

Uneven Development: Outer Suburbs and Exurbs 8

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

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

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. Shermeyen 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

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 decentraliza-

tion 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

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

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, "Fiscal 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 housing³⁷ 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

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 encour-

ages 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-

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	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 police, 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 dwell-

ings 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 Robert 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-

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

^aIncludes scattered, linear and satellite developments

^bIncludes 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 Florida*, 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 re-

quire \$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-

⁵⁴New Jersey Office of State Planning (OSP), *Impact Assessment of the New Jersey Interim State Development and Redevelopment Plan, Report II: Research Findings*. Trenton, NJ, 1992.

⁵⁵Burchell and Litoskin, 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	
				0/0
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 III: Supplemental IPIA Assessment." 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 Listoskin⁵⁶ summarized the locational costs found in the three studies: OSP,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 al., 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 Associates⁶⁶ 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 in Florida*. Report presented to the Governor's Task Force on Urban Growth Patterns and the Florida Department of Community Affairs, July 1989

⁶³Pennsylvania State University, "Fiscal Impact of Different Land Uses: The Pennsylvania Experience." Extension Circular 410, College of Agricultural Sciences, Cooperative Extension, nd.

⁶⁴Dupage 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.

⁶⁵This 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.

⁶⁶James Duncan and Associates, et al., op. cit., footnote 52.

⁶⁷EPA, op. cit., footnote 6, p. 5-3.

⁶⁸Frank, 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 (\$13,931), electricity (\$937), mail deliv-

⁷³U.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).

⁷⁴Carol 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).

⁷⁵R.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-

⁷⁶Burchell and Listoskin, op cit., footnote 30.

⁷⁷John 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.

⁷⁸William 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 decades⁸¹ 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

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

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 Lyons⁹⁴ 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 T.J. Lyons, "Transport Energy Use in the Perth Metropolitan Region: Some Urban Policy implications," *Urban Policy and 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 of 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 implications," *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 per-

centage 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

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 CO₂ 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 densi-

ties 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.

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

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 Jersey Office of State Planning (OSP), *Impact 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.

¹¹³Timothy Beatley, *Habitat Conservation Planning: Endangered Species and Urban Growth* (Austin, TX: University of Texas press, 1994), p. 2.

¹¹⁴Jerome 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.

¹¹⁵ OTA, op cit., footnote 21, p. 93.

¹¹⁶ Ewing, op. cit., footnote 8.

¹¹⁷ Downs, op. cit., footnote 1.