Because these firms compete less on cost and more on other factors, such as quality, innovation, and response time, they face fewer pressures to move production to lower-cost peripheral areas.[43]

Third, these firms often enter into cooperative arrangements with other producers or suppliers, and the density and proximity offered by metropolitan areas are ideal for the growth of such agglomeration economies. In many cases, small flexibly specialized firms cooperate in order to defray the costs of expansion and technological modernization, and to exchange technical and

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[38] Ibid, p. 20.

[39] For example, see John A. Alic, "Computer-Assisted Everything? Tools and Techniques for Design and Production," *Technological Forecasting and Social Change*, vol. 4, 1993, pp. 359-374.

[40] Timothy Dunne, *Technology Usage in U.S. Manufacturing Industries: New Evidence From the Survey of Manufacturers* (Washington, DC: Center for Economic Studies, Bureau of the Census, U.S. Department of Commerce , November 1991, CES 91-7).

[41] David L. Barkely and Sylvia Hinschberger, "Industrial Restructuring: Implications for the Decentralization of Manufacturing to Nonmetropolitan Areas," *Economic Development Quarterly*, vol. 6, No. 1, 1992; see also Allen J. Scott, "The New Southern California Economy: Pathways to Industrial Resurgence," *Economic Development Quarterly*, vol. 7, No. 3, August 1993, pp. 296-309.

[42] Telesis, Inc., *Strategic Audit of the NY/NJ Manufacturing Sector*, prepared for the Port Authority of New York and New Jersey, 1988, cited in Mitchell L. Moss, Hugh O'Neill, Timothy Bates, and John Kedeshian, *Made in New York* (New York, NY: Taubman Urban Research Center, New York University, 1995).

[43] Ramchandran Jaikumar, "Postindustrial Manufacturing," *Harvard Business Review*, November-December 1986, pp. 69-76.

market information. For example, textile and apparel manufacturing in Los Angeles and New York appear to thrive, in part because of close contact with designers that allows them to produce new designs rapidly.[44]

Finally, computer-integrated manufacturing (CIM) and other flexible technologies appear to reduce optimal facility size, allowing smaller sites to be profitably used.[45] The average manufacturing establishment declined from approximately 50 employees in 1977, to 42 in 1992.[46] This reduces land and building costs, reducing pressure to migrate to areas with lower cost land; thus, locating within the confines of urban factories and warehouses becomes more feasible.

Finally, in the case of companies pushing for flexibility, employees find themselves engaged in a wider range of frequently changing tasks, putting a greater premium on alertness and diligence, as well as continuing on the job learning.[47] As a result, firms choose to locate in metropolitan areas to be close to higher skilled workers.

The Persistence of Urban Manufacturing and Its Future Prospects

Though new manufacturing process technologies based on information technologies helped slow the decentralization of manufacturing employment away from large, higher-cost metropolitan areas, it has not necessarily meant that manufacturing is staying in urban cores. In fact, high-tech manufacturing appears to be highly concentrated in suburban counties. However, technological change does open up the possibility of some urban manufacturing niches.

There are a number of reasons why some manufacturing remains in urban areas.[48] First, inertia; that is, many manufacturers in cores stay because they are already there, and moving is too expensive or bothersome. However, sooner or later, the owners of "inert" businesses retire or die, close their plants, and disperse their employees.

Second, some manufacturers, such as printing, food processing, construction materials, and arts/entertainment equipment are located in cities to serve local markets.[49] Similarly, recycling firms are on the increase in urban areas in order to be near supplies of consumer and business waste.[50] For example, in New York City, Pratt Industries, an Australian-owned company, has leased a 30-acre site on Staten Island and has recently announced that it intends to build a plant employing 400 people making linerboard and corrugated boxes. At $250 million, it is one of the largest manufacturing investments in New York City in several decades. The access to a reliable and concentrated supply of raw material (mixed waste paper) was a key factor in their location decision.

Third, manufacturing dependent upon rapidly changing designs or with need to be close to upscale customers may do well. The importance of design—one of the factors that plays a role in the persistence of manufacturing in New York—also appears to explain a modest revival of city

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[44] David Friedman, "Getting Industry to Stick: Enhancing High Value-Added Production in California," unpublished manuscript May 1992, p. 7.

[45] Jaikumar, op. cit., footnote 43.

[46] U.S. Department of Labor, Bureau of Labor Statistics, unpublished data.

[47] U.S. Congress, Office of Technology Assessment, *Worker Training: Competing in the New International Economy*, OTA-ITE-457 (Washington, DC; U.S. Government Printing Office, September 1990).

[48] Kenneth E. Poole and Caroline Samuels, "Manufacturing Trends in America's Larger Cities," in *Urban Manufacturing: Dilemma or Opportunity*? (Washington, D.C.: National Council for Urban Economic Development), pp. 21-28

[49] B.M. Nicholson, Ian Brinkley and Alan W. Evans, "The Role of the Inner City in the Development of Manufacturing Industry," *Urban Studies*, vol. 18, 1981, pp. 57-71.

[50] Hugh O'Neill and Megan Sheehan, *Exploring Economic Development Opportunities in Recycling*, (New York, NY: Urban Research Center, New York University and Appleseed, August 1993).

manufacturing in the Great Lakes region and in industries like automobiles and steel that were once key urban manufacturing sectors. Two recent studies describe a process of "reindustrialization within deindustrialization" or manufacturing "reconcentration" in the old industrial Midwest.[51] Hicks argues that Japanese manufacturers who build plants in the Midwest may not locate in central cities, but nonetheless make use of design, toolmaking, and engineering skills to be found in the region's cities.[52] Similarly, textile manufacturing in Los Angeles was spawned by design requirements. Los Angeles garment manufacturers required two things: high-quality, well-designed textiles, and just-in-time production that could satisfy the demand for seasonal clothing changes and sophisticated fashion. These manufacturers provided a local market for textile specialists from around the world—Iran, Korea, Western and Eastern Europe, and the eastern United States—all of whom converged in Los Angeles in the mid-1970s.

Fourth, the need for close linkages to other firms, including service firms, may give some urban areas a competitive edge. Linkage to the service sector helps to explain the persistence of another industry—entertainment-related manufacturing—crucial to the Los Angeles economy. The movie and television industry in Los Angeles now consists of many small firms, linked together regionally with corporate distributors on one end, and a host of suppliers and sub-suppliers on the other end.[53]

Finally, cities provide a pool of workers, many often immigrants, willing to work at low-wage manufacturing jobs (e.g., clothing apparel, leather goods). There are two reasons why the informal economy in manufacturing is generally an urban phenomenon. First, it makes use of low-wage but often highly skilled immigrant labor (e.g., Dominicans trained to sew, Asian cooks, Mexican and Brazilian metalworkers), especially undocumented aliens, who are now readily found in large cities. Second, it is comprised of small businesses whose start-up costs, plant spatial needs, and function in the larger economy are well-suited to a densely populated city location.[54]

New York City, for example, exemplifies many of the elements that make for the persistence and perhaps for the vitality of urban manufacturing. New York has a number of firms that remain because of inertia—e.g., Farberware cookware, which has been in the same building in the South Bronx for more than 50 years. New York City's density also provides an internal market for some kinds of manufacturing such as customized food supply and commercial bakeries. New York's role as a center for arts and design spawns customized manufacturing that relies heavily on the design component, that can adapt to cyclical changes in fashion, and that produces for niche markets. This helps to explain why industries like fashion apparel, leather goods, fabricated metals, specialized and upscale furniture manufacture, cosmetics, crafts and manufacture attendant upon movie making, and specialized textiles are doing well in New York. New York's strong service sector likewise stimulates certain kinds of manufacturing such as commercial printing, paper-related products, construction materials, office furnishings, arts/entertainment equipment and supplies.[55]

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[51] Richard Florida, "The Economic Transformation of the Industrial Midwest," Draft Paper, Carnegie Mellon University, August 1994; and Donald A. Hicks, *Beyond Global: Innovation and Adjustment in U.S. Automobile Manufacturing* (Washington, D.C.: American Enterprise Institute, 1994).

[52] Hicks, ibid.

[53] Susan Christopherson and Michael Storper, "The Effects of Flexible Specialization on Industrial Politics and the Labor Market: The Motion Picture Industry," *Industrial and Labor Relations Review*, vol. 42, No. 3, April 1989, pp. 331-347.

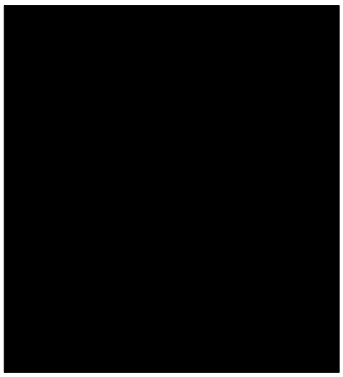
[54] Saskia Sassen, "The Informal Economy," in John Mollenkopf and Manuel Castells (eds.) *Dual City: Restructuring New York* (New York, NY: Russell Sage Foundation, 1991), pp. 79-102.

[55] Mitchell Moss, op. cit., footnote 42.

Telework, Intelligent Transportation Systems, and Telecommunications Infrastructure

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In addition to workplace technologies, there are other technologies that could have a significant impact on the spatial distribution of jobs and homes. This chapter examines three such technology systems: telework, intelligent transportation systems, and telecommunications infrastructure. Telework, which lets people work in distributed locations, including at home, is expected to increase, with potentially large impacts on where employed people live. Intelligent Transportation Systems (applying information technologies to surface transportation) could reduce congestion on metropolitan highways and improve traffic flow, similarly allowing people to live in outlying locations without spending more time commuting. Advanced telecommunication infrastructure is becoming highly dispersed across the country, enabling industrial development elsewhere than the largest metropolitan areas.



TELEWORK AND ITS EFFECT ON METROPOLITAN AREAS

The terms "telework," "telecommuting," "distributed work," and "teleprocesses" all refer to the substitution of transportation by the use of telecommunications and other information technologies, but these terms are often used to mean different things. The terms "telecommute" and "telework" were coined in 1973[1] and are better known than the other terms, but the distinctions are blurring.

[1] Jack M. Nilles, "Telecommunications and Organizational Decentralization," *IEEE Transactions on Communications*, vol. COM-23, No. 10, October 1975, pp. 1142-1147.

Telecommuting means the partial or complete substitution of an employee's normal working hours in a traditional office or other workplace by the home or alternative workplace such as a neighborhood telework center. Telecommuting reduces commuting time and is accomplished through information technologies.

Telework includes telecommuting, but also includes some self-employed people who work at home and mobile workers who use information technologies and telecommunications to do their jobs.[2] A teleworker may use a laptop and modem at the customer's site to conduct business; a telephone, fax, computer, and/or modem to work out of a permanent office located in the home; or a cellular telephone to conduct business while in a vehicle. As the broader concept, telework is more relevant to the overall study.

"Hoteling" is often a component of telework, and refers to two or more mobile workers sharing office space in a traditional office or telework center. Hoteling saves office costs but requires special workspace arrangements, as well as sophisticated telephone and computer networking tools. The offices should offer temporary or portable storage by the rotating workers, and should be able to route calls and electronic transactions to the worker, wherever he or she may be.

"Distributed work" is the use of telecommunications and other information technologies to perform work at a distance *but not necessarily outside of an office.*[3] In particular, distributed work specifically includes group activities—such as videoconferencing and networked information resources—that allow people from distant locations to work together. Distributed work can cut travel costs, and perhaps more importantly, permits work to be done that previously could not have been done at all, or only at great expense or inconvenience. In contrast, telework emphasizes the *substitution* of a home or other remote or mobile environment for the traditional office, although the difference is often difficult to distinguish and may eventually become meaningless.

Finally, a teleprocess is defined as an arrangement in which a remote transaction is performed by anyone (not just a worker) and is facilitated through the use of telecommunications (see figure 7-1).[4]

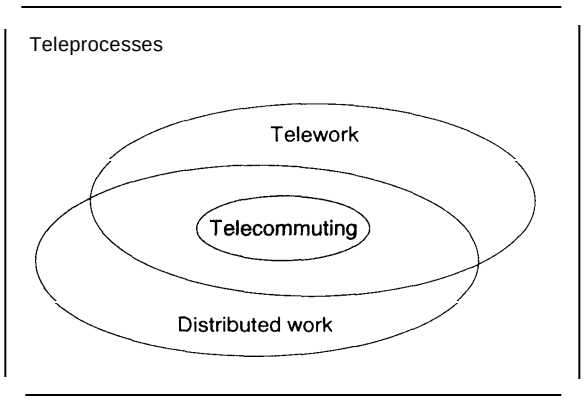
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[2] "Home work" or "home-based" work refers to any form of work at home—whether using information technologies or not. "Mobile work" or "nomadic work" may occasionally use a home or traditional office, but the primary focus of the work is to be in transit between locations (such as taxi drivers and truckers), on the customer's site (such as case workers, field service representatives, construction workers, etc.), or in other variable locations (such as reporters, video crews, police, etc.). "Remote work" can be defined as "work done by an individual while at a different location than the person(s) directly supervising it," and includes most types of mobile work and home work, including telecommuting. "Flexiplace" is part of a terminology that accounts for flexibility in time and space. That is, traditional work arrangements concern a relatively fixed time and place. "Flex-time" arrangements use the traditional work location, but allow the worker to be present at different times to reduce traffic congestion, etc. Flexiplace involves traditional working hours but flexible work location—thus, remote or mobile work. Finally, "flexwork" allows both time and location to be flexible.

[3] See Charles E. Grantham and Larry D. Nichols, "Distributed Work: Learning to Manage at a Distance," *The Public Manager* (Winter 1994-1995), pp. 31-34; Lee Sproull and Sara Kiesler, "Computers, Networks and Work," *Scientific American*, September 1991, pp. 116-123; National Research Council, *Research Recommendations to Facilitate Distributed Work* (Washington, DC: National Academy Press, 1994).

[4] Teleprocesses include telework and distributed work (moving the workers), but also teleservices, which uses telecommunications to change the location of customers. The set of teleprocesses includes such activities as electronic funds transfers, electronic data interchange (EDI), remote sensing, distance education, telemedicine, and the use of on-line and recorded information (see chapter 4). Teleprocesses could be extended to include perhaps all but personal telecommunications transactions. U.S. Department of Energy, Office of Energy Research, *Beyond Telecommuting: A New Paradigm for the Effect of Telecommunications on Travel* (Springfield, VA: National Technical Information Service, September 1994).

FIGURE 7-1: Diagram Showing Overlapping Terminology



SOURCE Office of Technology Assessment, 1995

■ Motivations for Telework

There are several reasons for the adoption of telework.[5] First, the worker can benefit, through reduced commuting time, a more flexible work schedule, more time with family, lower fuel costs, and possibly more freedom of choice in where to live. Telework can also increase opportunities for disabled workers and others who are limited in mobility.

Second, organizations can also benefit. Proponents claim that telework brings many immediate benefits to organizations, such as improving individual productivity, improving employee morale, reducing employee turnover, and reducing office space. However, some of the productivity increases noted in pilot studies have not considered the overall productivity of the organization. For example, an individual worker may greatly improve his or her own productivity by working at home, in part because many of the interruptions—e.g., telephone queries—are offloaded to fellow employees who remain in the office. Also, in the case of long-term, full-time telework, the employee may become isolated from the organization and his fellow workers, and his productivity may drop.

Third, proponents argue that metropolitan regions and society at large benefit from widespread telework because of reductions in traffic congestion, pollution, and energy use. To the extent that travel is reduced, accidents may also be reduced. Not all of these benefits can be demonstrated, however, and others note that businesses will adopt telework based on its merits for business, not on its broad social impacts.

Some commentators fear that telework will create a growing group of itinerate information workers who work on limited-term contracts without the benefits and security that accompany full-time employment. In exchange for flexibility, they may be less able to negotiate favorable terms, since each contract could be negotiated individually by the employer. The concern is that ultimately such contract-based telework may become imperative rather than optional for many workers, leading to increasing instability for workers, and decreased loyalty and institutional memory for employers.

■ Tasks Amenable to Telework

As this report uses the term, three categories of jobs are appropriate for telework: routine information-handling tasks, mobile activities, and professional and other knowledge-related tasks. One estimate suggests that 40 percent of the workforce in the United States could telework at least some of the time, but of these workers, many may not prefer or be suited for telework, or their managers may not encourage telework.[6]

■ **Routine information-handling tasks.** Workers in these positions perform well-defined

[5] See, for example, Mitchell L. Moss and John Carey, "Information Technologies, Telecommuting, and Cities," *Cities in Competition: Productive and Sustainable Cilies for the 21st Century,* John Brotchie, Mike Batty, Ed Blakely, Peter Hall, and Peter Newton (Eds.) (Sydney, Australia: Longman Australia, 1995).

[6] Jack Nines, personal communication, Aug. 8, 1995.

tasks using telephones, facsimile machines, or computers with modems in such a way that their tasks are not tied to a physical location. Thus, a customer service worker who uses a computer to answer telephone queries or input information into a computer from toll-free telephone calls may be a candidate for telework. Directory assistance, dispatching, and data entry may also be suited for telework. On the other hand, if specific paper or other resources tied to a central location are necessary to complete the tasks (e.g., many library tasks), telework is not appropriate.

- **Mobile activities.** Field service representatives, delivery personnel, field salespersons, and others perform their duties at the customers' or vendors' site and may not require an office environment except for occasional meetings or to use shared resources. Many employers use telework arrangements for such workers to encourage more direct contact with customers and to save on the costs of unoccupied offices while the workers are offsite (hoteling).
- **Professional and other knowledge-related tasks. "**Knowledge workers" manipulate, analyze, or otherwise process information in a nonroutine manner and may spend many hours with telephone, facsimile, computer equipment, and/or paper documents. Thus, consultants, translators, marketing personnel, authors and editors, software engineers, executives, and others may telework from home or while traveling. This set of tasks overlaps with the other categories. For example, a consultant can work both at home and at a customer site, making that worker both a professional and a mobile worker. Likewise, many tasks are not clearly routine or non-routine, such as translation services and some customer service tasks.

Technologies Necessary for Telework

The technologies required for home-based telework are relatively commonplace. For most teleworkers, a laptop or personal computer with a modem, electronic mail software, facsimile equipment, and traditional telephone service are enough. For the employer, current computer networking and/or call distribution equipment is often adequate. Some applications, however, benefit from or require faster data transmission for file transfers or videoconferencing. In such cases, current digital telephony services, including ISDN (Integrated Services Digital Network) service, is generally adequate, although such services are not necessarily available or affordable to homes or in certain areas. Desktop videoconferencing equipment is becoming less expensive, but the demand for video communications is not yet clear. While these advanced technologies may facilitate the further adoption of telecommuting, they may or may not become widespread, even if costs continue to decrease.[7]

More advanced telework applications are possible, including advanced technologies for high-performance computing and networking. For example, a scientist may wish to process data entered from a collaborator at another location using software resident on a computer at a third location, and display the results at his or her computer. Such applications use the most advanced information technologies available today.[8] Ultimately, the widest range of information technologies could be applied to telework, just as they are currently applied to the wider set of teleprocesses, including:

[7] Some argue that videoconferencing will have the appeal of the telephone and the television, and will therefore eventually become pervasive. On the other hand, many videoconferencing efforts have failed, and the technology could have a general appeal more like quadraphonic stereo. Also, the telephone provides privacy and mobility that the videophone does not. Finally, it is not clear over what period its adoption will occur, since to some extent an established infrastructure of equipment is necessary to make video calls.

[8] See, for example, C.E. Thomas, J.S. Cavallini, G.R. Seweryniak, R.J. Aiken, T.A. Kitchens, D.A. Hitchcock, M.A. Scott, and L.C. Welch, "Virtual Laboratories: Collaborative Environments and Facilities On-line," paper presented at the IEEE 1995 Conference on Real-Time Computer Applications in Nuclear and Plasma Physics, East Lansing, MI, May 22, 1995.

cryptographic tools; advanced data transmission protocols for special applications; satellites for distance education, remote sensing, or geographic positioning; and virtual reality tools.

The shift from paper-based to computer-based document systems within industry facilities telework (see chapter 5). For example, electronic file management systems that rely on electronic imaging allow an increasing share of back office workers to review customer and other files, make comments and changes, and send the files to another worker for the next step in processing, all on desktop computers. Similarly, "groupware" programs facilitate the sharing of electronic resources for workers who collaborate on projects. Transforming the work itself so that an increasing share can be conducted using personal computers increases the mobility of the work and makes telework cheaper.

The widespread application of the most advanced technologies for telework is uncertain, however, since the current cost of high-speed digital transmission and advanced computer networking equipment is out of range for most telework applications. Moreover, a great deal of telework arrangements use only basic information technologies that are currently available; existing technology is sufficient to sustain substantial growth in telework for the next several years.

Telework and Management

Telework is only one component of a larger movement to change the way organizations operate—often referred to as "reengineering" and "reinvention." Organizations may reorganize, relocate offices, redefine their markets, create new types of relationships with customers and vendors, eliminate workers and middle management, incorporate information technologies in new ways,[9] as well as implement telework.

Telework ultimately will affect not just measures of individual productivity, but the performance of an enterprise in ways that are impossible to attribute to telework alone. For example, a hoteling arrangement may force salespeople to meet more directly with customers, increasing sales. Or, more flexible working arrangements may lead to improved employee morale and therefore better service, a better reputation, and more business. In particular, telework requires that organizations manage by results instead of physical presence in the office, which may lead to better worker performance, even for those workers who are not teleworking. Thus, attempts to measure the positive effects of telework on individual productivity are useful, but the business case for telework does not necessarily succeed or fail based on individual results.

Many hoteling arrangements design office space to promote "water cooler" discussions and interactions among employees who may visit the shared office only one or two days per week. Employees who are absent from the traditional office will need contact with their coworkers that may only partially be accommodated by videoconferencing, electronic mail, and other new media. It is not clear to what extent these media can substitute for direct human contact.[10]

Many commentators claim that managers are slow to implement telework, but management practices are nevertheless changing. However, management must make a much greater change to accommodate full-time, rather than part-time, telework. Each organization must therefore discover its own balance between those activities that

[9] See, for example, Thomas J. Allen, and Michael S. Scott Morton, *Information Technology and the Corporation of the 1990s* (New York, NY: Oxford University Press, 1994).

[10] It was once predicted that if computer programmers used terminals instead of punch cards, some socialization would be lost since the programmers had to carry the cards to a central location for processing. However, most programmers continued to work in shared locations and found other outlets for face-to-face interaction.

are appropriate for telework, and those more appropriate for a traditional office.

Telework Forecasts

Given the variety of definitions used in discussions of telework and related arrangements, and the difficulty of obtaining data on many of these activities, estimates of the number of existing arrangements and possible trends differ greatly. Forecasts fall into two main types. One type uses case studies, focus groups, and surveys to extrapolate findings to the nation at large. The other type estimates on a national scale the maximum number of jobs and workers that are suitable for telework and infers the level of adoption based on trends in the acceptance of telework by management and other factors. These different forecasts then reference each other. These analyses contain many assumptions, and any forecast must necessarily include a range of values for different scenarios.

The U.S. Department of Transportation (DOT) estimates that there were two million telecommuters (1.6 percent of the labor force) in 1992, telecommuting an average of 1-2 days per week and working mainly out of homes (99 percent).[11] DOT forecast that the number of telecommuters would increase to 7.5 to 15.0 million by 2002, telecommuting an average 3-4 days per week, with about one-half working from telework centers. This amounts to about 5 to 10 percent of the forecast labor force.

The assumption about the trend toward telework centers versus work at home is challenged by some telework experts. Given the option of managing workers in a telework center or in their homes, managers often initially choose the telework center as an intermediate or trial step so that certain issues (such as liability or socialization) can be managed in a traditional manner. Later, these organizations may wish to allow more workers to telework from home as management becomes more comfortable with telework. Also, many workers may have special reasons for teleworking from home. In any case, some forecast that home-based teleworkers will predominate over those in telework centers in the near and long term.

It is difficult to collect information on the number of workers in telework centers. In comparison, home-based telecommuting has been more easily and accurately monitored using census and other survey information, explaining why home-based telecommuting is more widely recognized than other activities.

A 1991 forecast estimated that the number of U.S. telecommuters would grow to between 12 and 25 million by 2002.[12] Importantly, this forecast portrays the growth as greatest in the early years when the number of teleworkers is relatively small, and as slowing to below 20 percent per year in the mid- to late-1990s. The high estimate is contingent on many factors, including:

- relatively rapid and complete acceptance by management of telework practices;
- relatively rapid adoption of technologies that may facilitate telework arrangements, such as ISDN and desktop videoconferencing;
- adoption of federal, state, or local policies that promote telework arrangements; and/or
- unpredictable local or global events, such as an earthquake or a fuel crisis.[13]

Effect of Telework on Urban Areas

Much of the discussion about the effects of telework on metro areas has focused on the possibility of reducing traffic congestion, pollution, and energy consumption. The major focus of this report

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[11] U.S. Department of Transportation, *Transportation Implications of Telecommuting* (Washington, DC: U.S. Department of Transportation, April 1993).

[12] Jack Nilles, JALA International, Inc., "Telecommuting Forecasts," Los Angeles, CA, 1991.

[13] When the Northridge earthquake struck Los Angeles in January 1994, for example, federally sponsored telework projects were quickly adopted and continued for some time after the local infrastructure was repaired.

is on the spatial redistribution of workers and residents as a result of telework, and the consequent changes in travel patterns (rather than just on reduction of peak-hour congestion). However, very little is understood about these changes, in part because telework is a relatively new phenomenon. Most analyses of telework have focused on direct effects (e.g., reduced commuting), rather than on indirect effects such as reduced office space demand, relocation by telecommuters to outer suburban or exurban locations, and stimulation effects on travel.

Savings in Office Space

Proponents of telework suggest that telework arrangements that share office space—hoteling arrangements—can save on office space costs for the employer.[14] As discussed earlier, management acceptance of telework hinges on its business case, and this cost savings provides a strong, but not necessarily sufficient, motivation to adopt telework.

Hoteling is successful in many applications where field service technicians, sales representatives, or consultants are in the field much of the day. Such employees have similar needs for information technologies and can therefore share office equipment. An example is the accounting firm Ernst & Young, which, through hoteling, reduced its office space needs in Chicago's Sears Tower by over 10 percent.[15] Other employees require dedicated space and equipment to perform their work, even if they are not in their offices for the entire workday. If only a few employees in an office can practice hoteling, management may not perceive sufficient savings to implement it, and in any case, real estate cost savings would be marginal. Work practices, software, and office design may evolve sufficiently to accommodate many workers and managers who are uncomfortable with hoteling at present, but the penetration of hoteling into the workplace will continue to be low for the immediate future.

Residential Land Use Patterns

Some studies suggest that widespread adoption of telework would lead to more decentralized land use patterns, as residents choose to live farther from dense metropolitan centers in exchange for lower real estate costs, lower property taxes, and more rural settings.[16] However, little empirical work has been conducted regarding this consequence of telework.

An early pilot project in California found that in the first two years, there was no significant difference in household move patterns as a result of telework arrangements.[17] However, long-term effects are likely to be more pronounced than results measured over the short term. Also, the telecommuters in that pilot study lived, on average, farther from the traditional workplace than the workers in the control group. Thus, the telecommuters may have already relocated, and were using telecommuting to reduce their inconvenience.

It is not surprising that the first employees of a firm to sign on to telecommuting programs may be those who have the most to gain because they live far from their jobs and have a long commute.

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[14] See, for example, U.S. General Services Administration, Office of Workplace Initiatives, "Interim Report: Federal Interagency Telecommuting Centers," report to the House Appropriations Subcommittee on Treasury, Postal Service, and General Government, March 1995.

[15] Interview with officials at Ernst & Young, October 1994. See also Michael Bagley, J. Mannering, and P. Mokhtarian, University of California at Davis, Institute of Transportation Studies, "Telecommuting Centers and Related Concepts," research report UCD-ITS-RR-94-4 prepared for the U.S. Federal Highway Administration and the California Department of Transportation, March 1994. According to the UC Davis study, Ernst & Young expects eventually to shrink its office space nationwide by 2 million square feet, for a savings of $40 million per year.

[16] See, for example, Ajay Kumar, "Impact of Technological Developments of Urban Form and Travel Behavior," *Regional Studies*, vol. 24, No. 2 (1990), pp. 137-148.

[17] California Department of General Services, "The California Telecommuting Pilot Project Final Report," report prepared by JALA Associates, Inc., June 1990.

Later, people who do not live so far from their jobs may begin to telework as accommodations become available to them, or when the benefits are perceived to outweigh the costs.

Changing residential locations and land use should not be viewed only in terms of decentralization, since the character of urban life is also changing. While telework is most often promoted as an antidote to the traditional suburb-to-center-city commute, metropolitan residents increasingly work in and commute between suburbs, which have urban sub-centers of their own. Also, as discussed earlier, workers are not only applying telework in their work, but employers are applying telecommunications in more of their operations, and residents are using teleprocesses for more than just work.

The impact of telework on residential location also depends on whether the household has one earner or two. Single-earner households are more free to move to a new location than those with two-earners, since not all workers will telework full-time. Residents will also prefer to remain in metropolitan areas for other reasons in the short and long term, such as to keep children in a particular school or to be near family and friends.

Most importantly, the degree of decentralization depends on whether telecommuting continues to be part-time for most participants, or whether it becomes predominantly full-time. In the former case, participants could still live within commuting distance of metropolitan areas, although this distance could be considerable for some people. In the latter case, participants could live almost anywhere, leading to a much wider decentralization of activities and a much larger impact on residential location.[18]

Those who think of telecommuters living in idyllic, remote locations are generally thinking of the full-time telecommuter. Most of the experts with whom OTA spoke expect that full-time telework will remain a small fraction of overall telework, suggesting that telework is unlikely to result in a widespread shift of households to rural locations.

Changes in Travel Patterns

Perhaps the most comprehensive documents surveying telecommuting and telework are a series of reports from DOT and the U.S. Department of Energy (DOE). DOT estimates that, by 2002, telecommuting could save 2.3 to 4.5 percent of annual passenger-vehicle *commuting* miles traveled, or about 0.7 to 1.4 percent of *total* annual passenger-vehicle miles traveled.[19] The estimated number of miles saved from telecommuting is nominally large (17.6 to 35.1 billion miles per year or 1.3 to 2.5 billion trips in 2002). However, the total number of vehicle miles that Americans drive each year is also increasing as women, young adults, and immigrant populations incorporate more driving into their lifestyles. The share saved from telecommuting is therefore smaller than it would be if current driving levels were fixed.

Even though the net effect of telecommuting on traffic congestion appears relatively small compared to the total vehicle miles traveled, small reductions in the number of vehicles on highways can have a great effect on congestion when traffic is at saturation. That is, although greatly reducing the number of vehicles on a nearly empty highway has little or no effect on travel time, reducing the number of vehicles on a crowded highway by only a small amount can significantly improve travel time. Thus, the adoption of telework will have the greatest effect in metro areas with the biggest traffic problems. The 10 largest cities could account for perhaps one-half of the benefits in delay reduc-

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[18] Jack M. Nilles, "Telecommuting and Urban Sprawl: Mitigator or Inciter?," *Transportation*, vol. 18, 1991, pp. 411-432.

[19] U.S. Department of Transportation, op. cit., footnote 11.

tion, and the 75 largest cities for 90 percent of the benefits.[20]

Furthermore, though telework may have a relatively small impact on the total number of trips, it may redistribute the trips in time and location and therefore reduce peak-hour traffic congestion more than appears at first glance. Thus, traffic in suburban areas and off-peak hours may increase, but peak-hour congestion could decrease. The effect of telework could be to average traffic over space and time.

Also, the effect of telework on peak-hour congestion, even if small, is nevertheless significant if its cost is much less than the alternatives.[21]

DOE complemented the DOT study by examining the indirect effects of telecommuting, and found that perhaps one-half of the forecast reduction may be negated by the indirect effect of latent demand.[22] That is, as telecommuters avoid vehicle use by staying at home or commuting to neighborhood telework centers, others who previously avoided driving because of excessive traffic congestion will begin driving. Thus, if reduction of traffic congestion is an objective, telework arrangements should be part of a larger effort that focuses on demand management, intelligent transportation technologies, and public and alternative transportation. Demand management efforts—such as congestion pricing of peak hour traffic—could in turn increase the migration to telework arrangements as traditional commuting becomes more expensive.

More importantly, little is known about the much larger stimulation effect of telework on transportation, as noted in a later DOE study.[23] Substitution effects are inherently easier to estimate than stimulation effects, since the substitutional behavior patterns can be identified, tracked, and tested in pilot studies. On the other hand, stimulation effects arise from innovations that have not yet occurred. The following stimulation effects from teleprocesses—including some telework applications—have been suggested, or are already in progress.

- Demand for "just-in-time" (JIT) delivery will generate more trips for homes and businesses, which may be more geographically dispersed than before; JIT is facilitated by teleprocesses such as electronic data interchange and wireless dispatching.
- Teleworkers who spend more time at home may generate trips for services such as home delivery of fast food, goods purchased through home shopping, and trips to neighborhood stores that would have otherwise been integrated into a commute or walk near the central office.
- To the extent that telework enables increased residential mobility, residences could become more geographically decentralized. Thus, postal service, infrastructure maintenance, and other services could become less efficient (see chapter 8). Moreover, decentralized residents require longer trips when a commute is necessary, potentially driving more miles overall.

Telework Centers in Distressed Neighborhoods

Most telework efforts are directed at workers who live in suburban neighborhoods and who commute into the central city or to other suburbs. Little effort has been directed toward arrange-

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[20] DOE ranked the following cities according to accumulated annual traffic delay reduction in 2010: Los Angeles (including Long Beach, Pompano, and Ontario, CA), New York and Northeastern New Jersey, Chicago, Dallas-Fort Worth, San Francisco-Oakland, Detroit, Atlanta, Houston, Washington, DC, San Diego, Philadelphia, and Boston. U.S. Department of Energy, Office of Policy, Planning, and Program Evaluation, *Energy, Emissions, and Social Consequences of Telecommuting* (Springfield, VA: National Technical Information Service, June 1994).

[21] See, for example, Jack M. Nilles and Walter Siembab, JALA International, Inc., "Telecommuting and Vanpooling: Cost and Benefit Comparisons," Los Angeles, CA, August 1992.

[22] U.S. Department of Energy, *Energy, Emissions, and Social Consequences of Telecommuting,* op. cit., footnote 20.

[23] U.S. Department of Energy, *Beyond Telecommuting: A New Paradigm for the Effect of Telecommunications on Travel,* op. cit., footnote 4.

ments that allow workers in urban neighborhoods to work at a distance with employers in the outer suburbs, or to promote telework in distressed urban and suburban neighborhoods.

The Los Angeles County Metropolitan Transit Authority has plans to operate two workstations in its "Blue Line Televillage" to serve potential teleworkers in the South Central Los Angeles area. The center currently provides a variety of services to residents of distressed neighborhoods in that area. The telework stations are viewed as an experimental project, with the intent of testing the application before dedicating additional resources.

The Clinton Administration in its National Information Infrastructure program made brief mention of such alternative telework arrangements. One suggestion was to establish "smart Metro stops" that could serve as telework centers, a center for public services, and an educational center for residents.[24] The U.S. General Services Administration (GSA) is working with the National Housing Program to establish telework centers for federal and other employees in public housing complexes, beginning in the Washington, D.C., area, but no formal plans are yet in place.[25]

Federal Programs and Policies Affecting Telework

Federal policies and programs related to telework fall into three categories: 1) pilot programs and research directed at promoting telework for federal employees, or more broadly; 2) federal and other policies that indirectly impact telework; and 3) funding for state and local governments that can be used for telework programs. Despite the fact that the federal government is devoting resources to promote telework, there is still no clear understanding of the costs and benefits of telework to business, workers, and society, including impacts on urban form.

Cost and Benefits of Telework

The various federal policies, programs, and statements on telework implicitly favor suburban and rural areas.[26] While there has been some discussion of teleworking from urban homes and centers to suburban offices, most interest is predominantly in the other direction, and such discussions often implicitly assume that dispersion of residents to more suburban and rural locations is universally beneficial. In practice, the allocation of the benefits may or may not match the allocation of costs for the various stakeholders.

Suburban and rural residents clearly stand to gain the most from telecommuting arrangements as they exist today. Workers who live well out of metro areas typically benefit from lower housing costs, reduced taxes, reduced crime, better schools, and other amenities. If these workers also can telecommute they save in fuel costs, tolls, and commuting time (which in turn may save in such items as day care expenses). In exchange, these workers may pay some of the costs (through donated personal space,[27] computer equipment, telecommunications charges, or extra hours maintaining computer equipment). However, if they work from a telecommuting center and still occupy their old office space, then their employer is paying more for total office space costs. Center city residents can also telecommute, but the benefits to those residents may not be as great.

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[24] U.S. Department of Commerce, National Institute of Standards and Technology, *The Information Infrastructure: Reaching Society's Goals—Report of the Information Infrastructure Task Force Committee on Applications and Technology,* NIST Special Publication 868 (Washington, DC: U.S. Government Printing Office, September 1994).

[25] Warren Master, U.S. General Services Administration, personal communication, Aug. 24, 1995.

[26] This also appears to be the case in Europe, see European Commission, Directorate General XIII, "Europe and the Global Information Society—Recommendations to the European Council," Brussels, May 26, 1994. See also Bagley, Mannering, and Mokhtarian, op. cit., footnote 15.

[27] If the personal space is in addition to traditional office space, however, the total cost also goes up by the amount of the donated personal space.

On a larger scale, the metropolitan area itself may gain if widespread telework arrangements attract new businesses and residents because of improvements in quality of life, or if telework enhances the competitive advantage of local businesses. Alternatively, if telework becomes widely adopted, residential and business real estate in many center city locations could become less valuable, and urban governments could lose tax revenue. None of this is at present well understood.

Some of the costs could be reallocated to reduce subsidies. A telecommuter who works out of a telework center, for example, could pay some of the expenses of the center. Such a scheme might encourage employers to implement telework. On the other hand, one survey has indicated that workers would be strongly deterred from teleworking if their salary is cut (equivalent to being charged additional costs).[28]

Further examination of the costs and benefits of telework to stakeholders would allow policymakers to make better decisions.

Federal Telework Efforts

The federal government has a number of telework-related programs.[29] The motivation for the federal government includes energy conservation (DOE), traffic management (DOT), pollution control (Environmental Protection Agency—EPA), facilities management and the federal work environment (GSA), and personnel management (Office of Personnel Management—OPM). The general strategy has been to overlap these missions where common goals exist. In particular, the federal government has promoted telework in its own agencies as a means to manage its own resources better, as well as to set an example and to promote telework more broadly. Thus, the central federal activity has been the funding and implementation of pilot and other projects.

GSA and OPM have experimented with flexible workplace arrangements for over five years, including a pilot project that was completed in 1992 and included more than 1,000 federal employees nationwide. Congress later appropriated $6 million to GSA to establish pilot telecommuting centers around Washington, D.C., through partnerships with local governments and industry, to be completed in 1996.[30] For example, in Hagerstown, Maryland, GSA worked with the city of Hagerstown and Hagerstown Junior College, while in Fredricksburg, Virginia, GSA worked with the Rappahannock Area Development Commission. Following the 1994 earthquake in Northridge, California, GSA established three emergency telecommuting centers in the Los Angeles region. More recently, GSA established telecommuting arrangements in Oklahoma City following the bombing of the federal building in April 1995.

GSA is also the lead agency implementing the Federal Employee Clean Air Initiatives Act, intended to reduce federal employee reliance on single-occupancy vehicles, including measures to promote telecommuting. The Administration's National Performance Review also recommended that OPM and GSA work with agencies to expand flexible work arrangements for federal employees.[31] The President's Management Council

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[28] The reverse was not true; that is, increasing salaries for workers who were willing to participate did not seem to be a strong motivation to telework. These hypotheses were based on survey questions and not actual program results. Adriana Bernardino and Moshe E. Ben-Akiva, "Employer's Perspective on Adoption of Telecommuting," paper presented at the 1995 Annual Meeting of the Transportation Research Board, National Academy of Sciences, session 163, Washington, D.C., January 1995.

[29] Since this report considers federal policies that impact telework for its own or for other employees, this chapter does not explicitly describe private sector efforts in telework. For an overview of private sector efforts, see U.S. General Services Administration, op. cit., footnote 14.

[30] Ibid., U.S. General Services Administration.

[31] Vice President Albert Gore, Jr., *Creating a Government that Works Better and Costs Less: Report of the National Performance Review* (Washington, DC: U.S. Government Printing Office, September 1993).

is currently reviewing a proposal for a National Telecommuting Project to be led by DOT and GSA that would span three years and 30 metropolitan areas.[32]

DOE has sponsored several studies on telework and related activities because of its interest in energy efficiency.[33] In 1993, DOE asked the National Research Council to conduct a study on the technological issues related to telework, broadening the focus to include distributed work and high-performance computing applications.[34]

Finally, the Clinton Administration's Climate Change Action Plan directs the EPA and DOT to work together to promote telecommuting. Actions include: encouraging states to use the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) to fund telecommuting programs (see below), pilot projects for federal employees, and issuing guidance to states wishing to establish telecommuting measures.[35]

Federal and Other Policies Affecting Telework

- **Telecom policy reform.** Several experts noted in interviews with OTA that perhaps the most significant federal policy affecting telework is the current telecommunications legislation. Proponents suggest that—to the extent that affordable technology is important—telecom policy reform could facilitate telework by making new technologies and services cheaper and more widely available.
- **Tax policies.** Expenses for home computers, telecommunications equipment, and other information technologies are allowed as tax deductions for home businesses, but for those teleworkers who do not work primarily at home the deduction may not be valid. Employers could also receive tax deductions or credits for telework programs that meet specified criteria. However, in both cases it is not clear why teleworkers should receive preferential tax treatment relative to employees that live closer to work and do not telecommute.
- **Fair Labor Standards Act.** Relatively few occupations are restricted on work at home because of federal labor laws, although many states have restrictions on certain types of work or the hours that an employee can work without compensation. In many telework cases, such provisions may be difficult to enforce.
- **Labor union concerns.** Labor unions have been generally supportive of telework efforts, but are concerned about several issues. First, widespread teleworking could reduce the ability of unions to effectively represent workers who telework outside a traditional workplace. Second, employers may exhibit preferences to allow some workers to telework, affecting equity. Third, electronic monitoring and other techniques may increasingly be used to supervise employees, increasing stress and reducing privacy. Fourth, employers may attempt to convert workers from career employment to contract work, reducing benefits and job security. Finally, for some workers, telework could mean a return to micro-management and the assignment of piecework, thus reducing the quality of work and upward mobility.
- **Zoning.** Some localities have restrictions on the location of businesses in residential areas—

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[32] U.S. Department of Commerce, *The Information Infrastructure: Reaching Society's Goals—Report of the Information Infrastructure Task Force Committee on Applications and Technology*, op. cit., footnote 24.

[33] Two studies were prepared in response to a requirement in the Energy Policy Act of 1992, in conjunction with the Department of Transportation: U.S. Department of Transportation, op. cit., footnote 11; and U.S. Department of Energy, *Energy, Emissions, and Social Consequences of Telecommuting*, op. cit., footnote 20. DOE later contracted for a study on policy and other implications teleprocesses, looking beyond the narrower applications of telecommuting and telework. U.S. Department of Energy, *Beyond Telecommuting: A New Paradigm for the Effect of Telecommunications on Travel*, op. cit., footnote 4.

[34] National Research Council, op. cit., footnote 3.

[35] President William J. Clinton and Vice President Albert Gore, Jr., *The Climate Change Action Plan*, 1993.

restrictions that technically include many telework arrangements.[36] Many teleworkers sidestep these restrictions by working discreetly from their homes, and local authorities generally overlook such violations.

- **Congestion pricing of transportation.** Tolls for use of highways during rush hours could indirectly motivate workers to adopt telework. Such policies could be instituted as part of a regional transportation plan not specifically oriented toward telework itself, and directed at recovering some of the social costs of traffic congestion from those who generate the traffic. However, if congestion pricing significantly reduced congestion, it would also make commuting more attractive. (See next section.)
- **Demand management of energy.** Policies that encourage the pricing of energy use according to demand could reduce costs for residents while not at home, but increase costs for workers who telework from home. These increased costs could reduce the motivation for teleworkers to work from home (if they are paying their own energy costs), but also increasing the motivation for employers to reduce office energy costs.[37]
- **Liability.** Official telecommuting programs normally require a formal agreement between employer and employee that puts responsibility for a safe workplace on the telecommuter, and permits employer inspection with prior notice. Such an agreement may also limit the employer's liability for workman's compensation to specific work hours and to specific areas of the home. In cases lacking formal agreements, however, the assignment of liability for a safe workplace is less clear.

ISTEA Funding

Using Federal Highway Administration funds, DOT can fund telecommuting projects through the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). ISTEA funds can be applied to support compliance of the Clean Air Act and to improve the efficiency of local transportation infrastructures. Telecommuting programs qualify as travel demand management, and funds can be used to plan, develop, and market regional telework strategies. An example is an effort launched by the California Department of Transportation to create several telecommuting centers across the state through partnerships with local governments and the private sector.[38] Local governments have claimed, however, that the funds are not effective as currently allocated, and that the local governments should be able to apply the funds toward other telework-related expenses, e.g., toward construction and operating costs.

METROPOLITAN IMPLICATIONS OF INTELLIGENT TRANSPORTATION SYSTEMS

The form of cities is the result of many economic and social forces interacting in complicated ways—the transportation system is not necessarily the primary driver of change.[39] However, technological advances in transportation have had and will continue to have profound implications for cities and societal institutions in general. Dramatic changes in the shape of cities, in manufacturing and service industries, and in societal opportunities occurred during the past century as transportation technology changed from horse-drawn carriages to electric street cars to high-capacity

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[36] See, for example, JALA International, Inc., "Village One Telecommunications Feasibility Study," report prepared for the City of Modesto, CA, October 1994.

[37] Robert J. Aiken, John S. Cavallini, and Mary Ann Scott, "Energy Utilities and the Internet: Users or Providers?," paper presented at the Fifth Annual Conference of the Internet Society, Honolulu, Hawaii, June 27, 1995.

[38] Bagley, Mannering, and Mokhtarian, op. cit., footnote 15.

[39] This section is based on a report prepared for the Office of Technology Assessment on Intelligent Transportation Systems. David C. Hodge and Richard Morrill, "Metropolitan Form Implications of Intelligent Transportation Systems," July 1995.

mass transit systems, and finally to automobiles, trucks, and other motor vehicles.

The next major change in metropolitan transportation systems will come from the application of information and automation technologies, rather than from fundamental changes in vehicle form or the infrastructure. Enhancing transportation infrastructure capacity, travel decisions, and vehicle safety through sensors, communications, computers, and electro/mechanical control technologies is referred to as *intelligent transportation systems* (ITS). ITS encompasses a wide range of applications and services, from synchronized traffic lights to computerized road maps. Some of these technologies have been deployed, some are now being tested, and some are still only concepts. Most of the near-term (next 10 to 15 years) applications of ITS aim to enhance or automate existing transportation functions and services, rather than provide radically new operational characteristics. These applications include automated transactions (e.g., paying tolls), traffic management and control, information for trip planning and navigation, and improving vehicle and driver performance.[40]

Chronic traffic congestion problems have been the primary motivation for ITS programs. ITS technologies offer two basic approaches for mitigating congestion: 1) increasing the effective capacity of road and highway infrastructure; and 2) changing the demand for travel mode and time through better information for ridesharing, transit, and other trip decisions; new forms of transit services; and practical and cost-effective direct pricing of transportation infrastructure (e.g., congestion pricing). If either aspect of ITS is successful in significantly changing the real or perceived costs of transportation, it could have implications for future metropolitan development.

Key ITS Technologies

Of primary interest to this study are the elements of ITS that could affect mobility and accessibility in the near-term, and could consequently affect metropolitan form. These ITS technologies and services can be put into three groups: 1) automated transactions, 2) traffic system management and control, and 3) traveler information services.[41] Advances in information management technologies—sensors; information processing; data networks; location and identification systems; and data entry and display devices—underpin ITS. The functions, technologies, and operational implications of these three ITS groups are described briefly below:

Automated Transactions

Automated transactions can reduce the time and costs for such tasks as toll and fare collections and, especially for commercial vehicles, regulatory, administrative and enforcement processes. Electronic payment technologies now allow drivers to pay tolls without stopping or slowing from cruising speed. On transit systems, such technologies mean passengers don't have to provide exact change; this speeds boarding times, and reduces cash handling costs for transit operators. Development of digital cash systems[42] should protect individual anonymity, often a concern with current electronic payment methods that maintain data on transaction location and time.

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[40] The "Automated Highway System" concept—hands-off, high-speed, high-density trips by automobile—would offer dramatically different operational characteristics than current highways.

[41] A fourth area is "automated vehicle controls and sensors." Automated vehicle control systems are not assessed because in the near- to mid-term, they are unlikely to affect congestion, travel times, or mobility/accessibility. Certain safety, environmental, and energy-related systems are, however, discussed.

[42] Digital cash is based on public key cryptography that allows a buyer and seller in electronic commerce to transact business without necessarily identifying themselves to one another. Secure electronic payment with high levels of anonymity (and low cost) is expected to be essential for commerce on the Internet, and has received a great deal of recent attention.

For commercial vehicles, roadside weight and credential checks can be done automatically without stopping vehicles, and administrative processes such as obtaining permits and paying registration and roadway fees can be accomplished electronically, thus reducing costs for motor carriers and state regulatory agencies.

Traffic System Management and Control

Surveillance and communications technologies can improve the management of surface traffic. Surveillance is achieved by widespread traffic sensors such as induction loops, computer vision, and vehicle transponders. Traffic management centers process the information from sensors and other sources, including vehicles in the system acting as probes. The information is then used to regulate traffic flow through signal timing and freeway ramp controls, and to respond to accidents and other incidents. Vehicles need no new equipment for these ITS applications.

Traveler Information Services

These systems acquire, analyze, communicate, and present information to travelers, vehicle operators, and fleet managers on traffic conditions, routes, and schedules. In conjunction with advanced traffic management, traveler information systems could advise people while en-route about traffic conditions, how to avoid blockages, and where to find parking and other services.

Users will need special equipment to receive this ITS service. Systems might include electronic maps and electronic tourist guides supplied via equipment in vehicles, homes, businesses, and sidewalk kiosks. The more advanced en-route services will require wireless communication and information processing systems. Many commercial truck fleets and public transit systems have installed travel information technologies such as routing and dispatching systems and automatic vehicle location equipment. There is a growing consumer market for global positioning system-based navigation for private automobiles. However, with the exception of broadcast radio and some cellular phone services, there is not yet an operational deployment of commercial technologies for route guidance based on real-time traffic conditions.

Spatial Location Implications of ITS

It is highly unlikely that ITS will "cause" changes in urban form. Since good transportation is widely available at a relatively low cost, new facilities or changes in transportation technology have less impact than they once did. Other forces are restructuring the physical form and organization of cities, such as new technologies in industry, the reorganization of business, and demographic changes. ITS is not so much a new transportation technology as it is an extension, albeit potentially a significant one, of motor vehicle operations. As such, it may have a major role to play as an enabler, i.e., a technology which enables the other forces to change metropolitan form.

Transportation Capacity and Land Use

ITS can have some impacts on land use by increasing the average, and in some cases the maximum, vehicle-throughput capacity at certain bottlenecks and routes. ITS does this by speeding toll collection, optimizing flow through and across signalized routes, and allowing road officials to detect and resolve accident-causing delays more quickly. These technologies are likely to facilitate residential and commercial dispersion. Almost all theoretical formulations of the impact of transportation investment assert that better transportation in an area will attract business and people, and will spread out development because a greater distance can be covered in the same amount of time. The stability of metropolitan commuting times in recent decades provides evidence that this rela-

tionship holds and that time is the ultimate constraint on how people commute.[43]

A better transportation system may increase the concentration of businesses in the center, but it will almost certainly contribute to commutes over longer distances by workers. Signal preemption for buses, in combination with reserved lanes, can significantly improve public transportation by reducing travel times; however, it seems very unlikely that these improvements will cause many more people to switch to buses. Similarly, better transportation will be supportive of more dense development, but will not stimulate such developments.

Because metropolitan areas are not likely to be outfitted with many more traffic signals and integrated traffic control systems in the foreseeable future, gains in regional mobility will depend on ITS information systems. The deployment of driver information systems would support the decentralization of urban areas and a decline in public transit. Such systems would enable trip times to become more predictable, and allow drivers to avoid unexpected traffic jams.[44] Already heavily congested places would find little relief, however, because of the lack of viable alternate routes. Thus, the prospects for increasing maximum highway capacity through information systems are minimal. The benefits from information about non-recurrent congestion would be more noteworthy, but would depend on the context. Medium-sized metropolitan areas with moderate congestion and relatively good highway infrastructure are most likely to experience pressure for decentralization through driver information systems.

Transportation Demand and Land Use

ITS technologies for electronic payment, location, and identification enable two categories of pricing policies intended to allocate the costs of transportation more efficiently.[45] One option is to charge vehicles directly for the amount of public and private infrastructure they use, and possibly for the environmental and other costs that transportation imposes on society at large, if the latter can be quantified. The other option is to charge users for the congestion costs they impose on one another, with the goal of directly influencing individual behavior and choices to allocate more efficiently the scarce resource of road and highway access at peak periods. Reducing travel delays through congestion pricing would lower the overall costs of those who value their time highly, and raise total costs for others.

Transportation Infrastructure Pricing

Currently, the costs of public infrastructure for transportation are not efficiently priced.[46] That is, the payment mechanism, such as gasoline tax, does not necessarily correspond to the value of the "infrastructure consumed," which depends on vehicle weight, distance traveled, type of road, and other factors (see chapter 8). There are also costs that transportation users do not directly pay for, but often do account for in their travel decisions. The prime example is parking.

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[43] Geurt Hupkes, "The Law of Constant Travel Time and Trip Rates," *Futures*, vol. 14, 1992, pp. 38-46; and P. Gordon, H. Richardson, and M. Jun, "The Commuting Paradox: Evidence From the Top Twenty," *Journal of the American Planning Association*, vol. 57, 1991, pp. 416-420.

[44] Non-recurring congestion stems from random, unpredictable incidents such as traffic accidents, stalled vehicles, or weather conditions that create temporary bottlenecks (capacity shortfalls).

[45] ITS technologies may have a dramatic effect on the quality and efficiency of both fixed route mass transit and paratransit that could lead to increased ridership. However, public transportation in most metropolitan areas, indeed in all but some of the largest historic urban centers, accounts for only a small fraction of urban travel, even commuter travel. While increased transit ridership should reduce the rate of congestion growth, there is little expectation that ITS technologies alone could make transit so attractive as to *reduce* automobile congestion in metropolitan areas. Alternate transportation options, such as high-quality transit, would be an important element of any congestion pricing policy.

[46] U.S. Congress, Office of Technology Assessment, *Saving Energy in U.S. Transportation*, OTA-ETI-589 (Washington, DC: U.S. Government Printing Office, July 1994), p. 12.

In a previous study, OTA concluded that "these costs could be fully recovered and/or more fairly allocated among users. If subsidies were withdrawn, externalities 'internalized,' and hidden costs brought out into the open and directly charged to motor vehicle users, the perceived price of motor vehicle use would increase substantially and people would drive less."[47] Consequently, infrastructure cost pricing would encourage more concentrated development and in-fill, favoring locations with established transit systems and road networks. Expansion at metropolitan peripheries would be more market driven, as is the case for the few private toll roads currently planned or under construction in the United States.[48]

Congestion Pricing

The impacts of a congestion pricing scheme on land use depend on the geographic patterns within a metropolitan area, the current patterns of travel and congestion, and the nature of the scheme. In places with very dense urban cores, congestion pricing would probably reduce travel time to the center. This would help sustain development in such central business districts, but it would also encourage dispersion of wealthier workers, business suppliers, and anyone willing to pay for the privilege of traveling on otherwise congested roads. In the short run, those whose time is less valuable (e.g., the poor) would shift their travel time or mode in response to the extra costs. Over longer periods, congestion pricing would lead to more concentrated residential development for those with lower incomes, while higher-income residents would be dispersed. Moreover, congestion pricing could lead to a movement of activities, such as retail, away from congested areas because the cost of doing business may be too high.

In conclusion, it is important to remember the complexity of the role of transportation within metropolitan areas and the tremendous amount of heterogeneity that exists in metro areas. No one knows what the long-term effects of congestion pricing on urban form would be. And the reality is that it is extremely unpopular politically.

TELECOMMUNICATIONS INFRASTRUCTURE AND ECONOMIC DEVELOPMENT

As more economic functions are conducted electronically, being able to transmit and receive large amounts of information rapidly will be critical in the competition for jobs and industry.[49] Just as the spatial distribution of the electrical power infrastructure helped shape urban development, so too does the spatial distribution of the telecommunications infrastructure shape development today. Moreover, like electrical power networks, advanced telecom infrastructure is rapidly diffusing across the country, minimizing competitive differences based on infrastructure alone. This section examines the spatial distribution of the telecom infrastructure and analyzes claims that an advanced infrastructure is critical for local growth.

Defining Telecom Infrastructure

The physical component of the telecom infrastructure is particularly relevant to this assessment, since much of the information economy is oriented toward the transmission of information, particularly the technology that delivers informa-

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[47] Ibid., p. 109

[48] For example, the Dulles Greenway, a privately financed tollroad in Northern Virginia, is scheduled to open in fall 1995.

[49] See Mitchell L. Moss, "Telecommunications: Shaping the Future," in *America's New Market Geography*, George Sternlieb and James W. Hughes (Eds.), 1987, pp. 255-275; and Mitchell L. Moss, "Telecommunications, World Cities, and Urban Policy," *Urban Policy*, vol. 24, No. 6, December 1987, pp. 534-546. See also Mark E. Hepworth, *Geography of the Information Economy* (New York, NY: The Guilford Press, 1990); and Aharon Kellerman, *Telecommunications and Geography* (New York, NY: Halsted Press, 1993). OTA completed an earlier work on telecommunications and rural America in U.S. Congress, Office of Technology Assessment, *Rural America at the Crossroads: Networking for the Future*, OTA-TCT-471 (Washington, DC: U.S. Government Printing Office, 1991).

tion in the so-called last mile to the customer. The provider may string cables (e.g., fiberoptic, coaxial, or twisted wire pair) to the customer, it may transmit a focused beam (e.g., ground-to-ground microwave, or earth-to-satellite microwave), or it may transmit its information openly or in code (e.g., cellular telephone, broadcast radio and television, satellite television). Each technology has advantages and disadvantages. The marginal cost per user of satellite transmission is low and it may be optimal to reach remote or mobile users, for example, but its initial cost is high and some transmissions can be subject to atmospheric disturbances. Cable transmission may be less expensive initially, but the marginal cost per user is higher and the infrastructure can be damaged in floods or earthquakes.

Switching equipment at central offices is equally important. The central offices transfer traffic among residents and businesses, and through the providers' large-capacity trunk lines to other central offices. Special-purpose computer switches route transmissions from one user to another, whether that transmission is a telephone call, an electronic mail message, or a video channel. Switching capability adds capacity and flexibility, but also complexity and cost.[50] Table 7-1 displays some examples of transmission and switching technologies. Point-to-point communication, for example, has traditionally required central switching and cable transmission in the last mile. The cabled arrangement was well suited for densely populated areas, while radio telephones achieved the same purpose in remote rural areas. Cellular telephones use switching and coded radio broadcast to localized cells, offering mobility in densely populated areas.[51] The low-earth-orbit satellite systems now in development will use switching and satellite broadcast, expanding mobility to remote areas of the world.

TABLE 7-1: Examples of Switching and Wiring Combinations in the Last Mile to the User

	Switched	Unstitched
Wireline	Traditional telephone, Electronic mail	Cable television
Wireless	Cellular telephone radio telephone, paging	Broadcast radio/TV, Satellite TV

The telecommunications infrastructure has advanced well beyond the traditional set of telephone wires and over-the-air broadcast. The different transmission and switching technologies allow each user to tailor the technology to the application. A user may prefer satellite transmission for distance learning, for example, and wireline systems for videoconferencing. In many cases, a user may employ two complementary technologies to insure against downtime. Traditional voice transmissions—which also include facsimile and data transmissions using modems—are now completely digital or converted to digital form before being switched.

Also important in the information infrastructure is a confusing and overlapping variety of service providers and equipment manufacturers. Many of these providers resell to other providers, sometimes through several intermediaries. There are also numerous types of providers who own or lease the physical infrastructure and provide enhanced services, including value-added services, Internet features, and dial-up network services.

[50] The importance of switching is demonstrated by comparing the costs of two systems. The coaxial cable that carries cable television delivers many more orders of magnitude bandwidth (capacity) to the user (about 500 MHz) than do the twisted wires used to deliver basic telephone service (as low as 4 kHz for analog voice service). This tremendous capacity is necessary in order to deliver many channels of video programming. However, the basic cost of delivery of traditional (wired) telephone service and cable television service are comparable. The difference is that telephone service requires dynamic switching and billing services not used in basic cable programming.

[51] See U.S. Congress, Office of Technology Assessment, *Wireless Technologies and the National Information Infrastructure, OTA-ITC-622* (Washington, DC: U.S. Government Printing Office, 1995).

Measuring Urban Telecom Infrastructures

Little work has been done to characterize and compare telecommunications infrastructure across the United States at the metropolitan area level.[52] The publicly available information is usually only compiled at the regional or state levels, and private-sector information is often scanty or hard to get.[53] Moreover, it is difficult to define and measure the quality of the infrastructure, especially as the technologies become more arcane and speculative. For example, the widespread availability of Integrated Services Digital Network (ISDN)[54] services in a particular region may be viewed as progressive by some and as irrelevant by others. Several parameters, however, may be (or have been) used to measure infrastructures.

The most immediate measure of an infrastructure is the tangible investment in transmission media, including the number of miles per capita of fiberoptic cable that connects central office switches or customers,[55] the miles of microwave bypass routes, and the number of cellular telephone channels per capita. The installation of advanced equipment internal to the providers' networks is also important, such as the percentage of switches that use electronic, particularly digital, technology,[56] the percentage of central office switches with Signaling System 7 (SS7) software, and the percentage penetration of advanced intelligent network (AIN) features.[57]

Measuring only the advanced components of the infrastructure obscures, however, the value of the older infrastructure such as traditional twisted-wire cables or analog switches. Much of the established infrastructure is quite robust for modern applications, or can be used in innovative ways to squeeze more performance out of the sunk investment. Fiberoptic cable, for example, is the technology of choice for carrying traffic between telephone company central offices, but a custom installation may be expensive overkill in an application where its full capacity is not used. Also, measuring the number of households using the copper wire or radiotelephone infrastructure is a measure of universal access.[58]

The installed investment internal to the users' local networks is also important, since many sophisticated users buy bulk services and do much of the switching themselves, becoming providers

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[52] A recent Department of Commerce report notes that current indicators from the Federal Communications Commission do not show the geographical distribution of basic telephone service, nor do they go beyond basic telephone service to include, for example, personal computers and modems. U.S. Department of Commerce, National Telecommunications and Information Administration, "Falling Through the Net: A Survey of the 'Have Nots' in Rural and Urban America," July 1995

[53] Firms exist that sell information about installed fiberoptic cables, microwave paths, and wireless licenses in various metros. This information is gathered from publicly available information and news releases, and may overlook many private installations, or information about features and applications associated with the installations.

[54] ISDN is a feature that allows more flexibility and faster data transmission than allowed by conventional analog telephone and modem equipment. ISDN can use existing copper wire but requires digital equipment at the user's and provider's ends.

[55] Several U.S. cities now claim to have the most miles of installed fiberoptic cable or cable per capita. These claims are difficult to verify and subject to change, and demonstrate the importance of using a variety of parameters to measure the physical infrastructure.

[56] Observers agree that the replacement of electromechanical switches with electronic switches is particularly important for modern services. Electronic switches can be based on analog or digital technology. Of these, digital switches are programmable and provide the most modern features.

[57] The advanced intelligent network takes the programmability of digital switching one step further by allowing the provider to program new features for the entire network from central points, avoiding costly and time-consuming installation of features at each switch.

[58] See U.S. Department of Commerce, National Telecommunications and Information Administration, *The NTIA Infrastructure Report: Telecommunications in the Age of Information* (Washington, DC: National Technical Information Service, 1991). See also *Wireless Technologies and the National Information Infrastructure*, op. cit., footnote 51.

and sometimes reselling that capacity elsewhere.[59] Measures of the users' installed infrastructure might include the number or percentage penetration of digital private branch exchange (PBX) equipment[60] and the total subscription to advanced telecom features.

Industry also makes investment and location decisions based on factors relating to the *market* for telecom services that go beyond the nominal availability of physical infrastructure. For example, a diverse selection of providers and services may indicate a more sophisticated or innovative market. Diversity may be crudely measured by the number of locally available providers in various markets such as long-distance and local telephony, cable television, cellular, value-added services, new personal communication services (PCS), and satellite uplink services. Other market-related factors that figure into investment decisions include: the price structure of the services, and the quality of service by the providers (e.g., the time delay for the installation of new features by a particular provider).

General State of Urban Telecom Infrastructures

Lacking data, in its interviews OTA found a consensus that the level of quality of telecom infrastructures in metropolitan areas across the United States is not only relatively high, but also relatively uniform. While variations in the physical infrastructure and the markets clearly exist across the country—and a more detailed analysis could highlight the variations—these differences appear to be relatively small compared to differences between, for example, some rural communities.

For example, most (if not all) U.S. metropolitan areas have local access to the Internet and online computer services such as Compuserve, America Online, and Prodigy. Competitive access providers (CAPs)[61] such as Metropolitan Fiber Systems, Teleport Communications Group, and MCI Metro are expanding into an increasing number of metros and competing with the traditional local providers. For example, while the CAPs initially served the most crowded markets such as New York and Chicago, they have expanded to smaller metros such as Omaha, Nebraska, and Wilmington, Delaware. Telephone and cable companies are competing to serve the video entertainment market wherever the new services are allowed and the residents are willing to pay.

A nominal review of news releases and maps detailing the location of fiberoptic cable and advanced services across the United States indicates a relatively uniform distribution from coast to coast. All the major telephone companies have their central offices substantially or completely interconnected by fiberoptic cable. But, microwave or satellite transmissions are indistinguishable from fiberoptic transmission for many common applications and the lack of fiberoptic cable in an areas does not necessarily mean a lack of quality infrastructure.[62] Also, the long-distance

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[59] Some argue that such private investment should not be included in the infrastructure since its private nature precludes the leveraging aspects of public infrastructures such as roads, canals, or electrical power systems. The difficulty lies in the complex ownership of the telecom infrastructure, which is provided by an array of mostly private corporations, of which some have common carrier provisions and some do not. The tradeoff between managing telecom operations internally or contracting-out the services from providers varies by company and with time as the technology changes. Such internalization of the infrastructure, however, is more difficult for smaller, less-sophisticated businesses.

[60] PBX equipment allows a customer to lease high-capacity circuits and perform some or all of its switching on premises.

[61] Competitive access providers (CAPs) install all-fiber networks to connect customers to each other or to long-distance providers, bypassing the traditional local telephone company. A CAP may switch circuits for the customer, or it may simply interconnect locations and allow the customer to switch circuits in-house. CAPs were established in the 1980s as fiberoptic cable transmission became competitive with microwave transmission.

[62] Microwave and satellite transmissions are particularly appropriate for mobile or other flexible applications, while fiberoptic transmission is particularly appropriate for high-quality applications (such as commercial television feeds). Satellite transmission is also appropriate for broadcasting.

companies must pass voice, video, and data messages back and forth with the local telephone and other providers. In some cases, these inter-company connections pose technical problems since different companies use different equipment and provide different services. These differences limit the accessibility of some services, despite the presence of extensive fiberoptic cabling.

Furthermore, not all organizations need advanced telecom services and of those that do, some of the largest customers may be able to receive whatever they wish regardless of the local infrastructure. Large users may make special arrangements with the local providers. Companies may also construct private telecom networks by leasing channels wholesale from satellite or other providers. Internalization of much of their telecom operations makes large users less dependent on the local features of the public-switched network. The global nature of multinational corporations tends to make differences in the local public infrastructure less relevant. Thus, snapshots of the public infrastructure do not reveal much about its flexibility.

The difference between the collective urban and rural telecom infrastructures can be large, however, depending on what is measured and when. For example, in a 1993 survey only 55 percent of central offices in rural areas provided equal access[63] to competing long-distance providers—an indication of the level of diversity of carriers—compared to 97 percent of urban central offices.[64] This parameter ranged from zero (in rural Maryland, Wyoming, and Utah) to 100 percent in rural Connecticut. In that survey, digital switching was relatively widespread, however, with an average 91 percent penetration in rural central offices (the lowest being rural Arizona with 56 percent). The average interconnection of central offices with fiberoptic cable was 42 percent (with zero percent in rural Massachusetts, Maryland, and Vermont), and the penetration of SS7 software in rural central office switches averaged only 15 percent. However, these penetration rates are increasing as telephone companies modernize their networks.

Telecom Infrastructure and Local Economic Growth

Correlations Between Investment and Growth

Because of the perceived importance of the telecom infrastructure to local economic growth, there has been considerable interest in statistically demonstrating this relationship. It is often not possible, however, to find a statistical correlation between local investment in telecom infrastructure and local economic development. That is, the relationship may exist, but it cannot necessarily be mathematically demonstrated with the information provided.[65] Statistical correlations are difficult to demonstrate because economic development and investment are both affected by many interrelated factors—the relationship itself is not well-defined, even in principle. Also, effects may be obscured by other factors in the regional economy, by various delays before a cause results in an effect, and by incomplete measures of the use or quality of the infrastructure or of economic development.

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[63] In order to have access to different long-distance providers, the providers' central offices must provide "equal access" for its users. Equal access allows a caller to dial a five-digit code to access a particular long-distance provider, or to request that the local provider make a particular long-distance provider their primary provider. The penetration of equal access in central offices is therefore an indicator of the availability of alternatives to the traditional carrier.

[64] The differences in these figures have decreased since this data was collected. National Exchange Carrier Association, "Building the Telecommunications Infrastructure in Rural America," 1993.

[65] Such an analysis might begin by stating a hypothesis, and then testing the hypothesis by applying statistical methods to the available data. The hypothesis may be said to be valid if the analysis indicates it is valid to a chosen degree of confidence. Not demonstrating that correlation, however, is not the same as statistically demonstrating the negation of the hypothesis, which must pass the same test. Therefore, demonstrating the negation of the hypothesis may be equally difficult.

Investment in infrastructure and economic growth may each be driven, in part, by population density, complicating the analysis. One study of metros in Indiana found no statistically significant difference between large and small metros in the overall use of telecommunications and information technologies, possibly indicating that the telecom infrastructure and metro population are *not* correlated.[66] Likewise, a study of rural counties in Washington and Oregon demonstrated that a correlation exists between telecom infrastructure (particularly single-party service and electronic switches) and economic performance in a manner *not* explained by population density alone.[67] However, the relationship of large to small cities may be complex. Large metropolitan areas, for example, may attract more information-intensive industries and, consequently, build more infrastructure (indicating a correlation), but the technology itself also serves to spread economic activity over a wider area (reducing the correlation).

One study of the variations among the different regions served by the seven "Baby Bells" across the United States did show that the regions were statistically different from each other in terms of the diffusion of new technologies.[68] The study evaluated several parameters including the growth rates of kilometers per capita of fiberoptic cable, basic and primary ISDN channels per capita, digital business lines per capita, and revenue and employment growth in various information-related industrial sectors. The study suggests that the greatest number of positive correlations of new technology diffusion and sectoral economic growth are in the NYNEX and Bell Atlantic regions, possibly due to the concentration and growth of financial and information-intensive activities in the northeastern U.S. Several factors complicate such correlations at the regional level, however, including the averaging of growth rates over entire regions.

These correlations do not prove that technology investment necessarily causes economic development, or vice versa, but simply that investment and development are found together in certain areas. Other studies have tested for causality in either or both directions: economic development causing investment in telecom infrastructure, and vice versa, with mixed results.[69] Also, while the uniformity of the telecom infrastructure across metropolitan areas in the U.S. makes correlations difficult at the local and regional levels, correlations have been clearly established between access to basic telephone service and economic growth on the national scale, particularly in developing countries.[70]

Despite the difficulty in demonstrating statistical correlations between telecom investment and

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[66] Patrick Alles, Adrian Esparza, and Susan Lucas, "Telecommunications and the Large City-Small City Divide: Evidence from Indiana Cities," *The Professional Geographer*, vol. 46, No. 3, 1994, pp. 307-315.

[67] That is, increasing population density did not seem to cause independent improvements in the telecom infrastructure and in economic activity, with no direct correlation between the latter two. See E. Parker and H. Hudson, *Electronic Byways: State Policies for Rural Development through Telecommunications* (Boulder, CO: Westview Press, 1992).

[68] Mark Welsh, Department of Geography, Florida State University, "Economic Restructuring and Divestiture: An Examination of Analog and Digital Capital Development for the Regional Bell Operating Companies," Mar. 21, 1995.

[69] One study of two counties in Pennsylvania measured correlations between economic activity and two types of telecom infrastructure investment (central office equipment and outside plant—cable and wire) by sampling data over two, three, and four years to observe a cause-effect relationship. Francis J. Cronin, Edwin B. Parker, Elisabeth K. Colleran, and Mark A. Gold, "Telecommunications Infrastructure Investment and Economic Development," *Telecommunications Policy*, August 1993, pp. 415-430. Another study taken from 45 nations over 13 years presented evidence to demonstrate both the effects of economic growth leading to telecom investment and the converse. Andrew Hardy, "The Role of the Telephone in Economic Development," *Telecommunications Policy*, vol. 5, No. 4, December 1980, pp. 278-286.

[70] Robert J. Saunders, Jeremy J. Warford, and Bjorn Wellenius, *Telecommunications and Economic Development, 2nd Edition* (Baltimore, MD: Johns Hopkins University Press, 1994).

economic growth, observers nevertheless believe that the relationship exists, but the improvement of a local telecom infrastructure to a minimum level (particularly the installation of digital switching) may be necessary for economic development but not sufficient. That is, the widespread notion that "if you build it, they will come" is not necessarily true.

First, factors determining local economic growth are complex and not dependent only on investment in telecom infrastructure. Second, there is an effect of diminishing returns; investment in basic infrastructure in less-developed communities or regions will naturally show the greatest returns, while additional investment in relatively advanced areas may produce only marginal returns.[71] Third, as more localities reach the threshold of investment to spur economic development, that threshold provides less of an advantage for each. Fourth, minimum thresholds of telecom investment—if they exist—may be difficult to discern and may change over time. Statistical correlations demonstrated today may not apply tomorrow. Purchasers of advanced services are often required to commit to a particular technology that may become quickly obsolete or overinvested, causing uncertainty.

Finally, businesses are often mobile and free to relocate when conditions elsewhere become more favorable. One expert told OTA that telecom-related back office jobs are "easy come, easy go," unlike heavy industry, medical centers, deep-water ports, or natural tourist attractions that are more difficult or impossible to move. Thus, municipalities who see telecom as a tool for economic development must gain a large enough competitive advantage to attract some key businesses, and then transform the economic growth into a more permanent or diversified economy.

Importance of the Business Climate

As the telecom infrastructure becomes more evenly distributed, the behavior of providers, users, and regulators becomes more important than the differences among urban infrastructures—it is not "what is there" but also "how it is used" that is important. Some regions and regional providers are more responsive to business needs than others, and businesses may make location decisions accordingly. In particular, if local public policy or the private sector does not recognize the importance of stimulating user demand for new and advanced services, supply-side approaches alone are likely doomed to fail.[72] That is, by generating and augmenting demand for services rather than generating infrastructure per se, "the deployment pattern for the infrastructure will be rationalized and its utility will be maximized." [73]

These three parties—the users, providers, and regulators—are interdependent. The providers buy and sell each others' services, and many large businesses and institutions exchange extra telecom capacity with providers. The corporate decisions of large telecom providers reflect not only specific market demands, but also the corporate vision of its role in the evolving industry. For example, anticipating more competition, the large telephone companies have been reorganizing (from functional lines to lines of business) in part to be more responsive to customer needs.[74] Regulatory pressure, in turn, may be applied to balance the short-term interests of providers with the long-term interests of the region. For example, regula-

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[71] Andrew Hardy, op. cit., footnote 69.

[72] David Gibbs, "Telematics and Urban Development Policies," *Telecommunications Policy,* May/June 1993, pp. 250-256.

[73] Gail Garfield Schwartz, "Telecommunications and Economic Development Policy," *Economic Development Quarterly,* vol 4., No. 2, May 1990, pp. 88.

[74] Other official and unofficial reasons include realignment toward new regulatory regimes, an appearance of responsivity to the financial markets, and as a means to relocate workers and cut costs.

tors may encourage the providers to interconnect their networks and unbundle their services in order to provide more choices for users. Finally, innovative corporate and institutional "early adopters" create demand for new and quality services. Also, special events such as Olympic Games or a political convention force the infrastructure to a higher priority.

Telecom Investment and Distressed Neighborhoods

Investment in telecom infrastructure is also relevant to economic growth at the neighborhood level, particularly as information technologies disperse organizations and workers throughout metropolitan areas. Some claim that telecom providers neglect low-income neighborhoods as they upgrade the infrastructure, leading to lower levels of economic growth in those areas.[75] They argue that regulators should pressure telephone companies to provide the same services to wealthy and lower-income neighborhoods alike, in exchange for the continuing use of public property as right-of-way, or regulatory relief.

.From the provider's perspective, some difference in investment among neighborhoods and regions is inevitable as providers first invest in the areas with greater demand or most capable of returning profits, and invest in lower-income areas as the technologies become more mature and less risky. Since advanced technologies such as ISDN and other switched digital services are not standard and require new investment, providers have held off on installation of such services to residential and low-income areas. Providers must constantly make business decisions and take risks based on the anticipated revenue potential of new services and future competition, the current and estimated operating and construction costs, and public relations.

Moreover, much of the gap in investment in distressed neighborhoods is irrelevant to growth because basic phone service is usually available and can be installed relatively quickly.[76] Also, a variety of technical solutions can often accommodate users who lack advanced services. For example, high-speed modems can transfer data over traditional telephone lines at speeds acceptable (and more affordable) for most business users, if advanced services are not available. Likewise, residents of distressed neighborhoods in metropolitan areas are not excluded from local Internet access, unlike many rural users who must access the Internet through long-distance calls.

Also, the income and expertise of residents of disadvantaged neighborhoods is often the limiting factor rather than availability of telecom service.[77,78] Contrary to the perception that personal computing is widely accessible, innovative applications and computer networking require training and resources that are not necessarily available in or relevant to the needs of distressed communi-

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[75] A 1995 Department of Commerce study found that the lowest telephone penetration levels were measured for households with incomes under $10,000 annually, households under 25 years old, and households with less than a high school education. Central city households generally fared worse in all of these comparisons with respect to rural and urban households; however, comparisons across income, age, and educational levels each generally demonstrate larger differences in telephone penetration than location. See U.S. Department of Commerce, "Falling Through the Net," op. cit., footnote 52.

[76] Wiring new cables in older buildings can sometimes be prohibitively expensive, however.

[77] A Rutgers University study sponsored by Bell Atlantic suggests that low-income urban areas consume a disproportionately high amount of premium features from the telephone company, but may not be able to afford them; and that inner-city residents may lose phone service because of the unlimited and unpredictable cost of long-distance service and other usage-related calls, not because of the access cost of local service itself. Milton Mueller and Jorge Reina Schement, Rutgers University, "Universal Service from the Bottom Up: A Profile of Telecommunications Access in Camden, New Jersey," report prepared for Bell Atlantic, January 1995.

[78] The average penetration of telephones in 1990 was estimated at 93.3 percent—about 6 million households are *not* connected at any given time—but another large and unknown number lose and regain service throughout the year. U.S. Department of Commerce, *The NTIA Infrastructure Report*, op. cit., footnote 58.

ties. In a similar fashion, school classrooms commonly do not have installed telephones, ready access to copiers, computers with user-friendly software, and Internet access, even though telephone service, copiers, software and Internet services are nominally available.

The main obstacles for residents and businesses in distressed neighborhoods are the capital equipment costs and technical expertise to establish and maintain telecom applications, and to some extent the ongoing expenses of standard telephone service, rather than the access to basic and advanced services per se. This does not mean that investment in the physical infrastructure is irrelevant, but other factors should be recognized and addressed as well, including education in computer skills, business assistance, and increasing neighborhood security.

Public Policy and Urban Telecom Infrastructure

Public policy is vulnerable to proposals that are technological fixes to complex problems but that cannot adapt to technological and regulatory change. Many proponents of early cable television, in particular, hoped for a decentralized, interactive medium that would solve many urban problems. Instead it became a commercial success only by imitating broadcast television. The early claims for cable television, however, were not unlike claims made today for the Internet or for a fiberoptic infrastructure.[79,80]

There are many examples of state and federal governments working to improve telecom infrastructure in order to promote economic development—successfully or not. For example, the state of Iowa contracted to lay fiberoptic cables in the ground to create its own high-capacity network for public services such as distance education and public administration. The state of North Carolina worked through universities, industry, and telecom providers to expand its "information superhighway" for advanced applications. The Canadian province of New Brunswick supported an effort to install fiberoptic cable and modern equipment to attract back office and other activities that operate remotely via telecommunications. State public service commissions and related bodies are also reconsidering telecom regulation to promote investment in their regions, balancing the interests of consumers and providers. The Clinton Administration has addressed telecom and other information technology applications through its National Information Infrastructure (NII) program, and other countries have been promoting similar efforts.

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[79] The concepts of "wired cities" and "electronic highways" based on the advent of cable television date back to this period. What has changed is that the technologies are different, the market forces are recognized to have a greater role, and the field of stakeholders has widened. The visions, however, are not necessarily less utopian. For example, in the 1970s it was hoped that cable television would provide more independent and diverse sources of content—promising over 100 channels, local home shopping, high-bandwidth information retrieval, interactivity, and more political participation. Instead, cable television became mainly a medium for commercial entertainment. See William H. Dutton, Jay G. Blumler, and Kenneth L. Kraemer, *Wired Cities: Shaping the Future of Communications* (Boston, MA: G.K. Hall & Co., 1986); and "Ralph Lee Smith, "The Wired Nation," *The Nation*, May 18, 1970, pp. 582-606.

[80] An early predecessor to today's NII initiative was an interagency study on urban communications published in 1971. The study suggested pilot applications including telemedicine, distance education, intelligent transportation systems, electronic delivery of public services, video surveillance for public safety, and so forth. These applications are still relevant today, even though the specific technologies used to implement them have changed over the 25 years since the report. The impact of telecom on economic activity in general, however, was not directly discussed. National Academy of Engineering, "Communications Technology for Urban Improvement," report to the Department of Housing and Urban Development (Washington, DC: National Academy of Engineering, June 1971. See Peter C. Goldmark, "Communication and the Community," *Scientific American*, 1972, pp. 143-150

Local governments have had a less pivotal role as enablers of local economic growth through investment in telecommunications.[81] As with other public and private organizations and the telecom industry itself, telecom was traditionally viewed as a relatively static infrastructure. The local government role was generally limited to internal procurements; and negotiation with cable television providers over rights-of-way, franchise fees, zoning regulations, institutional networks,[82] and channels set aside for public, education, or government (PEG) use.[83]

During the 1980s, some municipalities looked to teleports as a parallel to airports and maritime ports to spur economic and real estate development. A teleport is essentially a user or provider that consolidates communications to and from satellites. Unlike airports and maritime ports, however, proximity to a teleport is usually irrelevant if the local terrestrial telecom infrastructure can move information from the customer to the teleport and back.[84] Also, teleport providers resemble other telecom providers and services; thus, U.S. teleport providers have not greatly involved the public sector except to meet zoning or other land use restrictions. Finally, terrestrial fiberoptic cable eventually became competitive with satellite communication for many business applications, changing the strategic importance of teleports.

For example, New York City supported the Staten Island teleport to retain back office jobs in the New York metro. The teleport developed real estate in conjunction with the installation of satellite earth stations for data transmission, connected to Manhattan by fiberoptic cable and microwave links.[85] The cooperative effort eventually split off its fiberoptic transmission functions into what is today Teleport Communications Group (TCG—a competitive access provider), and continued the "dish farm" operations as a real estate development. One observer claimed, however, that the Staten Island teleport was appropriate for its time, and survived, but would not succeed if it were created today, largely due to competition from providers of fiberoptic transmission.

The Washington International Teleport, in contrast, did not play a role in real estate development. It evolved at first as a local microwave interconnect company and soon began to operate facilities to serve broadcasters and video programmers. It continues to serve as an intermediary or gateway to move mostly video information from earth to satellite and back. Because of its mid-Atlantic coast location, its gateway function now serves countries on the "Atlantic Rim."

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[81] "Despite the central role of cities as 'hubs' of the burgeoning information economy, the nature, location and quality of urban telecommunications infrastructure was shaped entirely by telephone companies working within regulatory frameworks. This was in sharp contrast to the central role often played by cities in the development of urban transport, water and public health infrastructure." Stephen D.N. Graham, "The Role of Cities in Telecommunications Development," *Telecommunications Policy,* April 1992, pp. 187-193.

[82] Institutional networks are arrangements with cable television providers for free access to private video and data channels for internal use in exchange for franchise privileges and rights-of-way.

[83] Some municipalities have custom-made telecom plans to their particular needs. For example, Boston minimized the repeated repair of its congested city streets by planning and negotiating for extra capacity when first installing cabling. Los Angeles has a strong interest in accommodating telecommuting efforts to reduce congestion and pollution from commuter traffic. See Jurgen Schmandt, Frederick Williams, Robert H. Wilson, and Sharon Strover, *The New Urban Infrastructure: Cities and Telecommunications* (New York, NY: Praeger, 1990).

[84] European and Asian teleports are often modeled around real estate development, and integrate the teleport more completely with public sector planning and development. This integration is in part due to the need to bring the entire local infrastructure up to international quality. In the United States, in contrast, a stronger separation between public and private sector involvement is associated with a more competitive local infrastructure, and consequent difficulty for some teleports in the new industry to show a profit. Karen J.P. Howes, "Teleports—Satellites, Fiber and Compression," *Via Satellite,* August 1993, pp. 26-34.

[85] Gayle M. Horwitz, "New York's Port of the Future: The Staten Island Teleport," *The Journal of Urban Technology,* Fall 1992, pp. 69-86.

Today, many U.S. municipalities are forming telecom plans that at least recognize the significance of telecom to local development,[86] and some are particularly innovative in their attempts to craft a local infrastructure that meets their interests. For example, the town of Blacksburg, Virginia, in conjunction with Bell Atlantic and Virginia Polytechnic Institute and State University, created the Blacksburg Electronic Village to extend the university network to the residents of the town and to the municipal government. Many cities have arranged with cable television providers to install high-capacity institutional networks in partial exchange for rights of way within the city boundaries.[87] Many cities have established planning committees or policies to promote the local telecommunications infrastructure.[88] Seattle, Washington, has debated a public role in financing and installing its local telecom infrastructure, as has New Orleans. Omaha is well-known as a capital of telemarketing and data processing, not because of a planned strategy but in part because of labor expertise that spilled over from the Strategic Air Command facilities, and also because of state telecom policy reform.[89]

Most of the over 19,000 municipalities in the United States do not have explicit policies, however. A survey conducted by the International City/County Management Association of over 1,000 U.S. local governments found that only 5 percent had written telecommunications plans. On the other hand, about 72 percent felt that the "information superhighway" will have a positive effect on economic development in their community, while only about 2 percent felt it would have a negative effect.[90]

There are no federal telecom policies that are directed explicitly toward urban areas. However, Congress has recently considered legislation that could pre-empt or limit local government control over negotiating rights-of-way and franchises with telecom providers. Local officials have expressed strong opposition to any further limitation over local control, on the grounds that local governments should have maximum flexibility to negotiate terms that best fit their needs.[91] Local governments argue that the use of public rights-of-way should merit compensation, as with the use of any property, particularly since the use of a right-of-way sometimes requires public expense to repair cumulative damage to streets. They have also argued that the local community should be able to require access to public, educational, and government (PEG) programming that providers may not otherwise deliver. Thus, some argue that local governments should be able to charge franchise fees to direct-to-home satellite providers and telephone companies that provide television services via telephone lines, even if they are not currently using or paying for public rights-of-way. Franchise fees are important to local governments both

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[86] See Robert H. Wilson and Paul E. Teske, "Telecommunications and Economic Development: The State and Local Role," *Economic Development Quarterly*, vol. 4, No. 2, May 1990, pp. 158-174.

[87] For example, see City of New York, Department of Telecommunications and Energy, "Institutional Network Master Plan: Report to the Mayor's Telecommunications Productivity and Planning Committee," October 1993.

[88] For example, see San Diego State University, International Center for Communications, "San Diego: City of the Future—the Role of Telecommunications," March 1994.

[89] "Omaha's telemarketing industry developed there because its geographic location in the center of the country gave it a cost advantage in the days of banded, WATS service." It also had low labor costs and residents with mainstream dialects. "As it became a center of telemarketing, the infrastructure in and around the city became more capacious and sophisticated." Milton Mueller, listserv communication, Dec. 16, 1994.

[90] Less than 2 percent of communities with populations under 10,000 had such plans. Lisa Huffman and Woody Talcove, International City/County Management Association, "Local Governments Not Ready for the Information Superhighway," *Government Technology*, vol. 8, No. 2, February 1995, p.1.

[91] See National League of Cities, "1994 National Municipal Policy: Transportation and Communications," Washington DC, December 1993.

as a source of revenue and as a means of local control over their infrastructure.

Others have argued that while some communities have negotiated very favorable agreements, others have not, and the federal government is in a better position to mandate a standard that all providers must meet. Providers claim that the establishment of a single nationwide standard may minimize costs for providers that serve several communities, as well as the collective costs for local governments. Telephone companies argue that their delivery of "video dial-tone" is different from cable television provision, and should be exempt from the PEG requirements.

Federal policy could also pre-empt local control over antennas for wireless communications.[92] Local governments prefer to maintain control over zoning and other arrangements that specify how and where towers for cellular telephone and other communications can be constructed. The industry contends that making these arrangements with each community raises their costs and delays implementation of the wireless infrastructure.

Several programs are not part of an urban policy but are nevertheless relevant to urban municipalities (as well as rural communities) that are seeking to promote local infrastructure. Through its Telecommunications and Information Infrastructure Assistance Program (TIIAP), the National Telecommunications and Information Administration (NTIA) in the Department of Commerce provides matching funds for state and local applications that enhance the local information infrastructure.[93] These projects do not necessarily improve the local physical infrastructure per se, but rather improve access to government services and demonstrate innovative applications in, for example, distance education, health care, and digital libraries.[94] NTIA also provides funds through its Public Telecommunications Facilities Program (PTFP) for public radio and television broadcasting facilities, and the Department of Education provides funds to school districts for projects in distance education.

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[92] See *Wireless Technologies and the National Information Infrastructure*, op. cit., footnote 51.

[93] The 1994 appropriation for TIIAP was $25 million, increasing to $62 million for 1995. The current Congress reduced that appropriation to $45 million in the rescission package.

[94] OTA examined the use of information technology to improve federal government services in U.S. Congress, Office of Technology Assessment, *Making Government Work: Electronic Delivery of Federal Services*, OTA-TCT-578 (Washington DC: U.S. Government Printing Office, September 1993); and William H. Dutton, University of Southern California, "Electronic Service Delivery and the Inner City: Community Workshop Summary," contractor paper prepared for the Office of Technology Assessment, National Technical Information Service, December 1992. See also Organization for Economic Cooperation and Development, *Information Systems for Urban Management*, 1993. For information on community free-nets see Richard Civille, Miles Fidelman, and John Altobello, Center for Civic Networking, "A National Strategy for Civic Networks," Washington D.C.

Uneven Development: Outer Suburbs and Exurbs

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The typical pattern of American urban development is one of a vast, low-density, and fragmented urban region with sprawling suburbs surrounding an aging, sometimes decaying inner core.[1] As one extreme example, the Chicago metropolitan area of eight million people now covers over 3,800 square miles, encompassing 265 different municipalities, 1,200 separate tax districts and parts of six counties and three states. While the metropolitan population has grown only marginally over the last decade (4 percent), land devoted to housing increased by 46 percent and land used for commercial purposes increased by 74 percent. Between 1970 and 1990, the city of Chicago lost 17 percent of its population while the suburbs gained 24 percent, though the inner suburbs also lost population over the two decades. At the same time, the city of Chicago has more than 2,000 vacant manufacturing sites.[2]

The relationship between urban form and the overall quality of life in American cities has been debated for many years. Since at least the 1970s, concerns about urban sprawl and its relationship to taxes, the cost of providing services, and environmental issues (the loss of farmland, air pollution, water quality, energy use)

[1] Kenneth Jackson, *Crabgrass Frontier: The Suburbanization of the United States* (New York, NY: Oxford University Press, 1985); John Borchert, "Futures of American Cities," in J.F. Hart (ed.) *Our Changing Cities* (Baltimore, MD: Johns Hopkins University Press, 1991), pp. 218-250; Larry S. Bourne, "Recycling Urban Systems and Metropolitan Areas: A Geographical Agenda for the 1990s and Beyond," *Economic Geography*, vol. 67, No. 3, 1991, pp. 185-209; Paul Knox, "The Restless Urban Landscape: Economic and Socio-Cultural Change and the Transformation of Washington, DC," *Annals of the American Association of Geographers*, vol. 81, 1991, pp. 181-209; and Anthony Downs, *New Visions for Metropolitan America* (Washington, DC: The Brookings Institution, 1994).

[2] *The Economist*, Oct. 15, 1994.

have brought it to the top of the public policy agenda in numerous states and localities. As a result, many places have adopted explicit land use policies (and related provisions) to manage or guide such growth. However, recently there have been renewed questions about the effect of sprawled urban development on the economy and the problems of the central city. Some of this criticism has come from surprising sources. The Bank of America, for instance, has recently questioned the overall impact of urban sprawl on the California economy and the quality of life.[3] Such questions have also been raised by researchers at the Federal Reserve Bank of Chicago.[4] Clearly, then, it is time to take stock of the debate on urban form and its relationship to the health of metropolitan America generally, and the fate of central cities and inner suburbs specifically.

Sprawled urban development is an outcome of a number of factors, including market forces, social factors, and as discussed in chapter 4, technological advances. However, public policies at many different levels, including federal housing policy and local government infrastructural investment, also play a role. In particular, public policy appears not to require that the full costs associated with new development be paid by the users. In addition, policies may not require that indirect costs (externalities) associated with sprawl be borne by residents or businesses that generate them. Externalities associated with dispersed development might include environmental degradation, traffic congestion, and reduced access to open space. Because externalities are unpriced they, too, distort the market and lead to economic inefficiencies. Public policies and externalities subsidize outer suburban and exurban development, raising the relative cost of development in the urban core. (The urban core includes the central city, and inner, older suburbs of metropolitan areas). At a time when America's urban cores are struggling with poverty, unemployment, and deteriorating infrastructures, underwriting the costs of sprawl is particularly damaging. This chapter investigates the nature and extent of the costs and subsidies associated with urban sprawl.

WHAT IS URBAN SPRAWL?

The term urban sprawl has no accepted definition. In popular usage it refers to low-density, often residential, development on the fringe of or beyond the border of suburban development. However, it need not have a locational component. In the classic *Costs of Sprawl* study, sprawl is defined as standard single-family detached dwelling units at a gross residential density of two dwelling units per acre.[5] Both Frank and the Environmental Protection Agency define sprawl as residential development at a density of three dwelling units per acre or less.[6] Thus, sprawl can occur within the boundaries of development, though it is more likely to develop on the urban fringe where vacant land exists, or beyond the fringe in the form of ribbon or leapfrog development.[7] Moreover, sprawl also encompasses commercial and industrial uses and the relationship between different types of land use. For this reason, Ewing prefers to define sprawl in terms of accessibility between related uses. He notes then that poor accessibility, and

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[3] "Beyond Sprawl: New Patterns of Growth to Fit the New California" (San Francisco, CA: Bank of America, *Environmental Policies and Programs*, 1995); see also Downs, op. cit. footnote 1, and Jeff Gersh, "The Rocky Mountain West at Risk," *Urban Land*, March 1995, pp. 32-35.

[4] Jerry W. Szatan and William A. Testa, "Metropolitan Areas Spread Out," *Chicago Fed Letter*, vol. 83, July 1994.

[5] Real Estate Research Council, *The Costs of Sprawl, Detailed Cost Analysis* (Washington, DC: U.S. Government Printing Office, 1974).

[6] James E. Frank, *Costs of Alternative Development Patterns: A Review of the Literature* (Washington, DC: Urban Land Institute, 1989); Environmental Protection Agency (EPA), "Costs of Providing Government Services to Alternative Residential Patterns," report prepared for the Chesapeake Bay Program's Subcommittee on Population Growth and Development, May 1993.

[7] Alan Altshuler and Jose Gomez-Ibanez, *Regulation for Revenue* (Washington, DC: Brookings Institution and Lincoln Institute for Land Policy, 1993). They note sprawl covers at least three types of development: continuous low-density, ribbon, and leapfrog.

thus sprawl, "may result from a failure to concentrate development and/or mix land uses."[8] Some also define sprawl on the fringe in relationship to disinvestment in the core. As SEMCOG notes, urban sprawl is ultimately a two-part process with "sprawling low-density growth at the suburban fringe and the concurrent disinvestment and abandonment of older/urbanized communities."[9]

One measure of sprawl in the United States is a comparison of relative city population densities with cities in the advanced industrial nations of Europe and Asia. With the exception of New York City, residential densities in the United States are below 20 persons per hectare, compared with 50 persons per hectare for European cities and 150 persons per hectare for Asian cities.[10] Consequently, land is required in great quantities, and increasingly so. For instance, in the Chesapeake Bay watershed between 1950 and 1980, population grew by 50 percent, but the amount of land used for commercial and residential purposes grew by 180 percent.[11] Similarly in Philadelphia, where the population of the metropolitan area increased by 2.8 percent between 1970 and 1990, the developed land area increased by 32 percent.[12]

CAUSES OF SPRAWL

Outer suburban and exurban sprawl results from several sets of factors. Perhaps the most important is the decentralization of employment. This decentralization is in turn a result of lower land and development costs on the periphery, extensive modern highway systems that lower transportation costs to outer suburban and exurban locales, and the relative proximity of a good labor supply that moved first to the edge for reasons of space, privacy, and amenities. Moreover, as detailed in chapters 4-7, technological changes will most likely continue to facilitate this overall employment decentralization, which in turn permits even greater numbers of people to live in the outer suburbs and exurbs but be within commuting range of large employment sites.

Low-density suburban patterns are also partly the result of residential preferences deeply embedded in a "long tradition of exclusionary middle-class American urban values aesthetically articulated in the marriage of town and country."[13] A great majority of Americans say they would prefer to live in low-density, single-family housing given the choice,[14] often 30 miles from a major city.[15] The most extreme form of this preference is the desire for a Jeffersonian rural lifestyle, a factor behind exurban development. Today, such a lifestyle need not mean being cutoff from "urban" amenities in rustic isolation. On the contrary, urban amenities are made feasible by improved technology, such as modern septic systems

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[8] Reid Ewing, "Characteristics, Causes, and Effects of Sprawl: A Literature Review," *Environmental and Urban Issues*, Winter 1994, pp. 1-15.

[9] Southeast Michigan Council of Governments (SEMCOG), "The Problem of 'Urban Sprawl," *Planning and Zoning News*, vol. 10, November 1991, 5-10, p 6.

[10] P.G. Newman and J.R. Kenworthy, *Cities and Automobile Dependence: A Sourcebook* (Aldershot, England: Gower Technical, 1989).

[11] EPA, op. cit., footnote 6. As a result, in the Chesapeake Bay watershed between the mid-1950s and mid-1970s approximately 2,800 acres of wetland were lost annually to new development. During this period Maryland lost 5 percent of its total wetlands and Pennsylvania and Virginia lost about 6 percent each.

[12] Greenspace Alliance, "Toward a Green Space Legacy: A Call to Action in Southeastern Pennsylvania" (Pennsylvania Environmental Council, Philadelphia, Pennsylvania, nd).

[13] Ivonne Audriac, Anne H. Shermyen and Marc T. Smith, "Ideal Urban Form and Visions of the Good Life: Florida's Growth Management Dilemma," *Journal of the American Planning Association*, vol. 56, No. 4, 1990, pp. 470-482.

[14] Richard L. Morrill, "Myths About Metropolis," in J.F. Hart (ed.), *Our Changing Cities* (Baltimore, MD: John Hopkins University Press, 1991), pp. 1-11, reports 80 percent.

[15] Glenn V. Fuguitt and David L. Brown, "Residential Preferences and Population Redistribution: 1972-1988," *Demography*, vol. 27, No. 4, November 1990, pp. 589-600.

that substitute for urban sewer systems, satellite dishes that substitute for cable television, and electronic home commerce that replaces in-store shopping and services.

A third set of factors leading to decentralization are conditions in the central city. A good deal of the flight of households from urban to suburban and exurban locales is attributed to the aversion of middle-class white households to ethnic and racial diversity. In addition, outward population shifts can be attributed to increasing problems of crime, the poor quality of the public schools, and decaying infrastructure in the urban core. Compare, for instance, crime rates in the city of Baltimore and the surrounding area of Baltimore County. In 1991 the crime rate as compiled by the FBI was 11,371 (per 100,000) and 6,650 (per 100,000), respectively. Crime rates in both jurisdictions have risen since 1985, but the crime rate in the city has grown much faster than in the county (+32.6 percent in the city versus +13.4 percent in the county).[16] Other metro areas show similar disparities.

In most cases one would expect older metropolitan areas, and particularly their central cities and older suburbs, to be at a disadvantage in the market-based competition for growth and investment relative to newer regions and the outer suburbs. Already built-up urban areas pose certain obvious difficulties simply because they are already developed. They also impose additional direct costs (e.g., onsite purchase, preparation, cleanup, and development approvals), and pose barriers to changes in land use in comparison to undeveloped greenfield sites (new development on previously vacant land). However, the governmental environment in which the competition occurs—the "rules" of the development game—appears biased against older areas to a much greater extent than the market would produce.

The final set of factors contributing to urban sprawl, then, are governmental actions (subsidies) and non-actions (in terms of externalities). The potential sources of bias are many and difficult to quantify. Indeed, no one has empirically evaluated either the origins or the importance of this imbalance. Nevertheless, it is widely believed that a myriad of government policies, including tax policies, depreciation allowances, building regulations and implicit subsidies, subsidize sprawled greenfield development and discourage efforts to reuse older urban and suburban land and infrastructure.[17] Estimating these costs is especially difficult because of poor data and a partial patchwork of existing studies on this subject. However, though the magnitude of these disadvantages for older areas is not known, reducing them could potentially be a significant step in aiding development and redevelopment of the urban core. The rest of this chapter attempts to outline the magnitude of these subsidies and externalities.

BENEFITS OF URBAN SPRAWL

The increasing population of metropolitan areas in the United States necessarily implies that metropolitan areas will grow outward. Researchers have shown that when metropolitan areas grow beyond a certain size, a polycentric urban form is more efficient than a compact, highly centralized monocentric form, because it allows the clustering of land uses to reduce trip lengths and congestion.[18] Hence, relatively lower density development in a different form promises several benefits.[19]

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[16] U.S. Bureau of the Census, *City and County Data Book: 1988* (Washington, DC: U.S. Government Printing Office, 1988). And U.S. Bureau of the Census, *City and County Data Book: 1994* (Washington, DC: U.S. Government Printing Office, 1994).

[17] There are also sets of regulations that potentially contribute to sprawl. These include the Americans with Disabilities Act and laws aimed at health and safety at work, which make it less costly to build an entirely new building than to buy an existing building and bring it up to the standards demanded by these laws.

[18] V. Haines, "Energy and Urban Form: A Human Ecological Critique," *Urban Affairs Quarterly*, vol. 21, No. 3, 1986, pp. 337-353.

[19] Frederick Steiner, "Sprawl Can Be Good," *Planning*, July vol. 60, 1994, pp. 14-17.

To begin with, sprawl has allowed many people, including the poor, to realize their preference for low-density living in part because land costs are cheaper on the fringe than in the core. Elements of that preference are the fact that new suburbs are often safer (less crime), cheaper, and give businesses more flexibility to grow (less regulation).[20]

The automobile-friendly suburbs also have benefits for the individual and society.[21] Indeed, the overwhelming dominance of the automobile suggests that many people are willing to pay both the internal and external costs of automobile use. Hence, as OTA notes: "Automobile use clearly is perceived by many as having real benefits *other than those created by artificial incentives* in comparison to the use of alternative modes or to the option of not traveling."[22] The internal benefits to individuals include comfort, flexibility, low door-to-door travel time, freight-carrying capacity (for shopping trips), cheap long-distance travel, and the aesthetic benefits of separated land uses. Perhaps more importantly, there are other positive external benefits which accrue to society as a whole. Businesses might have more locational options, thus improving economic efficiency. Consumers might have access to superstores, which, through greater economies of scale, offer lower prices. And commuting to work by automobile releases workers from dependence on the timetables of public transit systems, allowing more flexible work schedules (increasing the use of capital, and hence its efficiency). Now with the decentralization of work as well as homes, it is suggested that commutes will decrease in the long term with consequent savings of time and energy.[23] (So far there is no evidence this has happened.[24])

Peiser argues that leapfrog urban development, furthermore, is not a problem because leaving parcels of land undeveloped in the urban area in the short run will increase land densities over the long term, as these parcels increase in value and are more intensively used.[25] Peiser examined this hypothesis with data from three places: Fairfax County, Virginia; Dallas, Texas; and Montgomery County, Maryland. Montgomery County did not conform to the hypothesis because its land use regulations do not allow higher densities on the leapfrogged parcels. The infill parcels in Fairfax did generally conform to the hypothesis with higher densities, and the results from Dallas were mixed.

A Presidential commission established toward the end of the 1970s to study urban development also suggested that there are social and economic advantages to sprawl. The commission suggested that often development costs in the dense central city are higher than in the less dense suburbs. This results from expensive right of ways in the city and the fact that replacing existing infrastructure is likely to cause greater disruption and cost more than suburban greenfield development. Moreover, the commission suggested that suburban residents are more likely to internalize public service demands by buying similar services in the private

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[20] Bank of America, op. cit., footnote 3.

[21] U.S. Congress, Office of Technology Assessment, *Saving Energy in U.S. Transportation*, OTA-ETI-589 (Washington, DC: U.S. Government Printing Office, July 1994), pp. 94-98.

[22] Ibid., p. 95, emphasis in original.

[23] P. Gordon, and H.L. Wong, "The Costs of Urban Sprawl: Some New Evidence," *Environment and Planning A*, vol. 17, 1995, pp. 661-666.

[24] Between 1983 and 1990 the average household vehicle trip increased from 7.8 to 9 miles and the average commute from 8.6 to 10.9 miles (see Downs, op. cit., footnote 1). This is partly due to the fact that jobs have not spread out as much as housing and workers do not live near their jobs, frequently cross-commuting from one suburb to another.

[25] Richard B. Peiser, "Density and Urban Sprawl," *Land Economics*, vol. 65, No. 3, 1989, pp. 193-204.

market than if they lived in the city. This improves the fit between demand and supply and decreases demands placed on government financing.[26]

Finally, Bae and Richardson suggest that low-density development might have fewer environmental impacts and adverse health effects than high-density development.[27] They note that a local air shed is better able to deal with pollution when spread out over a larger area.

COSTS OF SPRAWL: IS IT SUBSIDIZED?

Though there are many private benefits and some public benefits to sprawl, there is also a range of public and private costs. This section assesses the evidence on the costs of alternative forms of urban development and who bears them. In other words, does suburban sprawl pay its own way or is it subsidized?[28] If it is subsidized, to what extent do these subsidies increase sprawl and, by extension, weaken the development prospects of the urban core? The costs can be broken down into direct costs and externalities. Externalities are dealt with in the next section. Table 8-1 summarizes the direct public and private costs of residential development. The current literature suggests that sprawl costs more than compact development, and that some of that cost is subsidized. Yet, some of the extra cost of sprawl is borne by those who live in the outer fringe and exurban areas, suggesting that the benefits are worth the cost to fringe residents.

Direct Costs of Sprawled Development

The direct costs of development fall into four major categories:

1. the **onsite** costs to improve the lot, including the buildings and the connections from the building to offsite public facilities;
2. primary facilities, called here **neighborhood services**, which serve the development exclusively. This includes streets, water and sewer lines within a neighborhood, street lighting, and recreational facilities;
3. **community** costs (sometimes called secondary direct facilities), which serve an area outside the development but do not service the region. This includes schools, trunk sewer and water lines, fire stations, libraries, telephone, cable TV, electricity lines, and police;
4. **regional** facilities, also known as secondary indirect facilities, such as regional roads and highways, and central water and sewer facilities, including water reservoirs, central water treatment and pumping stations, sewage treatment, central electricity and telephone services, solid waste disposal, mail, and regional transit systems.

Estimating the cost of these facilities is difficult. To begin with, costs must be broken into several different components: capital costs; operation and maintenance costs; precipitated costs, which are costs incurred by a particular development (the marginal cost); and full costs to the jurisdiction, which are costs equal to precipitated costs plus the allocated cost of inherited facilities.[29] Precipitated costs and full costs rely on the difference between marginal and average cost when calculating the service burden of a new subdivision. In an area already partially built up, (or fully built up, but

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[26] President's Commission for a National Agenda for the Eighties, *Urban America in the Eighties: Perspectives and Prospects*, (Washington, DC: U.S. Government Printing Office, 1980).

[27] Chane-Hee C. Bae and Harry W. Richardson, "Automobiles, the Environment and Metropolitan Spatial Structure" (Cambridge, MA: Lincoln Institute of Land Policy Working Papers, 1994).

[28] This does not consider, as some environmental proponents would suggest, the case in which suburban sprawl pays its own way economically but nevertheless has adverse environmental (and social) consequences.

[29] This accounting method was first developed by William L. Wheaton and Morton J. Schussheim, *The Cost of Municipal Services in Residential Areas* (Washington, DC: U.S. Department of Commerce, 1955). It is reviewed in Frank, op. cit., footnote 6.

TABLE 8-1: Direct Costs of Residential Development

On-site

The building on the lot and the capital facilities on the lot that connect the dwelling unit to the nearby offsite public facilities. These are nearly always borne by the user but they maybe subsidized through mortgage and tax policies.

Neighborhood costs

collector streets
water distribution lines
stormwater collector lines
streetlighting
sewer collector lines
recreational facilities

Community costs

roads
water and sewer trunk lines
stormwater trunk lines
electricity lines
telephone lines
education
emergency services (fire, police, and hospital)
libraries and parks

Regional costs

regional roads
central water and sewer treatment
central electricity and telephone facilities
solid waste disposal
other transportation (airport, transit)

SOURCE: Office of Technology Assessment, 1995.

with some abandonment) the marginal **costs (or** precipitated or extra costs) of a new development will be low, much lower than the average cost, which is the **cost** of supplying services to the subdivision averaged across all users in a jurisdiction. In an area where there is no existing capacity, the marginal cost of supplying services to the new residents will be very high, though the average cost will decrease as development proceeds.[30] Attributing costs to a particular development, therefore, is not easy. Indeed, calculating the public service cost of a specific development to withstand legal challenge has been quite difficult, and one that has generally been easier to do on an average cost basis rather than a marginal cost one.[31]

Nevertheless, in the theoretical literature public facility and service delivery costs of urban development are generally thought to vary with land use type (commercial, residential, open space), density, and distance (from services and other land uses). To date, a good deal of the research on this topic has focused on *density*, particularly at the neighborhood level and to a lesser extent the community level. More recently, there have been attempts, particularly by state governments, to assess the costs of the different development pat-

[30]Marginal cost pricing is the economically most efficient way of pricing public services when average cost is rising, but average cost pricing is better when average costs are falling. J. Sonstelie and A. Gin "Residential Development and the Cost of Local Public Services, " in J.M. Johnson (cd) *Resolving the Housing Crisis* (Cambridge, MA: Ballinger, 1982).

[31]R.W. Burchell and D. Listoskin, "FiscaI Impact Procedures and the Fiscal Impact Hierarchy: The Public Costs of Differing Types of Land Uses," paper prepared for the Annual Conference on Public Budgeting and Finance, Oct. 13-15, 1994, Washington, DC.

terns at a greater spatial scale, and in which *location* is the more important variable. This work can give a picture of metropolitan costs and subsidies, though to some extent a detailed analysis at this scale is still missing.

Onsite Costs

The **onsite** costs of development include the buildings and the connections from the buildings to the offsite public facilities. Generally, the commercial and residential purchaser pays these costs in full in the price of the building or house.[32] However, the cost of homeownership is subsidized through the federal tax code—by deductions of mortgage loan interest, capital gains tax deferment, and property tax payments.[33] The amount of the subsidy is not insignificant. It is projected for 1995 that the federal outlay for homeowner deductions will be $83.2 billion. By contrast, subsidies for renters (usually low-income renters) in the form of public housing and rental assistance will total $24.9 billion.[34] Though tax subsidies to housing shrank as a result of the Tax Reform Act of 1986, the effect on renters was greater than on homeowners. As a result, according to Follain and Ling, the tax subsidy to regular residential rental housing was all but eliminated by the Act.[35] Not only do homeowners receive more benefits than renters, but high-income owners receive more than low- and moderate-income owners. In 1993 households with annual incomes of more than $100,000 received 38.9 percent of homeowner subsidies, even though they only represent 5 percent of the population. Approximately 12 percent of the subsidy went to the top 1 percent of the population, those earning over $200,000.[36]

What is the spatial effect of the homeowner subsidy? It is generally agreed that in the past the public sector encouraged low-density suburbanization through tax deductions, mortgage guarantees, and depreciation formulas favoring new construction over the upgrading and repair of existing structures. That is, dispersed urban development was encouraged by large implicit subsidies for homeownership and single-family housing[37] because, as Peterson notes: "The new, low-density construction favored by tax laws is obviously most suitable for location outside the central metropolitan core."[38] Though the spatial implications of the federal tax code have not been studied more recently, it is reasonable to conclude that this subsidy continues to sponsor sprawl.

Most of the homeowner subsidy goes to those in the suburbs, where homeownership rates far exceed those in the central city, and houses are generally more expensive. For instance, in the Washington, D.C., metropolitan area, the median price of a house in the District of Columbia in

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[32] EPA, op. cit., footnote 6.

[33] In fact Heilbrun notes that "U.S. tax law favors homeowners twice over," because a homeowner does not pay tax on the net income gained by occupying a self-owned property (that is the tax on income that would accrue from renting the house) and at the same time allows a tax deduction on interest, property taxes, and the like. J. Heilbrun, *Urban Economics and Public Policy. Third edition* (New York, NY: St. Martin's Press, 1987), pp. 49.

[34] Vicki Kemper, "Home Inequity," *Common Cause Magazine*, Summer 1994, pp. 14-18. See also P. Marcuse, "The United States." in W. van Vliet (ed.), *International Handbook of Housing Policies and Practices* (Westport, CT: Greenwood/Praeger, 1990).

[35] James R. Follain and David C. Ling, "The Federal Tax Subsidy to Housing and the Reduced Value of the Mortgage Interest Deduction, *National Tax Journal*, vol. XLIV, No. 2, 1992, pp. 147-158.

[36] Joint Committee on Taxation, U.S. Congress, *Estimates of Federal Tax Expenditures for FY 1993-1998* (U.S. Government Printing Office, 1993); see also James M. Poterba, "Taxation and Housing: Old Questions, New Answers," *Empirical Public Finance*, vol. 82, No. 2, 1992, pp. 237-242.

[37] John Pucher, "Urban Travel Behavior as the Outcome of Public Policy: The Example of Modal-Split in Western Europe and North America," *Journal of the American Planning Association*, vol. 54, No. 4, 1988, pp. 509-520.

[38] George E. Peterson. "Federal Tax Policy and the Shaping of Urban Development," in Arthur P. Solomon (ed.), *The Prospective City* (Cambridge, MA: MIT Press, 1980). See also Heilbrun, op. cit., footnote 33, pp. 48-49.

1990 was $121,700, while that in Fairfax County was $213,000, and in the more distant suburb of Prince William County, it was $137,700. Homeownership rates also vary dramatically by location. The percent of owner-occupied housing in D.C. is 38.9 percent, while in Fairfax County and Prince William County it is 70.7 percent and 71.0 percent, respectively.[39] Assuming that income characteristics are the same over all three jurisdictions, then Prince William receives more than twice the homeowner subsidy that the District receives, and Fairfax County receives more than three times the subsidy.[40] These tax outlays subsidize low-density development, one aspect of sprawl. By reducing the net cost of housing, as household income grows, tax policy encourages the over-consumption of owner-occupied housing and the land that goes with it.[41] Over-consumption allows a house buyer to buy a larger house on a larger lot, an effect that increases with income.

It has also been suggested that in metropolitan areas where home values increase with distance from the center, the urban core is disadvantaged by Section 1034 of the tax code, which allows homesellers to defer tax liability on capital gains when selling a home and buying another at equal or greater value. For instance, 82 percent of homes sold in the city of Cleveland in 1992 sold for less than $65,000, while 85 percent of suburban homes sold for more than $65,000. Bier and Maric argue that in such an environment Section 1034 encourages people to move outward from the city toward more expensive houses in the suburbs.[42] They also suggest Section 1034 is an obstruction to people who want to move into the city from the suburbs, due to the fact that they could suffer a large tax loss if a capital gain is involved. Bier and Maric estimated that movement outward by homesellers under the capital gains provision is 16 percent greater than would otherwise be expected. These results were later replicated in seven major urban areas in Ohio.[43]

Neighborhood Costs

Since the classic study *Costs of Sprawl*, a good deal of analysis has focused on capital costs at the neighborhood and to some extent community level, using hypothetical development prototypes.[44] The main focus has been on the effects of *density* on neighborhood and community public infrastructure costs, such as roads, sewers, education, and fire. Though there is a good deal of disagreement on the assumptions and calculations for such estimations, there is general agreement that decreased density leads to increasing public and private development costs.[45] Based on previous studies, Frank estimated the effect of density on neighborhood and community capital costs.[46] In table 8-2, these costs are updated to 1992 dollars and modified to coincide with the definition of neighborhood services given above.[47] These es-

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[39] U.S. Bureau of the Census, op. cit., footnote 16.

[40] This does not take into account relative income levels which might make the relative difference between central cities and suburbs even greater.

[41] Frank DeLeeuw and Larry Ozalle, "The Impact of Federal Income Tax on Investment in Housing," *Survey of Current Business*, December 1979, pp. 50-61; Jerry W. Szatan and William A. Testa, "Metropolitan Areas Spread Out," *Chicago Fed Letter*, vol. 83, July 1994; Poterba op. cit., footnote 36.

[42] Thomas E. Bier and Ivan Maric, "IRS Homeseller Provision and Urban Decline," *Journal of Urban Affairs*, vol. 16, No. 2, 1994, pp. 141-154.

[43] The Ohio Housing Research Network, "The IRS Homeseller Capital Gain Provision: Contributor to Urban Decline," Jan. 5, 1994. The Ohio Housing Research Network, Cleveland, Ohio.

[44] Real Estate Research Council, op. cit., footnote 5.

[45] Ibid; Frank, op cit., footnote 6; EPA, op. cit., footnote 6.

[46] Frank, op. cit., footnote 6.

[47] EPA, op cit., footnote 6.

TABLE 8-2: Cost Capital Facilities for Neighborhood Services

Dwelling unit type and density	Neighborhood costs	Community costs[a]	Total costs
SFD, 1 dwelling unit (du)/acre	$33,700	$25,300	$59,000
SFD, 3 dus/acre	$17,500	$25,200	$42,700
SF Clustered, 5 dus/acre	$10,500	$25,200	$35,700
Townhouses, 10 dus/acre	$7,200	$25,500	$32,700
Garden Apts, 15 dus/acre	$4,600	$25,500	$30,100
High-rise Apts, 30 dus/acre	$2,200	$13,900	$16,100
Mix, 12 dus/acre	$6,300	$30,300	$36,600

a,includes pollice, fire, solid waste collection and disposal, library, health, and general government 1992 dollars in cost/du Assumes 5 miles distance to employment, sewage plant, water plant, receiving body of water from residential development

SOURCE Environmental Protection Agency, "Costs of Providing Government Services to Alternative Residential Patterns, " report prepared for the Chesapeake Bay Program's Subcommittee on Population and Growth, May 1993

timates clearly show what is logically expected, that low density is related to higher neighborhood costs. For instance, a single-family dwelling at three dwelling units an acre is more than twice as costly to serve than townhouses at 10 dwelling units an acre.

By themselves, such cost differentials have no inherent public policy implications. Some individuals and firms choose to purchase more expensive housing and buildings, while others chose less expensive options, depending on income preferences. However, it is a public policy concern if lower-density development does not pay its own way and is partially subsidized by others. Increasingly, homeowners pay for most, if not all, development cost through the imposition of impact fees on developers, which are priced in the cost of a dwelling unit.[48] As Frank notes: "While large lots increase the cost of development, those increases are largely paid for by the occupants of that development in the form of the sale price of final dwellings rather than by existing taxpayers."[49] However, local government does incur greater responsibility for maintaining these interior collector streets, wastewater plants and the like.[50] Although, in an increasing number of places, homeowner associations effectively privatize operation and maintenance.[51]

■ Community Costs and Regional Costs

Based on the *Costs of Sprawl* study, Frank also estimated the effects of density on the capital cost of community facilities. The definitions in his review do not coincide exactly with the definitions given above, so some of the regional facilities are included in community services. Moreover, distance is held constant. In the figures in table 8-2 (column 3), distance from major facilities is assumed to be five miles. The results show that the cost of community and regional facilities per dwelling unit does not vary much with density, the exception being for high-rise apartments.

[48] Altshuler and Gomez-Ibanez, op. Cit., footnote 7.

[49] Frank, op. cit., footnote 6

[50] EPA, op cit., footnote 6, p. 5-2

[51] Robeft Dilger, *Neighborhood politics: Residential Community Associations in the American Governance* (New York, NY: New York University Press, 1992).

Another study of community and regional costs was conducted for the state of Florida.[52] The study was designed to look more closely at community and regional costs (labeled external costs), rather than neighborhood (or internal) costs, and at land use and distance relationships (urban pattern), not density. Moreover, the study approach was to examine eight actual case study areas in Florida, as opposed to hypothetical developments studied in much of the previous literature. The study found that compact and contiguous development is much more cost-efficient than scattered and linear development. It also found that significant subsidies exist for the more costly development (see next section).

The case studies were chosen to represent five types of development patterns:

1. **Scattered**—characterized by low density that has leapfrogged past vacant land into a virtually undeveloped area. These areas have few non-residential support services and few public services (Wellington and Cantonment case study areas);
2. **Linear**—low-density residential and mixed-use development extending outward from established urban area along major transportation corridor. This includes decreasing land use intensities and heavy reliance on automobile access (Kendall Drive and University Boulevard);
3. **Satellite**—moderate- to high-intensity mixed-use development in outlying suburban or exurban area with cultural and economic relationships but physical separation from the established major urban center (Tampa Palms);
4. **Contiguous**—moderate-density development located adjacent to existing urban development. This category also includes some mixed land uses, including non-residential support services and some public services (Countryside and Southpoint);
5. **Compact** — high-intensity development in a major urban area with vertical development, redevelopment of underutilized parcels, and underused public facilities (Downtown Orlando).

Capital and operating costs were examined for the most important community and regional services. It was found that it was cheaper to provide public services to the more compact and closer-in developments than those further out. As table 8-3 shows, the external capital costs for public facilities per unit are much lower for close-in, compact development than they are for fringe, scattered, linear and satellite development. Indeed, the cost of servicing Wellington (a scattered, fringe development) is more than twice that of servicing downtown Orlando.

This same Florida data can be interpreted in a somewhat different way. If the compact and continuous cases are deemed planned, and the scattered, linear, and satellite are deemed unplanned then it is possible to estimate the savings that might accrue from a planned urban form (see table 8-4).[53] Seen in this way, the Florida data show that planned growth can save significantly on road costs (60 percent over unplanned) and on utilities (40 percent over unplanned), and in a minor way on schools (7.4 percent over unplanned).

Another major state study headed by Robert Burchell of Rutgers University for the state of New Jersey attempted to calculate the costs associated with implementing a state plan aimed at concentrating urban development (known as "IPLAN"), in comparison with the situation if current development trends continued (a situation labeled "TREND"). The study examined the two different scenarios representing development under these plans for several different factors—eco-

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[52] James Duncan and Associates, Van Horn, Gray Associates, Ivey, Bennett, Harris, and Walls, Inc. and Wade-Trim, Inc., *The Search for Efficient Urban Growth Patterns: A Study of the Fiscal Impacts of Development in Florida.* Report presented to the Governor's Task Force on Urban Growth Patterns and the Florida Department of Community Affairs, July 1989.

[53] This is done by Robert W. Burchell and David Listoskin, "Land, Infrastructure, Housing Costs and Fiscal Impacts Associated with Growth: The Literature on the Impacts of Sprawl versus Managed Growth." Paper, Center for Urban Policy Research, Rutgers University, 1995. This follows from their earlier work on fiscal impacts and simulations of growth in New Jersey, see footnote 54.

TABLE 8-3: Total Community and Regional Capital Public Facility Costs (per single family dwelling unit, 1989)

Rank	Study area	Urban form	cost
1	Downtown	compact	$9,252
2	Southpoint	contiguous	$9,767
3	Countryside	contiguous	$12,693
4	Cantonment	scattered	$15,316
5	Tampa Palms	satellite	$15,447
6	University	linear	$16,260
7	Kendall	linear	$16,514
8	Wellington	scattered	$23,960
average			$14,901

SOURCE James Duncan and Associates, et al., *The Search for Efficient Urban Growth Patterns: A Study of the Fiscal Impacts of Development in Florida,* report presented to the Governor's Task Force on Urban Growth Patterns and the Florida Department of Community Affairs, July 1989.

TABLE 8-4: Community and Regional Costs for Planned and Unplanned Development (per single family dwelling unit, 1989)

Category of capital costs	Average of case studies under unplanned development	Average of case studies under planned development	Unplanned versus planned development difference		
				$	%
Roads	$7,014	$2,784	(+)	$4,230	60.3
Schools	$6,079	$5,625	(+)	454	7.4
Utilities	$2,187	$1,320	(+)	867	9.6
Other	$661	$672	(-)	11	1.7
Total	$15,941	$10,401	(+)	5,540	36.7

Note
[a]Includes scattered, linear and satellite developments
[b]Includes contiguous and compact developments.

SOURCE James Duncan and Associates, et al., *The Search for Efficient Urban Growth Patterns: A Study of the Fiscal Impacts of Development in Honda,* report presented to the Governor's Task Force on Urban Growth Patterns and the Florida Department of Community Affairs, July 1989; Robert W Burchell and David Litoskin, "Land, Infrastructure, Housing Costs and Fiscal Impacts Associated with Growth The Literature on the Impacts of Sprawl versus Managed Growth, " paper, Center for Urban Policy Research, Rutgers University, 1995.

nomic, fiscal, and environmental—from 1990 to 2010.[54] One part of the study examined the relative cost of major infrastructure for New Jersey over this time period. The findings are summarized in table 8-5.

Overall, the study found that between 1990 and 2010 planned growth versus unplanned would require $699 million less investment in roads, or 24 percent less; $561 million less investment in water and sewer costs, a 7.6 percent saving; $173 million less investment in schools, 3.3 percent less.[55]

In summary, this work shows that there are savings from higher-density development that is lo-

[54]*New* Jersey Office of State Planning (OSP), *Impact Assessment of the New Jersey Interim State Development and Redevelopment Plan, Report II: Reserch Findings.* Trenton, NJ, 1992.

[55]Burchell and Listoskin, op cit., footnote 52, pp. 15.

TABLE 8-5: Summary of Impacts of Planned Versus Unplanned Growth in New Jersey, 1990-2010 (per single family dwelling unit, 1989)

Growth/development impacts	Trend development	Planned development	Trend versus planned development Difference	o/o
Roads				
Local	$2,197	$1,630	$567	25.8
State	$727	$595	$132	18.2
Total Roads	$2,924	$2,225	$699	23.9
Utilities—Water	$634	$550	$84	13.2
Utilities—Sewer	$6,790	$6,313	$477	7.0
Total Utilities	$7,424	$6,863	$561	7.6
Schools	$5,296	$5,123	$173	3.3
All Infrastructure	$15,644	$14,211	$1,433	9.2

SOURCE' Robert W. Burchell and David Listoskin, "Land, Infrastructure, Housing Costs and Fiscal Impacts Associated with Growth The Literature on the Impacts of Sprawl versus Managed Growth. " Paper, Center for Urban Policy Research, Rutgers University, 1995, based on Burchell et al. (1993) "Impact Assessment of the New Jersey Interim State Development and Redevelopment Plan. Report Ill: Supplemental IPIANAssessment. " Apr 30, 1992.

TABLE 8-6: Relative Infrastructure Costs of Sprawl and Concentrated Development from Three Major Studies

Infrastructure cost category	Trend development	Planned development: findings from three major studies (in percent relative to unplanned growth)			Planned development
		Duncan	Frank	Burchell	
Roads	100	40%	73%	76%	75%
Schools	100	93%	99%	97%	95%
Utilities	100	60%	66%	92%	85%
Other	100	10270	NA	NA	10070

SOURCE: Robert W. Burchell and David Listoskin, "Land, Infrastructure, Housing Costs and Fiscal Impacts Associated with Growth: The Literature on the Impacts of Sprawl versus Managed Growth. " Paper, Center for Urban Policy Research, Rutgers University, 1995, based on James Duncan and Associates et al., *The Search for Efficient Urban Growth Patterns: A Study of the Fiscal Impacts of Development in Florida.* Report presented to the Governor's Task Force on Urban Growth Patterns and the Florida Department of Community Affairs, July 1989; James E Frank, *Costs of Alternative Development Patterns: A Review of the Literature* (Washington, DC: Urban Land Institute, 1989); and New Jersey Office of State Planning (OSP), *Impact Assessment of the New Jersey interim State Development and Redevelopment Plan, Report 11: Research Findings* Trenton, NJ, 1992

cated near to existing community and regional services. Burchell and Listoskin[56] summarized the locational costs found in the three studies: 0SP,[57] Frank,[58] and James Duncan Associates et al. (see table 8-6).[59] Table 8-6 shows planned concentrated development saving 25 percent for roads, 15 percent for utilities, and 5 percent for schools. Coupled with the savings on the cost of capital facilities derived from higher density, such as that for townhouses at 10 dwelling units per acre ($7,200) over single-family three dwelling units per acre ($17,500), there are significant cost differences between planned higher-density growth and low-density sprawl (see table 8-2).

[56] Ibid.

[57] OSP op. cit., footnote 54.

[58] Frank, op. cit., footnote 6.

[59] James Duncan and Associates et a]., op. cit., footnote 52.

Ladd has tackled the question of density and public service costs in a different way. Using data from 247 U.S. counties, Ladd constructs a regression model to examine the relationship between public spending and population density.[60] Controlling for a range of factors that might influence public spending—such as income, poverty, and number of school students—she finds that the lowest costs are found at about 250 people per square mile (ppsm), a predicted public spending rate of $972 per capita (1982 dollars). Below that density, costs increase to $1,111. However, above that level public service costs rise to $1,153 at a density of 1,250 ppsm, 19 percent more than the cost at 250 ppsm. Unpredictably, as density rises to 1,750 ppsm, costs drop to $1,040 per capita, but then rise again in the densest counties.

Despite the overall ambiguity of the results, the study suffers from several other problems. First, as the author points out, the density variable measures only residential population and not the total number of people placing demands on the public sector. Ladd notes: "Public sector activities serve people in their capacity not only as residents but also as employees, commuters and recreationists. Hence, a complete measure of the costs of different patterns of development should extend beyond residential patterns alone to include the public sector costs of the other activities that residents might engage in."[61] Since employment has not decentralized as much as population, high levels of employment are found in places with high residential population densities. By ignoring the public service burden of places of employment and recreation, the model overestimates the effects of higher residential density on public spending. Second, the model does not control for the age of a county's infrastructure. High-density counties are by and large those with the oldest stock of infrastructure, which increases operating and maintenance costs. Third, as Ladd points out herself, the model only accounts for average residential densities, ignoring the impacts of different development patterns such as compact development surrounded by open space. Moreover, it is unclear from this analysis if ribbon or leapfrog development contributes to public service costs or not. Finally, the analysis does not allow us to know if the greater public service costs of high-density locales, if such is the case, are subsidized by others.

Paying for Growth: Who Bears the Costs of Community and Regional Services?

The knowledge that low-density non-continuous development engenders greater community and regional costs leads to the next question, "Who bears the cost of growth?" Do those who live in scattered, fringe development bear the increased public costs associated with that development, or is there a cross-subsidy from other parts of society? If so, who pays?

In order to answer the question of who pays, fiscal impact analysis is often employed to examine the relationship between the public costs of providing services and the revenues that the development produces. Fiscal impact studies show that the residential development rarely pays its own way. Burchell and Listoskin show that only high-rise/garden apartments (with 1-2 bedrooms) and age-restricted (retiree) housing will show a fiscal surplus for a municipality.[62] Townhouses, expensive and inexpensive single-family houses, garden apartments (with 3+ bedrooms), and mobile homes will show a fiscal deficit. Such studies also

[60] Helen F. Ladd, "Population Growth, Density and the Costs of Providing Public Services," *Urban Studies*, vol. 29, No. 2, 1992, pp. 273-295.

[61] Ibid., p. 292.

[62] Burchell and Listoskin, op. cit., footnote 31.

indicate that commercial, industrial, and farm/open land are likely to contribute more to a local government's tax base than they cost in services.[63] However, some studies have found that even commercial and industrial uses eventually cost more than they produce in revenue because they attract added residential development.[64] With the realization that residential development does not cover the cost of providing services, many localities now impose charges in the form of developer exactions, which are passed onto consumers in higher home prices.

There are several problems with fiscal impact analysis and exaction schemes: First, only some sophisticated exaction schemes fully cover the costs of providing community and regional services.[65] Moreover, most fiscal impact analysis and exaction schemes are done on an average cost basis, ignoring the effects of density and location. As a result, outlying developments are subsidized by other residents, leading to urban sprawl. Thus, the fiscal drain of outlying development is usually much greater than concentrated development. For example, James Duncan and Associates[66] calculated the cost-revenue ratio for the eight developments summarized in table 8-3. Table 8-7 shows that only one produced more revenue than costs, and that the scattered and linear developments had much lower ratios than the compact and contiguous developments.

This evidence suggests that sprawl is less likely to pay its own way than more compact development, increasing the demand for leapfrog development.[67] This conclusion concurs with Frank's assessment that: "In most communities, costs beyond the neighborhood level are not fully passed on to the consumer as part of buying a house, whether those costs are the extra amount induced by leapfrogging or the normal ones associated with contiguous development."[68]

TABLE 8-7: Revenue/Cost Ratios Related to Urban Form

Rank	Area	Urban form	Revenue: cost ratio
1	Southpoint	contiguous	1,36
2	Downtown	compact	**0.90**
3	Countryside	contiguous	0.78
4	Kendall	linear	0.62
5	Tampa Palms	satellite	0.45
6	University	linear	0.43
7	Wellington	scattered	0.43
8	Cantonment	scattered	0.41
Average			0.68

SOURCE. James Duncan and Associates et al , *The Search for efficient Urban Growth Patterns A Study of the Fiscal Impacts of Development m Florida.* Report presented to the Governor's Task Force on Urban Growth Patterns and the Florida Department of Community Affairs, July 1989

[63] Pennsylvania State University, "Fiscal Impact of Different Land Uses: The Pennsylvania Experience. " Extension Circular 410, College of Agricultural Sciences, Cooperative Extension, nd.

[64] Dupage County Development Department, "Impacts of Development on DuPage County Property Taxes" (Wheaton, IL: DuPage County Development Department, April 1991). See also the discussion on p. 33.

[65] This is true for mainly legal reasons. An exaction must be directly linked to a cost of a development, which is hard to do with facilities which are distant from the development.

[66] James Duncan and Associates, et al., op. cit., footnote 52.

[67] EPA, op. cit., footnote 6, p. 5-3.

[68] Frank, op. cit., footnote 6, p. 42.

Second, it is not clear who specifically pays the price for fringe growth. Most of the cost of community and regional facilities is made up from general local government revenues, although the impact on different areas and different income groups within a local jurisdiction is unknown. In some places, such as the western United States, central cities and suburbs are often in the same local government jurisdiction, as the city expands by annexing land for development. As a result, if public service prices are based on average costs (through exactions) or by general revenues, then taxpayers in the central part of the city will probably subsidize those on the fringe. One official of a large western city told OTA that it costs the city $10,000 in additional public costs to service a new house on the urban fringe compared to serving a new house in the core. Because fringe development is in essence being subsidized, and core development taxed to pay for it, the likely effect is to exacerbate sprawl while weakening the development prospects in the core.[69] In the eastern United States, however, intense local government fragmentation means that jurisdictions are responsible for providing their own services. In such areas, the local government collects revenues to pay for new development, hence there is less chance for subsidization from core to fringe. If new residents do not bear the full cost, existing fringe residents and businesses pay the remaining cost of new development, which is a reason for no-growth movements in many suburbs.

Moreover, some of the costs of these facilities are subsidized by other local governments or other levels of government (state and federal). Often these are not taken into account. For example, the Florida study did not determine the costs of spillover impacts on other local governments in the metropolitan region. As Burchell and Listoskin note: "Fiscal impacts are projected for the public jurisdiction(s) where growth is taking place—the municipality, township, county, school district, and any special districts."[70] Moreover, state and federal governments also sometimes subsidize this growth. For instance, the New Jersey study notes that planned growth would save the state $90 million in road costs over the 20-year study period.[71] There would also be savings to local government and school districts, some of which would accrue to the state through a lowering of intergovernmental transfers. Moreover, the federal government might save on lower transfers to states and localities to finance highways and water and sewer facilities. As Ewing notes: "Though less true today, federal funding of waste treatment systems (and related regulations that led to excess capacity) contributed to the sprawl of the 1960s, 1970s, and early 1980s."[72]

Finally, fiscal impact analysis focuses on direct costs for municipalities, ignoring other costs, such as phone and electricity provision, and indirect costs known as externalities. (See table 8-8)

Other Services

The pricing of public and private utilities also understates the costs of providing services to suburban and exurban residents. There are good reasons for providing such things as telephones, mail, electricity, and gas at an average cost throughout a metropolitan region: health and safety and, through having a comprehensive mail and phone system, prevention of social and economic isolation. Universal service can also lead to overall economic gains. Although there have been few careful studies of marginal costs of utility provision in metropolitan areas, the evidence does sug-

[69] Of course, in such "elastic" cities, local government revenues are generated from a much broader tax base which may lead to a healthier fiscal situation. (See David Rusk, *Cities Without Suburbs*, Baltimore, MD: Johns Hopkins Press, 1994).

[70] Burchell and Listoskin, op. cit., footnote 31, p. 3.

[71] OSP, op. cit., footnote 54.

[72] Ewing, op. cit., footnote 8, p. 5.

TABLE 8-8: Who Pays?

Resident/consumer	
	direct consumer (resident/consumer of goods)
	indirect consumer (consumer of goods)
Local government	
	residential taxpayer in local jurisdiction of development
	residential taxpayer in another local jurisdiction
	business taxpayer in local jurisdiction of development
	business taxpayer in another local jurisdiction
State	
	state taxpayers
Federal	
	federal taxpayers

SOURCE: Office of Technology Assessment, 1995.

gest that fringe suburban and exurban development is subsidized,[73] largely because utility and other services are provided on an average cost basis.

Pricing policies for telecommunications services illustrates this. One regional Bell operating company provided a rough estimate that compared to the monthly costs of serving customers in the central business district, it costs twice as much to serve households in the rest of the central city, and approximately 10 times as much to serve households on the urban fringe. However, because of Public Utility Commission regulations, all customers pay the same basic rate for local service. Today, the cost of providing telephone service to rural areas is $30.9 billion, but rural customers only pay $22.2 billion, a subsidy of $8.7 billion. An estimate of the cost changes engendered by the eradication of this subsidy through "deaveraging" urban and rural customer payments is that urban costs per line would drop by $3.80 per month, and rural costs would increase by $19.03. Moreover, if rural users were required to pay the $8.7 billion, the loss of penetration (those that have service but would not with the additional cost) would be 7.3 percent (though the characteristics of this group are unclear, that is, if they are the poorest or most isolated). The cost of supplying service to these 7.3 percent would be $0.7 billion. So the same level of penetration could be had for a saving of $8.0 billion. [74]

It also appears that electricity, gas, cable TV, commercial delivery service, and postal delivery likewise cost more for suburban and exurban development, and are partially paid for by central city and inner suburban customers. A study conducted in the early 1970s of the additional cost of services for a leapfrog subdivision over a contiguous subdivision in Lexington, Kentucky, found that by bypassing five tracts of suitable land the public and private costs increased by $272,534 per year (in 1973 dollars) .75 Part of the increase was made up of increased costs of providing telephone service ($13,93 1), electricity ($937), mail deliv-

[73] U.S. Congress, Office of Technology Assessment, *Technology and the American Economic Transition:* Choices *for the Future, OTA-ET-293* (Washington, DC: U.S. Government Printing Office, 1988).

[74] Carol Weinhaus, et al., "Redefining Universal Service: The Cost of Mandating the Deployment of New Technology in Rural Areas." Presentation at the NARUC Meeting, July 181994, San Diego, CA. See also Organization for the Protection and Advancement of Small Telephone Companies, *Keeping Rural America Connected: Costs and Rates in the Competitive Era* (Washington, DC: OPASTCO, 1994).

[75] R.W. Archer, "Land Speculation and Scattered Development: Failures in the Urban-Fringe Market," *Urban Studies, vol. 10, 1973, pp. 367-372.*

TABLE 8-9: Additional Costs of a 200-Acre 'Leapfrog' Residential Development Near Lexington, Kentucky

Service	Total additional costs per annum (1973 $)	Who paid the additional costs
Water	$8,766	Consumers, Lexington area
Gas	1,013	Consumers, Lexington area
Telephone	13,931	Consumers, statewide
Electricity	937	Consumers, statewide
Sanitary sewerage	9,016	City taxpayers
Refuse collection	638	City taxpayers
Fire protection	208	City taxpayers
Police protection	7,425	City taxpayers
Mail service	374	Federal taxpayers
School bus service	737	County taxpayers
Commercial delivery service	54,677	Consumers, Lexington area
Automobile community	172,207	Development's residents
Bus commuting	2,483	60% by consumers, Lexington area 40% by development's residents
Road and street maintenance	122	County taxpayers
Total	$272,534	

SOURCE R W Archer, "Land Speculation and Scattered Development Failures in the Urban-Fringe Market, " *Urban Studies,* vol. 10, 1973, pp. 367-372

ery ($374), and commercial delivery services ($54,677). (See table 8-9.)

COSTS OF INDUSTRIAL DEVELOPMENT

Because residential growth does not generally pay its own way, many jurisdictions compete for industrial and commercial facilities to help pay for municipal services. Indeed, most revenue impact studies of industrial and commercial facilities show that they have a strong positive impact on municipal finances.[76] McDonald et al. have questioned whether this is true in the long run as new employment attracts new residents.[77] However, Oakland and Testa more recently found that business development does not cause tax burdens to rise.[78]

At the local level business subsidies seem logical. Even when such subsidies are factored in, the fiscal impact on the locality is often positive, although the field of local economic development is replete with cases where localities have provided more incentives than they will receive in benefits. The problem with incentives is two-fold: 1) cities and states are increasingly caught in bidding wars where they must provide higher and higher incentives to a larger share of companies; 2) these bid-

[76] Burchell and Listoskin, op cit., footnote 30.

[77] John McDonald, Charles Orlebeke, Ashish Sen, and Wim Wiewel, "Real Estate Development and property Taxes in DuPage County: Final Report." Project #342. Chicago, IL: University of Illinois, School of Urban Planning and Policy, Center for Urban Economic Development, February 1992.

[78] William H. Oakland, and William A. Testa, "Does Business Development Raise Taxes: An Empirical Appraisal," *Economic Perspectives,* vol. XIX. No. 2, 1995, pp. 22-32.

ding wars disproportionately hurt central cities and older inner suburban communities.

Moreover, it is one thing for companies to leave the center city to move to the outer suburbs because land costs or rents are cheaper. Market forces are operating well here. However, it is quite another thing when financially well-off suburban jurisdictions provide financial incentives to induce companies to move out of the city. Though there are many cases where companies would have moved even without incentives, there are others where the incentives tip the balance. For example, Brooks Sausage, a minority-owned and largely minority-employee firm, formerly located in the South Side of Chicago, was offered significant incentives to relocate its facility to a smaller city in Wisconsin. It moved and laid off its Chicago workforce.

Even when cities are able to "win" these suburban/central city bidding wars, the cost can be quite high, particularly for cities struggling to keep tax rates low or service levels high. For example, New York City has provided huge incentives to companies to keep them from moving to the suburbs: these included $235 million to Chase Manhattan Bank; $98 million to the National Broadcasting Company; $97 million to Citicorp; $85 million to Drexel Burnham Lambert; and $74 million to Shearson Lehman Hutton.[79] In the last several years, New York has provided over $362 million in tax breaks and other concessions to four companies to keep them from moving to either New Jersey or Connecticut.[80] Moreover, it is not uncommon for companies to use the threat of relocation as a lever to extract incentives from financially strapped central city or inner suburban jurisdictions. For example, one vice president of a large regional bank told OTA that while the bank was planning to locate a new check processing facility in the downtown, it was also planning to threaten to locate nearby in an adjacent state in order to leverage incentives from the city government.

Moreover, state incentive policies, which have grown rapidly in the last two decades[81] are largely tilted against central cities. States provide a variety of incentives, including free land, subsidized training, tax breaks, tax exempt industrial development bonds, low interest loans, and other incentives. Virtually no states use incentives to target new investment to distressed areas, particularly in cities. In contrast, because states use incentives largely to attract new industry to the state or retain existing industry, they are unwilling to use incentives selectively to steer companies to distressed parts of the state, urban or rural. Rather, because many companies choose suburban and exurban locations, these funds simply reinforce that pattern. For example, the state of Virginia and the city of Manassas, an outer suburb of Washington, D.C., are providing close to $100 million to a joint venture by IBM and Toshiba to establish a semiconductor fabrication plant. In some cases, states, in an effort to keep companies within the state, will subsidize companies that are moving from distressed central cities to prosperous suburbs. For example, the state of Illinois provided Sears with $110 million to move out of the downtown, where a large share of its workforce was central city residents, to Hoffman Estates, an outer suburb of Chicago with little public transportation access for potential workers from the central city. Motorola announced the establishment of a large facility in Harvard, Illinois, some 70 miles from downtown Chicago, and the state will be providing incentives to the plant. Utilities also provide

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[79] U.S. Congress, Office of Technology Assessment, *After the Cold War: Living With Lower Defense Spending* OTA-ITE-524 (Washington, DC: U.S. Government Printing Office, February 1992).

[80] Corporation for Enterprise Development, *Bidding for Business: Are Cities and States Selling Themselves Short?* (Washington, DC: CFED, 1995).

[81] Keon Chi, "State Business Incentives," *State Trends Forecasts* (Lexington, KY, Council of State Governments, June, 1994).

subsidies. For example, the regional utility serving Harvard, Illinois, is providing incentives in the form of reduced power costs to Motorola.

Federal policies also exacerbate this. The federal government lets states and localities bid for federal facilities. The most famous of these was the bidding war for the location of the now canceled Superconducting Supercollider. More recently, the Securities and Exchange Commission located in Washington, D.C., was offered millions in incentives by Maryland and a suburban jurisdiction if they moved out of the District. Moreover, in some cases, cities use federal funds, including HUD community development block grant funds, to lure firms to their communities. For example, Harvard, Illinois, asked the state for several million dollars in federal funds to expand sewer lines when it attracted a new Motorola plant.[82]

Finally, to the extent that suburban jurisdictions attract new business (thereby decentralizing jobs), suburban employment development indirectly subsidizes suburban residential development, as well as hurts central city job opportunities. Clearly, decentralization of jobs has allowed people to live further from the center of a metropolitan area by keeping commuting distances manageable for those living on the fringe, and has helped to keep residential taxes and impact fees down.

AUTOMOBILE SUBSIDIES

It is generally acknowledged that low-density U.S. cities are heavily reliant on the automobile. Indeed, in U.S. cities only 4 percent of passenger miles are traveled on public transit versus 25 percent in Europe. And Americans also travel much more than Europeans in private vehicles. In 1980 Americans in cities traveled 13,000 km per person in highway vehicles versus 7,400 km per person in European cities. This led to much greater energy use. In 1980 U.S. cities averaged 59,000 megajoules (mj) per capita of gasoline consumption versus 13,000 mj per capita for European cities. These factors are in large part related to urban structure.[83] To what extent, if any, is automobile use subsidized? Does any automobile subsidy subsidize suburbanites, and how does it compare with subsidies for other forms of transportation and for residents of other areas?

Hanson argues that improvements in transportation decrease the costs of living further from the center and hence have sponsored sprawl.[84] Further, he argues that the costs of providing automobile infrastructure are not fully priced in the market. That is, automobile use (and hence suburbanization) is subsidized through government revenues and externalities. This is true even if one figures in registration fees and use fees. Hanson calculates that for the city of Milwaukee in 1987, local government general revenues provided $81 million of the $107 million of direct highway expenditures, with the remainder coming from state aid. That amount is $133 per capita and 21 percent of the net property tax burden.

For Madison, Wisconsin, Hanson also calculated indirect subsidies, including air pollution, water pollution from salt use, personal injury and lost earnings associated with accidents, land use opportunity costs for land removed from other uses, and petroleum subsidies. These amounted to a subsidy of $23 million in 1983, twice the direct subsidy (expenditures on road construction and maintenance, etc.) of $11.7 million. He also notes that compared with the automobile subsidy of $105 per capita in Madison, the subsidy of transit and elderly/handicapped transit is $22 per capita. If state aid is included the transit subsidy is $57 per capita.[85]

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[82] Wim Wiewel and Joe Persky. "Rejoinder to Hill and to Bendick and Geiger," *Environment and Planning,* vol. 12, 1994, pp. 494-496.

[83] Newman and Kenworthy, op. cit., footnote 10; OTA, op. cit., footnote 21, pp. 204-212.

[84] Mark E. Hanson, "Automobile Subsidies and Land Use," *Journal of the American Planning Association,* vol. 58, No. 1, 1992, pp. 60-71.

[85] Ibid.

OTA has previously estimated automobile subsidies, including road costs, free parking,[86] accidents, and the monopsony cost of importing oil.[87] OTA estimates that accidents cause $30 billion annually in property damage, medical expenses, and foregone wages that are borne by the non-responsible party and are not paid by automobile insurance, nor legal redress.[88] Free parking is a subsidy because it is a tax-free fringe benefit for employees and a tax-deductible expense for businesses that provide it.[89] Taking all of these into account, OTA estimates that motor vehicles pay about 73 to 88 percent of the *monetary* costs of motor vehicle use. If the non-monetary costs are added, including the externalities: "Motor vehicle users paid openly for 53 to 69 percent of the social (public plus private) costs of motor vehicle use, both monetary and non-monetary, excluding the value of time."[90] Thus OTA concludes: "If subsidies were withdrawn, externalities 'internalized,' and hidden costs brought out into the open and directly charged to motor vehicle users, the perceived costs of motor vehicle use would increase substantially (by 14 to 89 percent, depending on whether nonmonetary costs and other factors are included), and people would drive less."[91]

Another question asked is whether motor vehicle users pay for the public services they receive (apart of the total cross-subsidization). OTA concludes that for the nation as a whole: "Motor vehicle users paid for 62-72 percent of public expenditures for highway infrastructure and services, not counting military expenditures."[92] In 1990, they paid $70.3 billion to $72.3 billion for highway infrastructure and services out of public expenditures of $98 to $115.9 billion.

The Nationwide Personal Transportation Survey (NPTS) of 1990 shows that households in the U.S. in the central city make fewer trips (1 8.2 percent less), make on average much shorter trips (18.8 percent shorter), and travel far fewer miles by private vehicle (35.9 percent fewer) than people within the MSA but outside the central City.[93] Actually calculating the cost of driving by place of residence, however, is extremely difficult. Because core residents drive less, they may be less subsidized than suburban and exurban drivers. For example, Newman, Kenworthy, and Lyons[94] in a study of Perth, Australia, found that gasoline usage increases dramatically the further away from the center one is (see table 8-10). Assuming that gas use is closely related to the full social cost of automobile use, fringe suburban drivers appear to be more heavily subsidized than closer-in suburban drivers and presumably more than central city drivers. However, because of the

TABLE 8-10: Gasoline Use By Location in a Metropolitan Area

Location	Gasoline consumption (litres)
Inner suburbs	737
Middle suburbs	823
Outer suburbs	1164

SOURCE: P.W.G. Newman, J.R. Kenworthy and TJ Lyons, "Transport Energy Use in the Perth Metropolitan Region Some Urban Policy implacations, " *Urban Policyand Research, Vol. 3, No 2, 1985,* pp 4-15

[86] It is estimated that 1-2 percent of automobile travelers pay for parking in a day.

[87] OTA, op. cit., footnote 21, pp. 106-108.

[88] OTA, op. cit., footnote 21, p. 106.

[89] Pucher, op. cit., footnote 37.

[90] OTA, op. cit., footnote 21, p. 109.

[91] Ibid.

[92] Ibid, p. 110.

[93] U.S. Department of Transportation, Federal Highway Administration, *1990 NPTS Databook,* volume 11. (Washington, DC: Office Highway Information Management, Federal Highway Administration, 1994).

[94] P.W.G. Newman, J.R. Kenworthy and T.J. Lyons, "Transport Energy use in the Perth Metropolitan Region: Some Urban Policy tions," Urban Policy and Research, vol. 3, No. 2, 1985, pp. 4-15.

high costs of density and congestion, the cost of one mile of city driving may be more expensive than one mile of suburban and exurban driving.[95]

Similarly, calculating the costs of transit by residency is also extremely difficult. Transit is heavily subsidized by local, state, and federal government. Indeed, in percentage terms, transit is subsidized more than automobiles, because fares covered only 43 percent of operating costs (in 1990).[96] However, it might be argued that subsidies to mass transit subsidize suburban commuters, particularly those commuting to the central city, as well as city dwellers. Thus, it is unclear what proportion of the annual mass transit subsidy goes to city dwellers and what proportion goes to suburb and exurban residents.

SUBSIDIES TO THE CENTRAL CITY

Some argue that cities receive large transfer payments from federal and state governments that more than make up for the implicit subsidies that go to the outer suburbs and exurban areas to sponsor sprawl. Studies do indeed show that central cities receive greater intergovernmental transfers per capita than do suburbs. The Advisory Commission on Intergovernmental Relations found that in the 37 largest metropolitan areas in 1981 central cities received $705 per capita, whereas the areas outside the central city received $451, a ratio of 1.63.[97] Since then the gap between central cities and suburbs has declined to 1.53 in 1987.[98]

Some of these transfer payments undoubtedly go to subsidize the somewhat higher costs of infrastructural maintenance and development in the core, and possibly to more inefficient city government bureaucracies. However, most of the "extra" money the cities receive from higher levels of government appears to be a result of the large percentage of poor residents they contain. Higher concentrations of the poor in the central city place greater burdens on government than the non-poor, including additional demands for welfare, medical programs, housing assistance, and social services. Thus, monies from the federal and state governments represent a subsidy to the poor people of the cities, not the cities themselves. If the poor moved to the suburbs, the local governments of the suburbs would receive the transfer payments now going to the cities. The argument that subsidies to the poor represent an unfair advantage to cities (because of the transfer payments, which help to support the poor) is therefore not accurate.

Despite the high level of outside aid, central cities continue to tax their citizens at a much higher rate in relation to income than do suburban jurisdictions. For every dollar spent by suburban governments in 1987, $1.51 was spent by central city governments. This compares with $1.40 in 1981 and $1.47 in 1977. This results from several factors: first, even after taking into account federal and state payments, providing services to the poor costs cities money; second, the fact that cities also provide services demanded by suburban residents that work in the city. This is the so called "municipal overburden." At the same time, because of the concentration of the poor in the central city relative to the suburbs, the tax base in the central city is significantly lower, even when the enormous value of the central business district is taken into account.[99] Thus, to generate the same revenue, the city's tax rate needs to be higher than that in the suburbs. As flight to the suburbs continues and state and federal aid to local governments has fallen, the fiscal disparities between the central city and the suburbs have increased. The tax burden

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[95] In contrast, though, city roads are used more intensively, thereby generating more revenues per mile (gas taxes) than suburban roads.

[96] OTA, op. cit., footnote 21, p. 190.

[97] Advisory Commission on Intergovernmental Relations, *Fiscal Disparities: Central Cities and Suburbs, 1981* (Washington, DC: ACIR, 1984).

[98] Roy Bahl, "Metropolitan Fiscal Disparities," *Cityscape*, vol. 1, No. 1, 1994, pp. 293-306.

[99] Ibid.

has increased in the central city relative to the suburbs, from a ratio of 1.18 in 1981 to 1.55 in 1987.[100]

EXTERNALITIES ASSOCIATED WITH SPRAWL DEVELOPMENT

In addition to direct subsidies, there are also a number of indirect costs borne by others because of sprawling development, costs economists call negative externalities. These include environmental degradation (air, water, and land), traffic congestion, and reduced access to open space.

Air Quality

One element of environmental quality often linked to urban spatial structure is air quality.[101] Indeed, it is often believed that because of greater automobile use a sprawling urban form has a deleterious impact on air quality, a cost not passed on to drivers. It is true that as metropolitan decentralization has proceeded, people rely more and more on private vehicles for both work and non-work-related trips. Moreover, environmental externalities (for example CO_2 emissions) are closely related to automobile use. Yet, the relationship between sprawl and declining air quality as a result of increased automobile use is much less clear.

Bae and Richardson note that greater automobile use does not necessarily lead to worsening air quality.[102] For one reason, longer distances traveled in the suburbs are offset by faster speeds. They argue that vehicle hours traveled are more important than vehicle mile traveled (VMT). Second, lower per capita emissions due to high densities in a small area may have more environmental impact than higher per capita emissions in a low-density environment because of the ability of a local airshed to absorb pollutants, and the fact that pollution levels increase exponentially, not linearly, as the percent of capacity absorbed rises. Thus, higher-density neighborhoods are more likely to be more polluted neighborhoods.[103] More spread-out metropolitan regions might therefore have better air quality because of the ability of the atmosphere to deal with the pollutants. Third, automobile pollution is strongly related to the number of trips, with a major part of auto pollution deriving from cold starts. More compact cities and those with a better mix of land uses reduce VMT significantly more than the number of trips. For instance, a recent study in San Diego found that by balancing jobs and housing, VMT would be reduced by 5 to 9 percent, traffic congestion would decline by 31 to 41 percent, but vehicle emissions would only be cut by 2 percent. This resulted from only a small reduction in the number of trips (though the length of the trips was shorter).[104]

In its study of different urban forms, the New Jersey State Planning Agency found that the more compact urban development scenario, IPLAN, did not significantly improve air quality over the continuation of urban sprawl.[105] They found that improvements in air quality from cleaner fuels, more efficient engines, more stringent emission inspection, and more cars with anti-pollution devices dwarfed the improvements deriving from land use.

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[100] Ibid.

[101] Most agree that automobiles are a major source of metropolitan air pollution. In the Los Angeles basin in 1987, for instance, it has been estimated that automobiles accounted for 43.8 percent of the emission of reactive organic gases, 60.4 percent of nitrogen oxides, 87.8 percent of carbon monoxide, 25.8 percent of sulfur oxides, and 4.9 percent of PM10 particulate matter (see South Coast Air Quality Management District, *1991 Air Quality Management Plan*, [El Monte, CA: SCAQMD, 1991] Table 3-1).

[102] Chana-Hee C. Bae and Harry W. Richardson, op. cit., footnote 27.

[103] Ibid, pp. 3-4.

[104] San Diego Association of Governments, "Jobs/Housing Balance and Transportation Corridor Densities," *Regional Growth Management Strategy*, Appendix 3, 1991, San Diego, California.

[105] OSP, op cit., footnote 54.

Land

Another potential externality of sprawl development is the rapid conversion of land from rural to urban uses. For example, in northeastern Illinois (around Chicago), the region's population increased by 4.1 percent between 1970 and 1990, but residential land use increased by 46 percent. Views differ on the extent to which this conversion is a result of market imperfections and government intervention. The relative weight of subsidies to urban and rural uses would seem to suggest that farmland near urban areas is undervalued for agricultural uses and overvalued for urban uses, pushing the urban/rural border further out than would result from a perfect market.[106] There are three main concerns about the loss of rural land: the impact on agricultural production, the impact on the environment, and the amenity value of rural land.

Clearly, the development of rural land will have an impact on agricultural production. Most agree that in terms of raw acres, even in the face of rapid development, U.S. cropland is adequate to meet demand both here and abroad for the foreseeable future.[107] It is estimated that there are about 540 million acres of arable farmland, of which about 400 million acres are in cropland. Estimates of cropland needed for food production by the year 2000 range from 22 million acres to 113 million acres. Hence, some argue that a doubling of urban land uses would not significantly affect the supply of arable land.[108] However, about 48 million of the 250 million acres of prime agricultural land are within 50 miles of the 100 largest urbanized areas.[109] As Ewing observes: "Lands most suitable for growing crops also tend to be most suitable for 'growing houses' (being flat and historically near human settlements)."[110] Thus, with urban conversion of prime agricultural land there would be a slight increase in agricultural production costs because of farming more marginal lands with greater inputs.[111] Moreover, the conversion of agricultural land is more important and more costly in some regions than in others, and thus protecting land in those areas might be of a somewhat higher priority. For example, the Bank of America reports that between 1982 and 1987 the Central Valley in California, the most productive agricultural region in the state, lost 500,000 acres of productive farmland to development. And in the Central Valley, costs to agriculture from urban pollution exceed $200 million a year.[112]

Development on rural land can also affect environmental quality. Undeveloped land helps to control flooding, cleans the air, and provides habitat for wildlife. Though it is difficult to assign a dollar value to these things, their benefits are nonetheless real. The New Jersey study looked at the differential impacts of development on environmentally frail lands defined as steep slopes, forests, and critical sensitive watersheds. New Jersey's simulation of different development

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[106] For example, in 1989 federal government commodity supports totaled less than $20 billion, while in the same year federally backed mortgage loans issued exceeded $150 billion.

[107] Rutherford H. Platt, "The Farmland Conversion Debate: NALS and Beyond," *The Professional Geographer*, vol. 37, No. 4, 1985, pp. 433-442.

[108] William Fischel, "Urban Development and Agricultural Land Market," in John Baden (ed), *The Vanishing Farmland Crisis: Critical Views of the Movement to Preserve Agricultural Land* (Lawrence, KS: University Press of Kansas, 1984).

[109] Danile R. Vining, Thomas Plaut, and Kenneth Bieri, "Urban Encroachment on Prime Agricultural Land in the United States." *International Regional Science Review,* vol. 2, No. 2, 1977. See also Arthur C. Nelson, "Preserving Prime Farmland in the Face of Urbanization: Lessons from Oregon," *Journal of the American Planning Association,* vol. 58, No. 4, 1992, pp. 467-488.

[110] Ewing, op. cit., footnote 8, p. 11.

[111] Platt, 1985, op. cit., footnote 103.

[112] Bank of America, op. cit., footnote 3.

TABLE 8-11: Changes in Pollutant Loading 1990-2010 as a result of New Jersey IPLAN Implementation by tons and percentage

Pollutant	Changes in pollutant loading 1990-2010 as a result of IPLAN implementation (in tons)	Percentage change
Bio-chemical oxygen demand	-3,382	-27.7
Total phosphorous	-77	-43,5
Total nitrogen	-1,052	-42.6
Zinc	-29	-21.9
Lead	-19	-10,2

SOURCE New Jersev Office of State Planning (OSP), *Irnpact Assessment of the New Jersey Interim State Development and Redevelopment Plan, Report II: Research Findings.* Trenton, NJ 1992

forms in New Jersey found that IPLAN would affect only 20 percent of the frail lands that would be affected by TREND development.

Biodiversity is an important issue in the conversion of land from rural to urban uses. As Beatley points out: "In recent years habitat loss has become the primary threat to biodiversity as the extent of human settlements continues to grow." [113] Indeed, more than 700 endangered or threatened species are listed on the Endangered Species Act, and the number continues to grow. Although it is difficult, if not impossible, to quantify the costs to society of decreasing biodiversity and include them in a benefit-cost analysis, there are arguments for conservation other than the ethical and aesthetic. These include the potential scientific, anthropological, and medicinal benefits of species. For example, the bark of the yew tree, found in the northwestern U. S., has been found to be an effective treatment for certain types of cancer (see Beatley, 1994, for other examples).

Finally, there is a loss associated with the amenity value of rural land with its conversion to urban uses. That is, the time or cost of traveling to the country for urban dwellers increases with low-density developmental.[14]

■ Water Quality

Urban development also impacts water quality. The amount of pollutants in storm water runoff is related to the type of land use, which is related to density and the level of imperviousness, and the hydrological characteristics of the soil. More intense uses engender more pollutants, and large impervious surfaces lead to greater pollution. However, higher-density uses cause less pollution and impervious surface overall because less land is used. Moreover, the type of soil influences the amount of pollution found in storm water runoff. The New Jersey study of different urban development patterns found that compact development (IPLAN) would generate significantly less pollution than sprawled development (TREND) for all categories of pollutants. The reduction ranged from over 40 percent for phosphorous and nitrogen to 10 percent for lead (see table 8-1 1). The study notes that in some places where development is particularly dense, water quality will deteriorate, but in general water quality will be better with planned growth than with unplanned development.

[113] Timothy Beatley, *Habitat Conservation Planning: Endangered Species and Urban Growth* (Austin, TX: University of Texas press, 1994), p. 2.

[114] Jerome B. Rose, "Farmland Preservation Policy and Programs," National Resources Journal, vol. 24, No. 3, 1984, pp. 591-640.

Costs of Travel: Congestion

Another externality associated with sprawl is congestion. As OTA noted: "Congestion costs can be considered an externality to the extent that drivers during congested periods impose costs on all other drivers sharing the road, but do not account for these costs in their decisions to drive. Congestion also adds to environmental and energy costs because stop-and-go driving both wastes fuel and generates more pollution per mile than free-flowing driving."[115] As with the relationship between sprawl and air pollution, the link between sprawl and congestion is complex. High-density cities generate less VMT per capita, since trips are shorter and more are possible by modes other than automobiles. However, high density also leads to high levels of congestion. Thus, congestion on its own is a positive externality for sprawled development. However, recent empirical evidence suggests that travel times are shorter and travel costs lower where trips are shorter but more congested.[116]

Exclusionary Zoning

In the U.S. system of government, localities have enormous power over local land use through subdivision regulation, zoning, and building codes. The rationale for this system of control is that the market fails to take account of the negative effects (externalities) of development on one parcel on all the surrounding parcels. These regulations, however, can be used to exclude the poor, and result in a strict separation of land uses. Although these things may increase home prices, a great benefit to people who live in the jurisdiction, they create social costs that are not borne by those who benefit. These costs include increased commuting times for the low- and moderate-income people who work but cannot live in the area, increasing community costs and air pollution, and also increased travel costs between related uses for those who do live in the community.[117]

SUMMARY

Technology is enabling firms and residents to increasingly disperse both to lower-cost metros and to suburban and exurban locations in metros. This has a number of benefits such as cheaper land, less congestion, and allowing workers to live closer to work. However, there are also a number of costs which this development pattern engenders, including increased infrastructural and environmental costs. Economic theory suggests that as long as this new development pays the marginal costs of development, then these development patterns promise to be efficient. However, it appears from this analysis that for many reasons peripheral development does not pay the full costs, and is often subsidized by others, including businesses and households in the urban core. This suggests an allocative efficiency loss, plus a unnecessary weakening of development prospects in the core, since the result is to raise their relative costs of development there. The total magnitude of these costs is still quite unclear. The foregoing analysis suggests that sprawled development raises infrastructural costs in the range of 10 percent to 20 percent. Environmental costs are much more difficult to estimate and some are impossible to quantify. Unfortunately, the above analysis does not estimate these costs in relation to total costs. Indeed, they may be relatively small in regard to total annualized costs of development. Moreover, sprawled development is not totally a function of costs, but bound up with deeply embedded preferences. Hence, a total accounting for the costs of sprawled development may still not change development patterns. Nevertheless, such costs are important to look at for the health of metropolitan America.

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[115] OTA, op cit., footnote 21, p. 93.

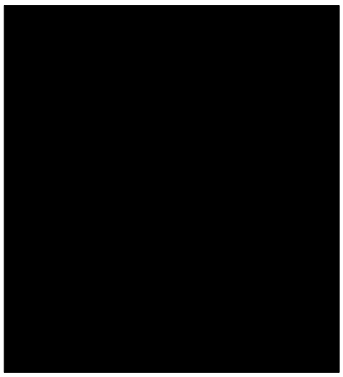
[116] Ewing, op. cit., footnote 8.

[117] Downs, op. cit., footnote 1.

Uneven Development: New Challenges for the Urban Core

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As discussed in chapters 4-7, technological change in addition to other economic, political, and social phenomena is redistributing people and opportunity across the American metropolitan landscape. Outer suburban and exurban areas, on the whole, have prospered in this redistribution, gaining large increases in population and both high-skilled and lower-skilled jobs. At the same time, the position of the urban core has become more precarious. The growth of producer services and some population increases through immigration have kept core economies viable. Nevertheless, problems of poverty, crime, and infrastructure abandonment have become increasingly entrenched. This chapter examines some of the mechanisms that account for the problems of the urban core and discusses possible sources of renewal. Finally, the chapter focuses on the issue of brownfields—abandoned, often contaminated, commercial and industrial sites—which is a major impediments to improving job opportunities in the core.



TECHNOLOGICAL CHANGE AND URBAN ADAPTATION[1]

The close relationship between cities and technology—including transportation, infrastructure, telecommunications, process technology and industrial and work organization—leads to mismatches and conflicts. Productive systems, especially in market-based economies, are characterized by their fluidity and openness to change, particularly stemming from the introduction of new

[1] This section is based in part on Brian Berry, "Classification Systems for U.S. Cities," report prepared for the Office of Technology Assessment, January 1995.

technology systems. Enterprises die and are born, contract and expand, move and reorganize, develop new products and adopt new process technologies. Likewise, although slower to change, the population's income, demographic characteristics, skills, and lifestyles also change and evolve, leading to new preferences for choices of regions, cities and neighborhoods.

In contrast, cities and their institutions adapt more slowly. Without adaptation, buildings can be abandoned or underutilized and land can become vacant. Institutions can become rigid and poorly suited to new challenges. Workforce skills and capacities can diverge from new workplace needs. Moreover, for some segments of the population, especially lower income groups, adapting to economic change is difficult, resulting in mismatches between skills, attitudes, and opportunity. Because these population groups are more heavily concentrated in certain regions and parts of metros, these places have felt the effects more profoundly.

As a result, there are two problems with adaptation. First, cities designed to fit old production systems cannot change as quickly. Second, and as a result, new production systems often locate in new places and spaces built to fit new systems more closely. Moreover, the ability of places to adapt to change depends on a number of factors, but perhaps none so important as the speed of change in production systems. When production systems are evolving slowly or along linear, well trod-paths, most cities have an easier time keeping up. In contrast, when production systems are transformed in sudden, discontinuous ways, as has happened a number of times in the history of America, and appears to be happening today, cities have a harder time adapting. For the speed as well as the discontinuity of the change brings new infrastructure needs and systems, new sectors and jobs with their own locational imperatives, and new process technologies that change locational calculus. The results are mismatches, with some places well-suited to new production systems growing rapidly, and others less well-suited growing more slowly or even declining.

The history of the American economic system is littered with failed enterprises that, because of the nature of their products, processes or management systems, were unable to adapt and went out of business to be replaced by firms better suited to the new environment. Likewise, some cities have been well-positioned or able to adapt while others have not. Some places will be able to adapt more easily than others because their location, infrastructure, business or population are more suited to the new environment. In addition, because adaptation is first and fundamentally a manmade process of investment and disinvestment, some cities will simply be organized to do better than others. Thus, the history of American cities is in one sense a story of cities growing and prospering during certain technological epochs and then either adapting to the next phase, or not making the transition and declining or stagnating in real or relative terms.

OTA concludes that the current wave of technological change will continue to cause metropolitan areas to grow. The United States. is not undergoing and will not undergo in the immediate future a radical deconcentration of employment and population to small towns and rural areas. Nevertheless, the advantages of some higher-cost, and usually the largest, metropolitan areas, such as New York, Boston, Los Angeles, and San Francisco, are weakening. The national redistribution of economic activities due to sectoral and residential change is also having a dramatic effect on the location of jobs and residences within metropolitan areas. As late as the 1960s, most core cities had advantages stemming from agglomeration and centrality (in terms of travel from the suburbs) that outweighed their high costs. However, technological change and other factors have reduced and continue to reduce the privileged position of the core, in some sense making it one of several "edge cities" within the metropolis. By widening the potential number of sites available for business location, technology has accentuated the tendency for jobs to follow people to the suburbs, reducing investment and jobs in many urban cores. Moreover, urban core economies, particularly the central

business district, increasingly contain more specialized functions employing skilled and educated people. In contrast, lower-skill work—particularly in goods production, transportation and distribution—has increasingly migrated away from the core to the suburbs. These changes have led to reduced opportunities for low- and moderate-income urban residents and to reduced investment and an increasing underutilization of the built environment (land, buildings and infrastructure), with resultant fiscal problems for many urban core governments.

JOB OPPORTUNITIES FOR URBAN CORE RESIDENTS

The weakening of many urban economies and the change in their sectoral and occupational composition will affect the economic opportunities available to low- and moderate-income core residents, particularly minorities.

First, as discussed in chapter 3, a number of metropolitan areas have experienced economic decline or stagnation, in part because they have been unable to adapt adequately to the new economy. In these economies, unemployment is higher for low- and moderate-income persons in the urban core than for similarly placed people in healthier metropolitan economies. There seems to be a positive correlation between overall metropolitan growth and growth in most portions of the metropolitan area, including the central city. People are attracted to a metropolitan area and then are dispersed throughout the region, depending on the competitive advantages of the different parts. In the 1980s central cities within fast-growing metros did better than central cities within slower-growing metros.[2] Thus, urban core problems of unemployment and poverty tend to be worse in the stagnant or declining metropolitan regions of the Northeast and Midwest as compared to the South and West.

Second, problems exist with the structure of job opportunities for low- and moderately-skilled workers, even in healthy metropolitan economies. The **spatial mismatch** between the suburban location of new jobs, especially blue collar jobs and jobs requiring lower education and skill levels, and lower-skilled, often minority residents in the core has increased in the last two decades.[3] The spatial mismatch hypothesis is controversial, but scholarly research does seem to indicate that spatial mismatch has gotten worse in the last decade as more low-skilled jobs than low-skilled workers have migrated to the suburbs, an effect which is more pronounced for blacks than for whites.[4] Whites appear to adapt to spatial change more easily than blacks by being more able to relocate to the suburbs. Furthermore, research shows that decentralization is *not* offset with longer commuting among blacks and central city residents.[5] On the contrary, blacks and inner-city residents travel shorter distances to work than suburbanites but take considerably more time traveling to work and when searching for work. Indeed, Holzer, Ihlanfeldt, and Sjoquist found that the time spent traveling per mile for black central

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[2] Mark Alan Hughes, "Formation of the Impacted Ghetto: Evidence from Large Metropolitan Areas, 1970-1980," *Urban Geography,* vol. 11, No. 3, 1990, pp. 265-284; Timothy J. Bartik, *Economic Development and Black Success* (Washington, DC: U.S. Department of Commerce, Economic Development Administration, 1993).

[3] Harry Holzer, Keith R. Ihlanfeldt, and David L. Sjoquist, "Work, Search, and Travel Among White and Black Youth," *Journal of Urban Economics*, vol. 35, 1994, pp. 320-345; Keith R. Ihlanfeldt, "The Spatial Mismatch Between Jobs and Residential Locations Within Urban Areas," *Cityscape,* vol. 1, No. 1, 1994, pp. 219-244; John F. Kain, "The Spatial Mismatch Hypothesis: Three Decades Later," *Housing Policy Debate*, vol. 3, 1992, pp. 371-460; Christopher Jenks and Susan E. Mayer, "Residential Segregation, Job Proximity, and Black Job Opportunities," Lawrence E. Lynn, Jr. and Michael M. McGreary (eds.), *Inner-City Poverty in the United States* (Washington, DC: National Academic Press, 1990).

[4] Hispanics appear to fall between non-Hispanic whites and blacks. See Keith R. Ihlanfeldt, "Intra-urban Job Accessibility and Hispanic Youth Employment Rates," *Journal of Urban Economics*, vol. 33, 1993, pp. 254-271.

[5] Holzer et al., op. cit. footnote 3.

city residents is twice that of suburban whites, partly because more whites use their own car to get to work than do blacks (69 percent for whites versus 43 percent for blacks), who are more dependent on public transportation. Poor residential and transportation mobility inhibits job accessibility. Job decentralization, moreover, also inhibits the flow of information about job opportunities, because information regarding job opportunities decreases with distance. Many jobs are discovered through informal social networks and much hiring is done on the basis of personal knowledge of job candidates or referrals. Because inner city residents do not live near suburban jobs, they may have more difficulty getting vital information about openings, as well as support during the application process.

Spatial mismatch, then, has a number of important effects on the employment of central city residents, which are particularly pronounced among blacks. Most importantly, it leads to greater and longer unemployment among low-skilled central city residents. The duration of unemployment is 25-30 percent longer for blacks than whites, as the former are more heavily concentrated in central cities.[6] Spatial mismatch also leads to lower wages in the central city because a large supply of low-skilled workers bids wages down. And for those who do commute, job decentralization increases the cost of commuting, lowering the net pay of central city residents working in the suburbs. Spatial mismatch is not the only cause of major employment problems for disadvantaged urban residents, but it does contribute to difficulties.

Third, as production has reorganized, in part as a response to technological change, skill and educational requirements for many jobs in metropolitan areas, particularly in central cities, have increased. As a result, the **skills mismatch** between the skills and educational levels of urban core residents and urban core jobs has increased. The skill level of jobs in many industries is rising, and likely to continue to rise. For example, as the many information-based service industries use more technology and less labor, the skill requirements of the labor force increases. Not only are organizations leaner, they must respond faster and they must complete tasks correctly the first time. In flat organizations there is no place to refer difficult questions, catch errors, or develop successors through on-the-job training. Employers expect technical proficiency in operational aspects of the business. Moreover, in many service sectors, many lower-skill office jobs are disappearing and in their place are more complex customer service and back office jobs. Customer service employees increasingly must have the personality to respond to customers, conventional speech patterns, be able to solve problems on the spot, and know the products thoroughly. In addition, perceived or actual work ethic differences play a role.[7] In many functions, such as customer service, advanced computer technologies make work much more demanding, for example, by eliminating pauses to rest as customers' files take time to come up on the terminal.

As discussed in chapter 3, these sectoral changes are reflected in the transformation in educational levels of central city employees (regardless of place of residence). Employment opportunities for those with a high school education or less, a larger proportion of whom are found in the urban core, have declined dramatically. Skills and spatial mismatch have combined to lower employment rates, particularly among minorities. Though not the only cause, unemployment among male high school dropouts and high school graduates is a big contributor to central city poverty, which has risen rapidly over the past 20 years.[8] In addition, a contributing factor to the declining

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[6] Ibid.

[7] U.S. Congress, Office of Technology Assessment, *Worker Training: Competing in the New International Economy,* (Washington, DC: U.S. Government Printing Office, September 1990).

[8] William Julius Wilson, *The Truly Disadvantaged* (Chicago: University of Chicago Press, 1987)

BOX 9-1: Work-Based Learning: Jot

With nearly 40,000 people employed by companies doing business at the port, and many thousands more working in nearby port-related enterprises, Port Newark-Elizabeth, located on the New Jersey side of the New York-New Jersey port, is one of the New York area's most important centers of commerce In response to concerns expressed by port businesses about their need for better-trained personnel, the New York-New Jersey Port Authority, in cooperation with the community colleges of Essex and Union counties, established the Jobsport Educational Institute.

Jobsport offers a mix of basic and specialized training programs They include GED courses, workplace literacy training, English as a second language—increasingly important m a community in which immigrants represent a steadily growing share of the labor pool—and training in computer information systems. One of Jobsport's most innovative programs is geared to training front-line supervisors in transportation, distribution and other trade-related businesses. The program covers topics such as motivating workers, delegating authority, dealing with "problem" employees, and union relations

Jobsport also provides more specialized training programs at the request of individual employers—for example, training in the processing and preparation of imported automobiles for distribution to dealers, and training of customer relations staff. The programs can be conducted either at Jobsport's training center, or at the employer's facilities

In addition to its training programs, Jobsport offers residents of the communities around the port—which include some of the poorest neighborhoods in the New York metropolitan area—an easily accessible source of information about employment opportunities in port-related businesses

earnings and employment prospects of the central city poor, particularly minority poor, is their increasing isolation into racially and economically segregated neighborhoods. The end result is, as Hughes notes, the concentration of poverty and the reconcentration of opportunity.[9]

IMPROVING OPPORTUNITIES FOR URBAN CORE RESIDENTS

There are three general approaches for improving the fortunes of residents of the urban core who have been hardest hit by contemporary economic, technological, and spatial change. First, following from the notion of skills mismatch, is improving the education and skills of core residents. Improving the performance of urban schools is a critical task. However, attention must not only be paid to the quality of public education in the core, but also its applicability to industry needs. Some have suggested the need for enhanced technical training and apprenticeship programs for the non-college-bound.[10] An example is the New York-New Jersey Port Authority's Jobsport program, which offers a notable example of cooperation between a transportation agency and local educational institutions in meeting the human resource needs of goods movement enterprises, while at the same time helping local residents gain access to job and training opportunities (see box 9-l).

Second, following from the idea of spatial mismatch, is the need to improve the access of central city residents to suburban jobs. This can be done either by improving transportation links between the core and the suburbs or by helping core residents move to the suburbs. Given the difficulty of "opening up the suburbs," at least in the short-run,

[9] Mark Alan Hughes, "Luncheon Address: Reverse Commuting in a Policy Context" in American Public Transit Association, *Access to Opportunity: Linking Inner-City Workers in Suburban lobs* (Washington, DC: American Public Transit Association, 1994).

10 U.S. Congress, Office of Technology Assessment, *Learning to Work Making the Transition from School-to-Work,* OTA-EHR-637 (Washington, DC: U.S. Government Printing office, September 1995).

Hughes suggests a mobility strategy would help the inner-city poor reach suburban jobs, thereby lowering unemployment and poverty rates.[11] Clearly there is an important role for public mass transit in this regard. However, efforts need to go beyond this to also improve linkages with employers.[12] For instance, Ihlanfeldt agrees that programs that enable more efficient job searching and provide incentives for employers to improve accessibility to urban blacks are necessary. But, because inner-city residents are often limited in their access to jobs due to dependence on public transportation, he argues, there is a need for privatization, allowing entrepreneurs or private/public partnerships to provide reverse commute services. An example is development of shuttles running from public transportation nodes along major suburban roads to take commuters to and from places of work. Suburban employers might also take a role in providing transportation for their employees as participants in public/private partnerships.[13]

Analysts stress that these strategies are more effective when complemented by others such as the Earned Income Tax Credit to supplement wages of entry-level jobs, making employment a more attractive option and offsetting the transportation costs of longer commutes.[14] Resolving spatial mismatch also demands improving the job information systems which might supply inner-city residents with information on suburban job openings and help create matches between the two. Often non-profit intermediary organizations can play an important role, not only to screen perspective job seekers but also to work with employers to identify openings. For example, Suburban Job Link in Chicago performs this role to link disadvantaged residents on the near-west side to suburban employers.

The third general approach to improve the fortunes of core residents is by providing new job opportunities in the core through a variety of "reurbanization" strategies. Reurbanization refers to increasing the level of use of, and capital investment in, urban land and infrastructure. Reurbanization does not imply a return to a traditional monocentric urban form. A more likely outcome of reurbanization is a multinodal urban structure in which revitalized suburban centers are encouraged. Nor does it necessarily imply an increase in net population densities, although gross densities are expected to increase through a more effective use of vacant and marginal lands.

FACTORS FACILITATING REURBANIZATION

Over the past decade there have been a number of economic and demographic forces driving reurbanization. There are some small pockets of revitalization based on gentrification by middle- and upper-income households and the revitalization of working- and middle-class neighborhoods into vibrant ethnic immigrant enclaves. Richard Nathan has called these places "zones of emergence."[15] In New York City, for example, Korean, Chinese, and Japanese businesses have revitalized the Flushing neighborhood. It may be that these quiet

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[11] Mark Alan Hughes, "Employment Decentralization and Accessibility," *Journal of the American Planning Association Jornal*, Summer 1991, pp. 296-97. See also American Public Transit Association, op. cit., footnote 9.

[12] Stephen Blake, "Inner City Minority Transit Needs in Accessing Suburban Employment Centers," (Washington, DC: National Association of Regional Councils, 1990).

[13] Keith R. Ihlanfeldt, "The Spatial Mismatch Between Jobs and Residential Locations Within Urban Areas," *HUD Regional Growth and Community Development Conference*, 1993, pp. 25-6. See also Robert J. Klein, "Access to Jobs: A Public Transit Agency's Initiative for Privately Operated Service," *Transportation Research Record*, vol. 1349, pp. 118-120; and Sandra Rosenbloom, "Reverse Commute Transportation: Emerging Provider Roles," (Washington, DC: U.S. Department of Transportation, March 1992).

[14] Ihlanfeldt, ibid.

[15] Richard Nathan, *A New Agenda For Cities* (Annapolis Junction, MD: National League of Cities, 1994).

changes are what constitute real revitalization. Wolman, Ford, and Hill argue that big, physical redevelopment projects downtown seem like successful change, but on the whole do not translate into increased economic well-being for residents.[16]

Reurbanization might also be based on a number of competitive strengths, which if enhanced, could help cities maintain employment. First, many downtowns still have strong agglomeration economies. Providers of higher-order business services are clustered downtown, making it easier for face-to-face learning and innovation to occur. In addition, the central business district (CBD) is still a prestigious location in most metros. The best hotels are often downtown; exclusive clubs where business leaders can meet and exchange information and develop informal networks are normally located downtown; and an address such as "Wall Street" or "Michigan Avenue" is still desirable for some businesses. The relative centralization of higher-order business services shows that agglomeration economies are still an important source of competitive advantage. While this will continue to be a source of strength for central cities, advances in information technology are likely to weaken its importance (see chapter 4). Moreover, the producer services boom of the 1980s is unlikely to be repeated.

Second, in many older cities, such as Philadelphia, New York and Chicago, transit provides excellent accessibility to the CBD, particularly for lower-level employees, thus enhancing its attractiveness as a business location. Although passengers are often not enthusiastic about the quality of service, regional rail lines in many cities do provide a viable alternative to driving into the city. In most cases, tickets cost less than parking, and in some cases travel time is less. The transit advantage many core cities enjoy may become more important if Clean Air Act mandates for employer trip reduction programs are enforced. Many states, for example, enacted employer trip reduction programs requiring large employers in nonattainment areas, normally the largest metropolitan areas, to submit plans that would increase the ratio of employees to vehicles arriving at their work sites. The Employer Trip Reduction Program may favor center city employers, since more of their employees use mass transit. It may also encourage more experiments with telecommuting.

Third, while in many metros the cost of land and labor in central cities is higher than in the suburbs, market forces are likely to lead to some readjustment. In a number of cities, the glut of office spaces in the CBD combined with strong demand in the suburbs, has meant that companies can move to new offices at very low cost. For example, in 1987, net rent for the Sears Tower was $22-26 per square foot, while operating costs were $6.50 and taxes $8.50. However, because of the movement of Sears to the suburbs and the glut of Class A and B office space in the downtown, it now rents for $22 gross, while net rent is now close to $1 per square foot.[17]

Similarly, in many metros it is hard to get workers in the suburbs, particularly for lower-wage routine jobs, since so many firms have moved there. For example, in Milwaukee, where metropolitan unemployment rates are 3.8 percent, a number of manufacturers have expressed interest in locating a portion or all of their employment in the central city in order to access the urban labor force, as long as environmental (brownfield) and crime problems can be solved.[18]

If core and suburban costs begin to converge, cities will increasingly rely on firms that are pay-

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[16] Harold L. Wolman, Coit Cook Ford III, and Edward Hill, "Evaluating the Success of Urban Success Stories," *Urban Studies*, vol. 31, No. 6, 1994, pp. 835-850.

[17] Discussion with Philip Domenico, John Buck Co. (Building manager, Sears Tower), September 1995.

[18] Sammis White, M. Marc Thomas, Nicholas A. Thompson, "Changing Spatial Patterns of Employment Location: Milwaukee, Wisconsin, 1979-1994," report prepared for the Office of Technology Assessment, 1995.

ing less rent and employing lower-wage workers. Just as rural America was the site of much low-wage manufacturing because of cheap labor and land, America's urban cores may become home to low-wage manufacturing and services, particularly those tied to markets or agglomeration economies. Rural areas that rely on a low factor cost strategy can gain needed jobs and development, but have difficulty increasing standards of living. The same may become increasingly true for cities.

Property utilization strategies that companies employ may also benefit the core. For example, as companies attempt to minimize the cost of doing business, many eliminated leased space in favor of ownership. The glut of low-cost buildings in the core may be attractive to many companies; that is, owning office space in the central business district may be cheaper than leasing space in the suburbs. For example, Colonial Penn Life Insurance, a long-established tenant leasing in downtown Philadelphia, had been looking for a new location for its headquarters and was considering the suburbs. However, it was able to buy a building close to its current one in the downtown at a very low cost. Total costs, including renovation, were less than half of buying or constructing a building in the suburbs.

Finally, politics, regulations, image and civic commitment keep many companies in the core, even if suburban locations are cheaper. Major employers in many cities are often sensitive to the city's position, and they know they will win political and public goodwill by keeping offices in the city. Regulatory bodies and union pressure also keep employment in the core. For example, when Provident Mutual merged with Covenant Mutual, the company began to move employment out of downtown Philadelphia to the suburbs, but the Pennsylvania Insurance Commissioner approved the merger on the condition that no more than 100 jobs leave. Public Utility Commissions have placed similar pressures on telecommunications operations.

FACTORS INHIBITING REURBANIZATION[19]

There are a range of factors that are likely to inhibit reurbanization. The most obvious constraint is economic: first, the high costs of site acquisition, preparation and rebuilding; and second, the absence of a strong demand for inner-city locations and older buildings. Urban America already has an excess supply of serviced land and building space.

These problems are exacerbated by a series of institutional constraints that add to the expense of using land in the core. In older districts, titles to property are often obscure, missing, contested, or tied up in court. Any attempt at large-scale redevelopment invariably involves the acquisition of sites in multiple ownership, thus multiplying costs and legal difficulties. Moreover, most older urban districts also are enmeshed in a myriad of overlapping and often contradictory institutional regulations affecting the use of land and buildings and the provision of public goods and services. In combination these tend to freeze urban landscapes in their current state. The rigid nature of zoning is a case in point, and other examples include occupancy standards, building bylaws, fire codes, and parking requirements.

Third, most inner cities are characterized by relatively high property and business taxes and high fees for services compared to their suburban counterparts. In the absence of region-wide or state-level revenue sharing, these taxes serve as a severe impediment to redevelopment and adaptive reuse, and a major stimulus to extensive suburbanization. With the loss of many middle-class residents to the suburbs and the continued decline of state and federal aid to local governments, fiscal disparities between the central city and the suburbs have increased. In 1987, residents in central cities paid 25 percent more per capita in taxes than residents in the suburbs. Adjusted for income the difference is 44 percent, increasing from just

[19] This section is based in part on Larry S. Bourne, "Reurbanization and Urban Land Development: U.S. Cities in a Comparative Context," report prepared for the Office of Technology Assessment, May 1995.

18 percent in 1981.[20] Tax rates in central cities are higher than in suburbs because of higher social service costs, declining residential tax bases, increased infrastructure maintenance costs, and sometimes less efficient government. For example, tax rates on office space in DuPage County outside Chicago are about one-third of rates in Chicago. In Philadelphia, taxes and maintenance costs are also at least $1 per square foot higher in the CBD. Moreover, many cities levy a wage tax. Philadelphia's current wage tax is 4.96 percent for city residents and 4.31 percent for those who only work in the city.

The general absence of a strong demand for inner-city locations and older buildings in most American cities is made worse by the prevailing images of suburbia as places for living and increasingly for business, and of central cities as places to avoid because of decay and crime. Yet, many firms report that they would stay downtown if it were safer and more attractive. One innovation to improve the image of the central city is the business improvement district, or BID.[21] These are ostensibly private organizations that are allowed to tax commercial property within prescribed districts in order to provide extra police protection, sanitation, and other management functions. Now operating in the central business districts of many large cities (among them New York, Philadelphia, and Baltimore), they have been effective in combating "crime and grime" within their districts, but not in the larger community where the problems are much worse. Such privatization innovations are not limited to the CBD. In Chicago, for example, local officials have considered making design modifications to existing industrial areas to make them more secure. In many older areas a number of manufacturing firms are often located in small, detached buildings along several city blocks. One proposal would close off a number of streets to create an industrial park with one secured entrance.

Finally, in the view of many local government authorities, the most important constraint on reuse and redevelopment is environmental. Authorities cite excessively high and rigid standards for environmental cleanup of older sites (especially contaminated industrial sites), the uncertainty of downstream cleanup costs, and the potential legal and financial liabilities associated with cleanup. This is generally discussed in terms of the issue of abandoned land and buildings known as brownfields. The rest of this chapter is devoted to this issue.

UNDERUTILIZATION OF URBAN CORE INFRASTRUCTURE: THE PROBLEM OF BROWNFIELDS

The extent of misallocation and underutilization of urban land and buildings and the premature writedown of investments in the built environment is largely unknown. Municipalities do not keep data on the number of vacant sites, let alone the underuse of land and buildings. A number of cities, among them Pittsburgh, are beginning to develop inventories of larger unused sites that might be useful for commercial or industrial users, with the aid of geographic information systems technology. Despite the absence of documentation, there is general agreement that vacant, derelict and abandoned land and buildings in older cities are significant and growing.

The city of Detroit, perhaps more than any other city, illustrates the scale and complexity of land and building abandonment. Since 1950, the city has lost more than 50 percent of its manufacturing base. Its population has declined from 1.9 million in 1950 to about 1.0 million in 1990, and slipped from 45 percent of its Metropolitan Statistical

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[20] Roy Bahl "Metropolitan Fiscal Disparities," *Cityscape*, vol. 1, No. 1, 1994, pp. 293-306.

[21] William J. Mallett, "Managing the Post-industrial City: Business Improvement Districts in the United States," *Area*, vol. 26, No. 3, 1994, pp. 276-287.

Area (MSA) population to less than 21 percent. Given that the population of the entire southeast Michigan region has remained more or less stable since 1970,[22] the impact on the city of continued population and employment decentralization has been dramatic. Because Detroit's most rapid growth took place later than most industrial centers in the Northeast, its initial building and population densities were lower, and thus the amount of land and infrastructure left idle by the rapidly declining population, housing stock and industrial base is huge. Some estimates, provided by local researchers and supported by other sources, suggest that over 30 percent of the physical land area of the city is either vacant or near-vacant and is increasing.

Like Detroit, the Pittsburgh story of massive deindustrialization, blight, and long-term economic adjustment is well known.[23] Once the country's iron, steel, and coking center, with the highest proportion in the country of its labor force in manufacturing (40 percent), Pittsburgh's industrial structure has been in decline since World War II. The population of the city, once over 677,000, is now less than 380,000. The city is also politically fenced in; it is one of 130 municipalities within Allegheny County, and is set within an equally fragmented urban region. In the last twenty years it has lost over 60 percent of its manufacturing jobs.[24] (The decline has been greater for many smaller communities along the Monongahela River). As a consequence, and given its restricted site, Pittsburgh has inherited a massive problem of vacant and underused property, much of it contaminated, as well as an outmoded industrial landscape and infrastructure. In the eight-county Pittsburgh region there are approximately 450 abandoned and possibly contaminated sites, with an average size of 2.5 acres, totaling 1,125 acres or 2 square miles. This does not include small vacant lots.[25]

The existence of potentially contaminated and abandoned property is not a new problem in many metropolitan areas, especially older, central cities and suburbs. Where industry has closed or moved, land and buildings are left behind, idled, or underutilized, jobs are lost, and local tax revenues reduced. Recently, significant attention has focused on these sites, referred to as brownfields, and the problems associated with their cleanup and reuse. The Environmental Protection Agency (EPA) defines brownfield as: "abandoned, idled or underused industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination."[26] Often the sites were, or may still be to a lesser extent, used for industrial or commercial activities where hazardous substances were handled, manufactured, or stored. The extent of contamination at brownfield sites ranges from low or moderate to extremely hazardous. Even abandoned properties with no contamination can suffer from the stigma of brownfields until a site assessment determines they are clean. Even then, properties with poor development potential may remain underutilized.

A small number of brownfield sites may have high levels of contamination and are candidates for addition to the EPA's National Priorities List or similar state priority lists. A large number of con-

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[22] Southeast Michigan Council of Governments (SEMCOG), *Land Use Tools and Techniques* (Detroit: SEMCOG, 1994).

[23] R. Beauregard, P. Lawless, and S. Deitrick. "Collaborative Strategies for Reindustrialization: Sheffield and Pittsburgh," *Economic Development Quarterly,* vol. 6, No. 4, 1992, pp. 418-430.

[24] Evan Stoddard, "Urban Redevelopment and Environmental Recovery: The Experience of Pittsburgh," paper presented at the International Soil Congress, Austria, September 1994.

[25] Discussion with Joel Tarr, Carnegie Mellon University, July 1995.

[26] Timothy Fields, Jr., Deputy Assistant Administrator, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, "Federal Agency Brownfields Initiatives," presented at the Environmental Law Institute's Redeveloping Brownfields Workshop, Washington, DC, Mar. 28, 1995.

taminated sites will never be put on these lists because they are not badly enough contaminated or have not been evaluated. Information about many sites is currently unavailable. The threat to public health from brownfield contamination varies widely (and is unknown in some cases), depending on the nature and extent of contamination, the exposure patterns, and the use of the site and surrounding area.

Estimates of the number of brownfield sites in the United States vary from tens of thousands to nearly 450,000 sites; the number of acres involved is equally uncertain. The sites vary from less than one acre to hundreds of acres. Many sites are concentrated in the Northeast and Midwest but brownfields are also common in the South and West and represent a wide variety of past industrial and commercial uses. Brownfields are frequently identified with distressed urban areas, particularly central cities and inner suburbs. Many of these areas have undergone deindustrialization, leaving abandoned and contaminated lands and buildings, making redevelopment difficult. In all cases, as a known or potentially contaminated site, brownfield property is worth less than property known to be clean.

Some metropolitan regions have recently initiated brownfield inventories. Chicago, for example, has identified over 2,000 brownfield sites in its metropolitan region, involving approximately 1,500 acres of underutilized land, which is nearly 18 percent of its planned industrial acreage.[27] On the West Coast, Portland has identified approximately 40 sites involving nearly 400 acres of underutilized land.[28]

Brownfields complicate economic development in many communities. In large part, this is because legal uncertainties attend brownfields, including difficult and costly cleanup requirements, cleanup standards, liability, and the availability of financing. Thus, brownfields contribute, in part, to reduced economic development and job creation in urban areas, particularly in central cities and older suburbs. Brownfields may also lead to development of previously unused land on the urban fringe, creating urban sprawl, traffic congestion, and loss of open space.[29]

Brownfields are getting more attention now partly because old, abandoned infrastructure, such as factories, mill sites, and warehouses, were not considered a threat to either human health or the environment until the mid-1970s when concern about contamination rose.[30] Over time and with the creation of the Superfund law in 1980 in the wake of Love Canal, the complicated environmental and liability issues surrounding many of these properties became better known.

Addressing the problem of brownfields is a complex task partly because of the many stakeholders who are interested in these sites. Brownfield discussions involve property owners, developers, bankers, environmental consultants, insurance providers, environmental and community development organizations, and regulators from all levels of government. Each stakeholder group has interests and concerns that must be considered in the context of the alternative perspectives represented by other parties. Based on a review of the brownfields literature and reports from the major brownfields forums recently under

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[27] U.S. Congress, General Accounting Office, *Reuse of Urban Industrial Sites*, GAO/RCED-95-172, (Gaithersburg, MD: General Accounting Office, June 1995).

[28] Institute for Responsible Management, Inc., "State Brownfields Policy and Practice," Conference Proceedings, Boston, MA, January 1995, p. 57.

[29] Bourne, op. cit., footnote 19.

[30] In 1976, the Resource Conservation and Recovery Act was enacted by Congress, and New Jersey adopted the New Jersey Spill Compensation and Control Act, a state "superfund" law.

way (in Chicago and Cuyahoga County, Ohio), there appears to be some agreement on the primary issues and on avenues for improvement.[31]

Technical Issues

The technical issues involve accurately assessing the type and extent of contamination, and deciding on cleanup standards and procedures. When the level of cleanup and the remediation process are unclear, uncertainties about time and money arise and impede action. In addition, the difficulty of fully and accurately assessing site contamination contributes to uncertainty about liability, because future owners may be responsible for cleanup of prior contamination.

In order to address remediation at brownfield sites, regulators must determine what level of initial site investigation is necessary to identify the type and extent (or absence) of contamination. Identification generally begins with a Phase I Site Assessment during which environmental consultants are often engaged to examine government and other historical records, perform site reconnaissance, and interview owners, occupants, and others associated with the site. If a Phase I assessment reveals evidence of contamination, a Phase II assessment may be conducted, including sampling of soil and groundwater. Until Phase II is complete, the exact level of the hazard posed by the site is not known, nor is the potential for enforcement action under federal or state Superfund laws; this means the potential remediation costs are unknown.

The uncertainties related to environmental remediation are especially troublesome for the developer who must meet a budget and schedule to stay in business. Depending on a state's procedures for managing hazardous waste cleanup and the characteristics of a given site, identifying and cleaning up contamination ranges from a fairly straightforward to cumbersome and time-consuming process.

Legal Liability

Legal liability at brownfield sites is also sometimes a barrier to cleanup and redevelopment. The potential for liability associated with hazardous waste sites is especially complicated by complex and often overlapping laws at the federal and state levels. Depending on the type and extent of contamination, as well as the current capacity (active or inactive) of a brownfield site, enforcement action may be warranted under the federal Superfund program, state superfund programs, the Resource Conservation and Recovery Act (RCRA),[32] and other federal and state environmental laws.[33]

The law most often associated with liability at brownfield sites is CERCLA, later amended in 1986 as the Superfund Amendment and Reauthorization Act (SARA).[34] The statute was passed in order to identify and clean up chemical spills and abandoned hazardous waste sites that pose a threat to human health and the environment. CERCLA is particularly significant due to its far-reaching enforcement capability. It applies strict, joint and

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[31] U.S. Congress, Office of Technology Assessment, *State of the States on Brownfields: Programs for Cleanup and Reuse of Contaminated Sites* (Washington DC: Office of Technology Assessment, June 1995).

[32] 42 U.S.C. Secs. 6901-6992.

[33] For example, sites involving contamination with petroleum-based chemicals are typically treated under state laws specifically created to address this problem.

[34] Public Law 99-499, 100 Stat. 1613 (1986).

several, and retroactive liability to the environmental cleanup of hazardous substances.[35] The law identifies a number of parties that may be held responsible for a site cleanup including:

- current owners or operators of contaminated property,
- owners or operators of property at the time it became contaminated,
- persons who arrange for treatment or disposal of hazardous substances, and
- transporters of hazardous substances.

Few exemptions exist within CERCLA's liability scheme, and court interpretations and decisions have exacerbated concerns of liability risk for certain parties.[36] To a lesser extent, other federal environmental laws add to the uncertainty about liability, along with state Superfund and other property cleanup and transfer laws.

Within this legal framework, any association with a hazardous waste site implies some level of uncertain liability. This real or perceived threat of liability often deters interested parties (especially lenders and developers) from undertaking any transaction necessary to clean up and redevelop a brownfield site. There are few assurances available at the federal or state level to protect a private party from enforcement action at a hazardous waste site, although some EPA and state voluntary cleanup programs have begun such initiatives.

Financial Issues

Even if technical and legal uncertainties are solved, assessing and cleaning up contaminated brownfield sites can be expensive and can limit redevelopment of these sites. Brownfield sites are often categorized in three ways:

- economically viable sites where market demands will promote redevelopment and even cleanup if necessary;
- sites that have development potential with incentives or financial assistance for assessment and cleanup; and
- sites that have extremely limited market potential, even if they were cleaned up.[37]

Financial issues are particularly complicated at brownfield sites because of the ultimate costs of assessment and remediation, the risk of liability, and limited public and private resources.

Hazardous waste cleanup costs are often uncertain and unusually high. Though data is limited on cleanup costs at brownfield sites, reports range from tens of thousands of dollars to millions of dollars. Even estimating the cost of remediation and development can require a site assessment that may be too expensive for smaller, less valuable sites.[38] Even the most thorough site investigations cannot guarantee an upper bound to remediation costs. Some stakeholders discover additional contamination during remediation, adding to the project cost.

Another financial barrier to brownfield cleanup is the uncertainty arising from the real and perceived risk of liability for cleanup costs. Since many stakeholders don't know what liability they can incur if they become involved at a brownfield site, they are often reluctant to become involved at

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[35] All liability requires proof of a causal link between a party and the harm. *Strict liability* means a party does not have to be found negligent in order to be found liable. *Joint and several liability* means that any single responsible party can be required to pay for all the cleanup costs at a hazardous waste site, even if other parties contributed to the contamination. *Retroactive liability* means that parties can be held liable for contamination that occurred before the law was passed.

[36] One case that is often cited is U.S. v. Fleet Factors Corp. (901 F2d 1550, 11th Cir 1990), in which the court found that a lender could be held liable for cleanup if the lender participated "in the financial management of a facility to a degree indicating a capacity to influence the corporation's treatment of hazardous wastes."

[37] Chicago Brownfields Forum participants also recognized an additional type: "currently operating sites that are in danger of becoming brownfields because historical contamination discourages new investment and lending." This is discussed in Chicago Brownfields Forum, "Initial Report of Workgroups Review Draft," Mar. 31, 1995.

[38] Phase I Site Assessments cost $1,000 to $5,000, while Phase II Assessments average $50,000 to $70,000.

all. Lenders are especially hesitant to make loans on properties where hazardous materials were once handled or will be in the future,[39] and developers fear they may be held liable for cleanup costs. The prospects of working with contaminated property as collateral in cases of foreclosure or bankruptcy dampen interest in brownfield activity.[40]

Finally, there is an apparent lack of public and private resources available to promote brownfield cleanup and redevelopment. While some states provide financing mechanisms, such as public grants, low-interest loans, and tax incentives, these resources remain limited as brownfield sites continue to be identified and left unaddressed.

Community Concerns

Brownfields do not exist in isolation. Brownfield property is often located in distressed communities and in close proximity to other businesses, retail districts, or residential areas. A brownfield site may attract illegal dumping, and if left unsecured and open to the public, can turn into makeshift playgrounds for neighborhood children or temporary shelter for the homeless. Thus, contaminated brownfields pose a threat to human health and the environment. Even uncontaminated brownfields are usually unattractive, and can lower property values in the area. Brownfields may also result in increased insurance rates for neighboring properties.[41]

While community groups are usually interested in promoting the cleanup and redevelopment of brownfields in their neighborhoods, they expect some assurance that remediation will protect their health and the environment. The public's concern includes protection during the cleanup, as well as at the final remediated site. When considering the prospects for site redevelopment, community members have a stake in the use planned for the property. In a few recent cases, concern about the potential for new jobs and economic development of a neighborhood brought forward numerous groups interested in being included in the decision-making process.[42] Thus, communication between the responsible parties and community members about the risks at a site and the plans for its redevelopment may prove essential to the success of a project.

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[39] Survey results of the Independent Bankers Association of America showed that one out of five of its members reported a mortgage loss or default on commercial property as a result of contamination on the site. In addition, seven out of 10 banks reported that they will not offer certain classes of loans due to environmental liability concerns. James Boyd and Molly K. Macauley, "The Impact of Environmental Liability on Industrial Real Estate Development," *Resources,* No. 114, Winter 1994.

[40] However, new Community Reinvestment Act (CRA) regulations (60 FR 22156, 22160) recognize loans for financing the cleanup or redevelopment of industrial sites in low- or moderate-income communities as credit toward meeting the act's requirements. This could help expand lender involvement at brownfield sites.

[41] A. Siewers, "The Building Blocks of Ruin," *Chicago Sun Times,* Mar. 14, 1993.

[42] Cara Jepsen, "Retooling South Works," *The Neighborhood Works,* March 1995.