

Special Report 257

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WORK

Insight from Western Europe, Canada, and the United States

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Insight from Western Europe, Canada, and the United States

Committee for an  
International  
Comparison of  
National Policies and  
Expectations Affecting  
Public Transit

**MAKING  
TRANSIT  
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Special Report 257

## Transportation Research Board Special Report 257

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This report has been reviewed by a group other than the authors according to the procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Comparison of National Policies and  
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## Preface

This report is the product of a 2-year study funded by the Transit Cooperative Research Program (TCRP).<sup>1</sup> The study had its genesis in discussions during 1995 and 1996 by the TCRP Oversight and Project Selection (TOPS) Committee, which were prompted by Louis J. Gambaccini, then General Manager of the Southeast Pennsylvania Transit Authority. A number of TOPS members, including many transit managers, had had the experience of being asked by their customers, as well as their policy boards, why transit usage is so low in American cities as compared with the cities of Western Europe, Canada, and other parts of the world.

Around that same time, teams of transit managers from across the country were returning from tours of public transportation systems in dozens of Western European and Canadian cities. Reports from these tours—documented in four TCRP Research Results Digests<sup>2</sup>—describe many innovative practices, services, and technologies with potential for application in the United States. The teams often prefaced their reports, however, by noting the distinct differences in the urban environments and transportation policies they witnessed abroad. For instance, they observed the following:

- Most Western European residents live in densely developed communities within reach of public transportation corridors that were established long before widespread use of the automobile, thus providing naturally large markets for transit operators.
- Motor fuel prices in Western European cities are three to five times higher than in the United States, and many other government taxes, parking regulations, and traffic policies encourage the use of transit, while deterring use of the automobile.

- The fragile and physically constrained medieval towns and historic cities of Western Europe compel government actions to discourage automobile use and promote public transit.
- The strong national and regional governments in Western Europe, as well as in Canada, allow for the coordination of policies governing urban land use and the planning of highways and transit, offering a means of emphasizing the latter.

Tour participants also observed a wholly different attitude about the role and value of public transportation among both policy makers and the general public. They visited transit systems that were treated as integral components of regional transportation systems. They met with transit managers having a high level of technical competence; professional prominence; and latitude to realign routes, change equipment, and adjust fare schedules as they saw fit. And they learned that innovating was commonplace among Western European transit operators and encouraged by elected officials.

Seeking a more complete explanation of the many factors underlying the above differences, the TOPS Committee asked the National Research Council, under the auspices of the Transportation Research Board (TRB), to convene a committee of experts to compare U.S. public policies and attitudes about urban form, transit, and highways with those of other industrialized nations. The sponsor emphasized that the comparison should be construed broadly to include government policies and institutions; public expectations and preferences; and economic, geographic, social, and demographic factors affecting urban transportation, housing, and land use (see Box P-1 for the project Statement of Task).

The Committee for an International Comparison of National Policies and Expectations Affecting Public Transit, led by Les Sterman, Executive Director, East-West Gateway Coordinating Council, St. Louis, Missouri, included experts in public transportation, economics, public policy, highway transportation, and urban planning. Early in its deliberations, the committee narrowed the study scope to compare the United States with Canada and the largest industrialized nations of Northern and Western Europe. These countries are closest to the United States in affluence, urbanization, and governance. Much of the committee's attention was focused on Germany, Great Britain, France, the Netherlands, and Sweden, which are the most studied, wealthiest, and populated countries in Northern and Western Europe. Where sufficient information and data were available, Austria, Belgium,

Box P-1

## Statement of Task

This project will compare U.S. public policies and preferences about urban form, transit, and highways with those of other industrialized nations. Public policies will be broadly construed to include tax policies affecting transportation, housing, and land; institutional forms and policies affecting land use regulation and urban form; and subsidies and investment policies affecting transit, parking, and highways. Although national policies affecting funding for transit and ancillary policies affecting transit use will be examined, the impact of those policies will be considered at the metropolitan level. Public attitudes and preferences will be examined on the basis of available public opinion data, travel behavior, and other published sources of comparative information. The project will include considerations of the dynamics and time scale of changes. Considerations of attitudes will not be restricted to transportation per se but will include historical and cultural factors as well. The committee will summarize available information and report its findings regarding the combinations of policies and attitudes that result in different levels of transit use among countries and will apply its judgment regarding the potential transferability of such public policies to the United States.

Denmark, Norway, and Switzerland were also examined. By and large, it is these ten countries that are referred to as Western Europe in the report.

The committee adhered closely to its original charge of examining the broader policies and external factors affecting transit use abroad. The report contains scores of references to publications that document specific transit technologies, operating practices, and fare and scheduling policies outside the United States, and some information of this kind is synthesized in the text (see Chapter 3 and the appendix); however, this is done mainly for explication. The discussion centers on those broader policies and factors outside the control of transit agencies.

The committee was also asked to render its collective judgment about the prospects for transferring the transit-supportive policies of Western Europe and Canada to the United States. However, it proved difficult to judge

the transferability of specific policies to the United States because the same social, economic, political, and other conditions that can make a policy or practice successful in one place can have little, if any, relevance in another. Moreover, conditions can change over time. Thus, instead of offering specific policy advice, the report is intended to inform policy makers and others who are interested in learning more about what has worked in other countries and may have application here.

## **ACKNOWLEDGMENTS**

A number of individuals provided valuable input and assistance during the course of this study. The committee met five times in a 20-month period. At one of its early meetings, Lee J. Schipper, Visiting Scientist, International Energy Agency, discussed his research findings on the effects of rising incomes and motor vehicle and fuel taxation on travel behavior in Western Europe and North America. Bo E. Peterson, former Director of Planning, Stockholm Transit, and Professor of Traffic and Planning, Lünd University, Sweden, joined with David Bayliss, former Director of Planning, London Transport, and a member of the committee, in describing changes now taking place in Western European transit policies and in the way transit is organized, managed, and funded. In conjunction with a meeting in Southern California, members of the committee met with staff of the Orange County Transportation Authority to discuss transit innovations and the challenges involved in offering bus services in a medium-density American urban environment.

The study was managed by Thomas R. Menzies, Jr., who drafted this report under the guidance of the committee and the supervision of Stephen R. Godwin, Director of TRB's Studies and Information Services Division. Eric Monami, consultant, OGM, S.A., Brussels, Belgium, drafted a resource paper describing recent changes in the delivery and organization of public transportation in the European Union.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge.

The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

The committee thanks the following individuals for their review of this report: David J. Banister, University College, London, England; Lawrence D. Dahms, Metropolitan Transportation Commission, Oakland, California; Thomas F. Larwin, San Diego Metropolitan Transit Development Board, California; Jonathan Levine, University of Michigan, Ann Arbor; Anthony Siegman, Stanford University, Palo Alto, California; and Hal Wolman, The George Washington University, Washington, D.C. Although these reviewers provided many constructive comments and suggestions, they were not asked to endorse the findings and conclusions, nor did they see the final draft before its release.

The review of this report was overseen by L.G. (Gary) Byrd, Alexandria, Virginia, and Lester A. Hoel, University of Virginia, Charlottesville. Appointed by the National Research Council, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Suzanne Schneider, Assistant Executive Director of TRB, managed the report review process. The report was edited and prepared for publication under the supervision of Nancy Ackerman, Director of Reports and Editorial Services. Rona Briere edited the report. Appreciation is expressed to Heather Allen of the Union Internationale des Transports Publics for providing the photographs used in the report. Special thanks go to Marion Johnson and Frances E. Holland for assistance with meeting arrangements, communications with committee members, and production of the final report.

## **NOTES**

1. TCRP, which is administered by the Transportation Research Board, was established under the sponsorship of the Federal Transit Administration to undertake research and other technical activities in response to the needs of transit service providers. Research projects are selected by an independent governing board (TOPS) composed mainly of transit managers from around the country. TOPS asked TRB and the National

Research Council to convene an interdisciplinary committee to conduct this TCRP-funded study.

2. See (a) *Research Results Digest 20: International Transit Studies Program, Report on the First Three Missions*, May 1997; (b) *Research Results Digest 22: International Transit Studies Program, Report on 1996 Missions*, October 1997; (c) *Research Results Digest 27: International Transit Studies Program, Report on the Spring 1997 Mission: Public–Private Partnerships and Innovative Transit Technologies in Scandinavia*, October 1998; and (d) *Research Results Digest 31: International Transit Studies Program, Report on the Fall 1997 Mission: Applications of Intelligent Transportation Systems to Public Transit in Western Europe*, October 1998.



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## Executive Summary

This report was prepared for policy makers searching for ways to boost public transit use in U.S. urban areas and wishing to know what can be learned from the experiences of Canada and Western Europe. With few exceptions, public transit has a more prominent role in Canada and Western Europe than in the United States. This is true not only in large cities, but also in many smaller communities and throughout entire metropolitan areas. Transit is used for about 10 percent of urban trips in Western Europe, compared with about 2 percent in the United States. Canadians use public transit about twice as much as Americans, although there is considerable variation across Canada, just as there is in Western Europe and the United States.

A number of factors have contributed to this differential, from higher taxes on motor vehicles and fuel to concerted efforts to control urban development and preserve the form and function of historic cities. Western Europeans and Canadians have devoted considerable attention and resources to ensuring that transit service is convenient, comfortable, and reliable. This report reviews these policies and practices and the historical, political, and economic circumstances that have influenced them. The focus is on comparing the largest industrialized countries of Northern and Western Europe,<sup>1</sup> as well as Canada, because their economic, social, and political conditions are most like those of the United States. The comparisons provide insight into why public transit is used more in Western Europe and Canada, as well as ideas on how to increase ridership in the United States.

## INTERNATIONAL COMPARISON OF TRANSIT TRENDS

The United States once led the world in public transit use. Early in the 20th century, American cities undergoing rapid population growth provided ideal settings for the introduction of many faster and more efficient transit technologies. Grid-style street systems, ample land for expansion, thriving economies, mass immigration, and a general willingness by the public to try new transportation technologies fostered a streetcar revolution that swept across the country. By 1920, Americans living in cities were averaging more than 250 transit trips per year, mainly on the nation's 65 000 km of electric railway. Hundreds of American cities were served by privately operated streetcar lines.

In many respects, however, the same characteristics that gave rise to electric traction hastened its decline during the middle of the century. Increasingly affluent and able to afford automobiles, Americans began buying them in droves after World War I. By 1930, one of every four households owned a car, and by 1960 there was one car registered for every two Americans. The faster and more flexible automobile vastly increased the amount of land available for residential and commercial development. Urban development could, and did, take place increasingly farther from the traditional central cities and early suburbs formed along transit lines. Large urban areas—many shaped almost entirely by the automobile—emerged after the streetcar era had passed.

Even as these trends were becoming manifest between the two world wars, little attention was being given to the lasting changes that were taking place in American cities, much less to the profound effects these changes would have on urban transit systems. Indeed, the migration of households to the suburbs—seeking better schools, more land, and larger homes—was generally viewed as a positive trend that would strengthen cities by relieving crowding and alleviating traffic congestion. A host of government policies, from tax incentives that fostered home ownership to the construction of freeways radiating out from city centers, would come to reinforce and accelerate this outward migration.

Businesses soon joined the flow of people to the suburbs. As central cities lost households, jobs, and shopping places, transit use fell sharply. Not until the mid-1960s, however, did the diminishing fortunes of American cities and the intertwined fate of transit attract national attention, precipitating large-scale federal and state investments in public transportation. By this time, the

automobile had supplanted demand for bus and rail transit throughout much of urban America. Though increasingly subsidized, public transit's market narrowed, in many cases comprising almost entirely the urban poor. Having limited political influence and contributing a dwindling share of operating revenues, these remaining riders endured declining levels of service. Among more affluent travelers with other transportation options, transit usage fell still further.

Today transit operators in the United States continue to face significant challenges in attracting and retaining riders. However, transit still plays an important role in the transportation systems of many large American cities, serving suburban commuters and city residents alike. In many other urban areas, transit's role has diminished, but it remains a crucial public service for those who use it regularly. Although transit's mode share has continued to decline during the past 20 years, the industry remains optimistic about the future. Renewed interest in its role as a complement to the automobile has arisen with recent increases in bus and rail ridership in several large urban areas; signs of central city rejuvenation; and a widening recognition of the importance of transit to the urban poor, disabled, and elderly.

### **Retaining and Rebuilding Transit in Western Europe**

By the time electric railways had been widely introduced early in the 20th century, most Western European cities were already quite mature, shaped by centuries of carriage by foot, water, and animal. Seeking to preserve their historic centers, many Western European cities were cautious in adopting new transit technologies—especially private streetcars. Rather than entrust the private sector with supplying this service, many opted to build and operate their own electric streetcar systems. Thus almost from the beginning of the century, transit was treated as a public rather than private enterprise in Western Europe—in sharp contrast with circumstances in the United States.

Western European transit systems, both public and private, drew little competition from the automobile until late in the 20th century. Recovering from two devastating world wars, few Western Europeans could afford automobiles before the 1960s, and fewer still could afford new homes farther outside the city. Government reconstruction and housing programs helped keep populations high in the central cities and in nearby suburbs

served by public transit. Because so few Western Europeans could afford to drive, more dispersed and decentralized patterns of development would have been both impractical and unpopular in many places.

Thus even as U.S. policy makers after World War II were responding to the proliferation of automobiles by building more urban freeways, Western European governments were strengthening their support for public transportation. Although they did add many new highways outside cities, Western Europeans continued to invest heavily in bus and rail transit, providing both capital and operating assistance. Meanwhile, automobiles, long having been viewed as luxuries, continued to be taxed heavily, making frequent driving affordable only for the few. These policies not only boosted demand for transit, but also obliged Western European governments to provide high-quality transit as an alternative to the automobile.

Carrying on this century-long tradition, Western Europeans continue to support public transit through a series of policies and programs aimed at making transit attractive to urban dwellers. Although most Western European transit operators receive government financial support, they still rely heavily on revenues from fare collections, and this reliance compels good service and a customer orientation. Much attention is given to the speed, comfort, and reliability of the service. Operating practices ranging from the routing of buses and spacing of bus stops to fare collection are determined not only with the convenience of passengers in mind, but also for the purpose of increasing service speed and reducing delays. Transit is marketed to attract new riders and to meet the needs of existing patrons through the use of many tailored discount passes. And travel is made less complicated through highly coordinated ticketing and scheduling among multiple transit modes and providers (see Box ES-1).

In addition, a transit-first approach to traffic management pervades Western Europe. Transit vehicles, whether buses or streetcars, are given priority in city traffic. They can selectively preempt traffic signals at busy intersections, operate on dedicated travel lanes, and move ahead of other vehicles waiting in queues.

By all measures, the automobile remains less convenient and more costly to operate in Western Europe than in the United States, especially in cities. High levies on motor fuel—several times higher than in the United States—and high parking charges and taxes on motor vehicles continue to make car ownership and use expensive. Many Western European cities have also taken direct steps to discourage driving, for instance by curtailing parking

## Box ES-1

## Examples of Key Practices and Public Policies Favorable to Transit Use in Western Europe and Canada

### Reliability and Frequency of Transit Service

- Wide spacing between bus stops to increase operating speeds
- Passenger loading platforms to ease bus reentry into traffic streams
- Prepaid tickets and boarding passes to expedite passenger boarding
- Low-floor buses with wide doorways to speed boarding and alighting
- Transit priority in mixed traffic (e.g., bus lanes and special signalization)
- Vehicle locator systems

### Comfort, Safety, and Convenience of Service

- Amenities at transit stops and stations
- Clean vehicles and knowledgeable drivers
- Convenient ticket purchasing places
- Sidewalks leading to stations and secure, lighted waiting areas
- Uniform and simplified fare structures across area transit modes
- Discounted transit passes tailored to individual rider needs
- Widespread publication of schedules and color-coded matching of buses and lines
- Special taxi service options to extend and complete the transit network

### Means of Making Transit Competitive with Private Automobiles

- High automobile taxes
- High motor fuel taxes
- Parking limits in city centers and uniform policies on an area-wide basis

Continued ▶

**Box ES-1 (continued) Examples of Key Practices and Public Policies Favorable to Transit Use in Western Europe and Canada**

- Restrictions on driving in certain areas, such as popular downtown retail districts
- Discounted automobile rentals and car cooperatives sponsored by transit agencies

**Compatible Urban Land Use Policies**

- Land use decision making shared among local, regional, and national governments
- Regional integration of transportation and land use plans
- Common rules and guidance on street and site development designs favorable to transit

spaces and restricting automobile use in their popular shopping and business districts. Such policies are frequently part of an overall strategy to curb downtown traffic congestion and preserve the traditional role of cities as economic, social, and cultural centers. The higher cost and greater inconvenience of driving in Western European cities does much to explain the higher levels of transit use there.

Western Europeans also tend to view their historic cities, as well as the undeveloped land around them, as scarce and fragile national resources that must be protected and conserved. Hence, in contrast with the United States, urban land use is typically planned and regulated at the national and regional levels. Western European land use planners have long encouraged compact and clustered residential and commercial urban development that is accessible by transit. The integration of land use and transportation planning is made possible in Western Europe because national, regional, and local governments often share these responsibilities, or one unit of government—often the national government—has sole jurisdiction over both.

By comparison, land use planning is very much a local responsibility in the United States, and it is seldom well coordinated with regional transportation planning. With such diffuse controls, it is difficult to foster urban development patterns that promote public transit use by raising densities and introducing mixed commercial and residential land uses. Residents of established communities often resist additional development, while localities on the urban periphery often seek it out in order to increase employ-

ment and raise tax revenues. The end result is that more development takes place in dispersed patterns farther from the central city and traditional transit corridors.

A consequence of these differing historical, economic, political, and institutional circumstances is that transit systems in Western Europe have been able to retain much higher ridership than American systems. As Western Europeans have become more affluent, however, they have been driving more, with the number of trips made by automobile having increased substantially during the past 30 years. Concomitantly, transit's mode share has declined in many places, although its use has remained high in central cities.

### **Systematic Support for Transit in Canada**

The experience with transit in Canada is especially relevant to the United States, but it has been markedly different in many ways. Nearly all of the external conditions and factors that differentiate the United States from Western Europe—from a history of low gasoline taxes and high rates of car ownership to powerful economic and demographic pressures for urban growth—apply to a large extent in Canada. After World War II, Canada also experienced rapid suburban development and precipitous declines in transit use. In contrast with the United States, however, the Canadian provinces and cities made concerted efforts to improve transit services. These efforts included a transit-first approach to urban traffic management, and eventually higher motor fuel taxes and other public policies that complement transit. Canadians share with Western Europeans many of the same attitudes about the desirability of planning urban land use at the regional, rather than local, level and about the importance of coordinating land use with transportation investments. Transit-accessible designs are required for suburban subdivisions and office parks, and new residential and commercial development is channeled to existing or planned transit corridors. As a result of these integrated efforts, transit has retained an important role in urban Canada during the past three decades.

### **INSIGHTS AND IDEAS FROM ABROAD**

Much of metropolitan America is now suburban in character and not conducive to public transit operations and use. An abundance of inexpensive

land available for development outside cities, burgeoning metropolitan populations and economies, and inner-city economic and social strife have combined with the automobile to create decentralized urban areas that are difficult to serve by public transit. Transit works best in areas with high concentrations of workers, businesses, and households. Even dramatic changes in transportation investments, land use controls, and public attitudes—including the acceptance of much denser settlement patterns and Western European-style disincentives to driving—would take many decades to reshape the American urban landscape in ways that would fundamentally favor transit use.

Still, there is ample opportunity for transit to play a more prominent role in the urban transportation system of the United States. Although it is unreasonable to expect American transit use to rise to Western European levels, there are many places in the United States that are now well suited to transit where its use could be increased. Boston, Chicago, New York, San Francisco, Washington (D.C.), and several other American cities have retained high levels of central city employment, population densities, and public transit mode shares. Many of the policies and practices in Western European and Canadian cities—from an emphasis on channeling new development into areas that are well served by public transportation to creative transit marketing and fare policies—are especially relevant for these places.

Table ES-1 gives several of the approaches examined in this report that have contributed to high levels of transit use in Western Europe and Canada. The potential for successful implementation is greatest in those American cities that have retained significant, broad-based transit usage. To the extent that American central cities can attract more residents and workers and urban areas can condition new development on transit access, transit ridership may be boosted further. Yet experiences abroad also offer insights into how transit can be improved in those American cities where it plays a smaller role. In particular, Western European and Canadian transit systems distinguish themselves in providing dependable, good-quality service. Indeed, Western Europeans and Canadians have come to expect and insist upon such service. Although the reliability, convenience, and comfort of transit service are enhanced in many different ways, what is perhaps most important is that a strong commitment to good service is viewed as critical, regardless of the scale and scope of the ridership base.

In short, what becomes clear from this international comparison is that no single factor can explain why transit tends to be more popular abroad.



**Table ES-1 Possible Approaches for Increasing U.S. Transit Use**

Possible Approach	Preconditions That Foster Successful Implementation	Examples of Conditions That Will Increase Effectiveness in Boosting Transit Use
Transit operational and quality-of-service enhancements	Flexible transit workforce; management autonomy, including latitude and incentives to innovate; regional coordination of transit fares and services; public expectations of dependable and convenient service	Existing significant ridership base; complementary traffic regulations that favor transit operations
Transit priority in traffic	Integration of highway and transit management and policy making; limited street space and suitable street geometry; latitude and incentives for transit operators to innovate	Large ridership on buses; chronic urban traffic congestion; commitment to enforcing priority measures; priority given to transit over a large area
Transit-oriented site design in land use zoning	Tradition of strong government regulation of development and land use; commonly accepted standards and guidelines for site design	Well-performing and ubiquitous transit network; safe and sufficient pedestrian access ways; large commercial complexes with significant ridership potential

Continued on next page ►

Table ES-1 (*continued*) Possible Approaches for Increasing U.S. Transit Use

Possible Approach	Preconditions That Foster Successful Implementation	Examples of Conditions That Will Increase Effectiveness in Boosting Transit Use
Parking restrictions	Regional governance that allows for parking coordination across a metropolitan area	Adequate transit availability, especially rapid transit that provides an attractive alternative to driving for access to major activity centers
Increase in cost of automobile use	Acceptance/tradition of high taxes on vehicles and fuel; public concern over pollution, noise, traffic, and other adverse side effects of driving; good alternatives to driving, including walking, biking, and transit	Persistent high costs, prompting fundamental changes in settlement and commuting patterns
Regional coordination of land use and transportation planning	Regional governance, including revenue sharing; government land ownership; tradition of strong regional governance; public concerns about environment and land scarcity	Attractive city centers; high residential and employment density; complementary policies that discourage driving, including tax policies

A number of policies, practices, and conditions working together have elevated public transit's role in both the cities and suburbs of Western Europe and Canada. By no means do these experiences offer panaceas for transforming the role of public transit in the more automobile-oriented urban areas of the United States. They do, however, offer insights into ways of making transit a more effective and attractive alternative for urban travel.

**NOTE**

1. When describing the experiences of Western Europe, reference is made primarily to Great Britain, Germany, France, the Netherlands, and Sweden; in some cases the discussion encompasses Austria, Belgium, Denmark, Norway, and Switzerland.



# 1



## Introduction

When touring cities in Western Europe and Canada, as well as some other parts of the world, Americans frequently marvel at the ubiquity, convenience, and popularity of the urban rail and bus systems they encounter. They may wonder why so few U.S. cities are as well served by transit or as easy to stroll or bike through. The differences in urban character and lifestyle become more palpable upon their return.

To be sure, such impressions are often derived from visits to large capital cities by tourists, students, and business travelers who have had little opportunity to observe urban life on a regular basis. They may have limited understanding of how transit fits into the daily activities of most urban residents or how patterns of transit use are changing over time. Still, even visitors to many smaller Western European and Canadian cities find transit systems that are both extensive and heavily used, especially as compared with their counterparts in the United States.

Indeed, the data back such common impressions of public transit's omnipresence and popularity abroad. Transit ridership—whether on motor buses or rail (rapid, commuter, and light rail lines)—is consistently higher in Western Europe and Canada than in the United States. On a per capita basis, Western Europeans and Canadians ride transit two to five times more than Americans living in cities of comparable size. Moreover, even those Western European and Canadian cities that are not frequented by tourists—such as Bremen, Germany; Halifax, Canada; and Lyons, France—have higher transit ridership levels than much larger U.S. cities with extensive public transportation systems, such as Chicago, Atlanta, and Philadelphia.

Yet almost in the same breath, returning visitors can be heard bemoaning how much more American the urban landscape of Western Europe is becoming. When venturing outside the traditional city centers, they may have encountered many more fast-food restaurants, supermarkets, office parks, and

shopping malls than in years past. Those who traveled the countryside by motor coach or automobile are apt to complain about the chronic traffic congestion they encountered—not only on the car-crowded thoroughfares outside the largest cities, but also on the narrow and meandering streets of the smallest Western European villages and towns.

The data support such observations as well. Automobile ownership levels have more than tripled in Western Europe during the past three decades, with cars becoming the main mode of personal transport for most Western Europeans. More affluent Western Europeans are living and working in lower-density urban developments and are increasingly reliant on the automobile for their travel needs. Automobile use, however, has not grown as rapidly in Western Europe as automobile ownership, and transit use remains strong as compared with the United States.

A commonly cited reason for this difference is that Western European governments provide significant financial aid to transit operators, coupled with many other transit-supportive policies and practices. For many years, large government subsidies have been accompanied by high taxes on automobiles and motor fuel, a long-standing public commitment to the preservation of historic cities, and concerted efforts to protect open space around cities, fostered by land use policies that emphasize dense and clustered urban and suburban development. Hence, while suburban development has increased in Western Europe, urban areas there remain far more compact overall than those in the United States. Consequently, European suburbs and their cities remain far more transit-oriented than their American peers.

Even in Western Europe and Canada, however, urban form and transit usage often vary widely from city to city, depending on local circumstances. Historical factors are important in these variations, along with the geographic setting and character of the local economy. Older cities that are bounded by bodies of water or hills, and that have few surface corridors as a result, are more likely to rely on transit than cities lacking such physical limits on outward expansion or the addition of more highway capacity. Likewise, urban areas with a service-based economy are more apt to have higher transit patronage than cities with economies oriented around manufacturing and heavy industry. Manufacturing plants, which require more land, are typically dispersed across the urban region. Office buildings, and the many white-collar workers that populate them, are more often clustered. Transit systems are most effective and efficient when serving commuter destinations that are concentrated.

Still, even when considering such localized factors, one cannot help but suspect that broader, more deep-rooted reasons underlie the marked differences in transit usage among Western European and North American cities. Their uniformly higher use of transit suggests that Western European cities and their residents share many experiences and conditions conducive to public transit that are not prevalent in the United States. Likewise, the consistently higher transit ridership in Canadian cities—which are more similar to American than Western European cities—suggests that factors other than local circumstances are at work.

This report therefore takes a wide-ranging look at the circumstances and conditions affecting transit use in Canada and Western Europe, from transportation planning and tax policies to demographic and economic trends. The focus is on Canada and Northern and Western Europe—especially Great Britain, France, Germany, the Netherlands, and Sweden—because they are closest to the United States in affluence, urban development, and political climate and because their policies are often offered as models for application in the United States. Where sufficient data are available for other nearby countries—including Austria, Belgium, Denmark, Norway, and Switzerland—they are examined as well.

More detailed country-by-country and city-by-city comparisons, which were not possible within the scope of this study, would undoubtedly have enhanced our understanding of the factors that differentiate the United States, Canada, and Western Europe with respect to public transit use. Nevertheless, a general review can also provide useful insights about common differences and their causes. To that end, this report

- Describes the differences in public transit use among U.S., Canadian, and Western European cities;
- Identifies those factors, from urban form to automobile usage, that have contributed to these differences; and
- Offers hypotheses about the reasons for these differences—from historical, demographic, and economic conditions to specific public policies, such as automobile taxation and urban land use regulation.

As explained in the preface, no attempt is made to determine whether any of the particular policies discussed could or should be implemented in the United States. Conditions relevant to transit use vary among the countries examined, and there is no guarantee that the conditions that have

helped make policies work in one place are essential and sufficient for them to work in another.

The remainder of the report consists of four chapters. In Chapter 2, international trends in transit ridership, automobile use, and urban development are compared. The chapter begins with a review of historical trends in ridership on buses and urban rail systems, including streetcars, light rail, and rail rapid transit (consisting of underground, surface, and elevated trains).<sup>1</sup> How transit is currently used, funded, and organized in Canada and several Western European countries is described. The chapter ends with a comparison of past and recent trends in North American and Western European urban development and automobility and their effects on public transit.

In Chapter 3, descriptions are given of a number of policies and practices that have been directly supportive of transit in Europe and Canada, enhancing transit quality, reliability, and availability. The discussion then turns to other, broader policies that have been complementary to transit, including high taxes on automobiles and motor fuel. The chapter concludes by comparing the extent to which urban land use and transportation infrastructure are coordinated in Western Europe, Canada, and the United States.

The external factors and conditions that have spurred transit use and the many transit-supportive policies found abroad are examined in Chapter 4. Differences in political institutions, public attitudes, and economic and social trends, among other factors, are discussed.

The main findings of the report are summarized in Chapter 5. Opportunities for applying the successes of Canada and Western Europe in the United States to enhance the use and availability of public transit are indicated.

## **NOTE**

1. Most of the analyses and statistics presented in this report refer to motor buses, light rail (including streetcars), and rapid rail transit, which make up the bulk of public transportation ridership in North America and Western Europe. Data on commuter rail and other transit modes, such as ferries, are more difficult to obtain in a consistent manner but are provided where available.





## Transit Use, Automobility, and Urban Form: Comparative Trends and Patterns

Early in the 20th century, American cities led the world in the introduction and use of many transit technologies. The size and shape of several American cities would be much different today if not for the advent of rapid rail and electric streetcar service that could carry thousands of workers into and out of their centers each day. This vital role continues in some very large U.S. cities. Yet in most American urban areas, a small share of residents and workers use bus and rail transit regularly, and among those who do, many are poor, elderly, or disabled, dependent on public transportation for mobility.<sup>1</sup> At the beginning of the 21st century, all measures indicate that transit is used to a much greater extent in Western Europe, and even Canada.

A number of factors help explain why trends in public transit have unfolded so differently in North America and Europe. To be sure, the scale and timing of urbanization have differed in each region, as have the breadth and pace of suburbanization. Transit tends to work best in compact cities with strong downtowns and central business districts that concentrate activity and minimize travel diffusion. While American central cities have lost thousands of residents and businesses to suburbs, Western European and Canadian cities have retained higher levels of both.

With few exceptions, the cities of Western Europe and Canada remain dominant centers of employment, retailing, and entertainment, providing natural focal points for transit service. Meanwhile, the centers of many older American cities have relinquished much of their economic, political, and cultural dominance, losing residents and businesses even as the urban

regions around them have continued to grow. In many other cases, whole urban regions have emerged and matured without distinguishable centers. Thus the population and employment densities needed to support transit ridership have dissipated in many older American cities, while in many others they were never there to begin with.

Western European and Canadian urban areas have also decentralized and spread out, but on a more modest scale. Indeed, in nearly all industrialized nations, urban areas have grown in population, and income development patterns and economic activity have become less concentrated around a single center. As in the United States, the private automobile has played a major role in decentralization by increasing residential and commercial development of once-remote land around central cities. Whereas automobiles were mass introduced in North America a full generation earlier than in Western Europe, the international gap in car ownership has been shrinking over time. Car ownership levels in much of Western Europe are now similar to those in the United States during the 1960s and 1970s.

As these trends in automobility have taken hold, however, national, regional, and local governments in Western Europe and Canada have taken steps to retain and even increase transit ridership, in part to preserve their city centers and to protect the environment in and around cities. Aided by a host of complementary policies—from high motor vehicle taxes to restrictions on downtown parking and suburban development—transit systems have managed to maintain an important, if not central, role in the transport systems of most cities and entire urban regions. Thus even as automobiles continue to proliferate throughout Western Europe, transit continues to enjoy ridership levels not experienced in the United States in more than 40 years.

## **HISTORICAL DEVELOPMENTS**

The current status of transit in the United States is in marked contrast to the situation much earlier in the century when American cities pioneered new mass transportation technologies. Indeed, it is often forgotten that many new forms of public transportation were first introduced widely in the United States. Beginning with the first successful installation of cable cars in San Francisco during the 1870s and electric rail street lines in Richmond a decade later, the burgeoning American cities of the late 19th century were quick to adopt, and adapt, the latest innovations in urban mobility (Middleton 1987; Pushkarev et al. 1982, 4–5).

## Rise and Decline of American Mass Transit

Unquestionably, the heyday of American transit was during the early electric streetcar era, which began in 1890 and peaked in the early 1920s. Almost overnight, American city dwellers became the most mobile people in the world. By the 1920s they were averaging more than 250 streetcar trips per year (Middleton 1987, 77).

Less expensive and faster to build than the rapid rail systems (underground and elevated) found in many Western European cities—and a few large American ones (New York, Boston, Chicago, and Philadelphia)—the electric streetcar systems were particularly well suited to the many medium-sized and rapidly growing American cities of the early 20th century. Located on most city thoroughfares, as well as on some dedicated ways for interurban connections, the less than 2400 km of electrified traction in 1890 had grown to more than 32 000 km by the century's end (Middleton 1987; McKay 1988, 11).

Transit patronage—the vast majority on electric streetcar—escalated during the next two decades, a period that coincided with tremendous migration into American cities (Pushkarev et al. 1982, 4–5). Detroit's population, for instance, grew from less than 300,000 to more than 1 million in the span of only two decades, from 1900 to 1920. The population of Los Angeles grew from 100,000 to 600,000 during the same period. Even established cities such as Boston, Baltimore, Chicago, and Philadelphia were growing at a fast pace as a result of migrants from the countryside and abroad (Warner 1978, 5–14). In 1880 there were only 20 U.S. cities with populations exceeding 100,000; by 1910 there were more than 50 (Middleton 1987, 77). This boom in urban growth created an intense demand for personal mobility, and the private streetcar companies could barely lay track and erect trolley wires fast enough to meet it (Foster 1981; McKay 1988, 5).

From the start, American investors grasped the effect this new transportation technology would have on land values. Real estate investors, as well as electric power companies, provided a large infusion of funds to finance the new rolling stock, track, and conductor lines that would extend out to the city fringes (McKay 1976, 71; Jacobson and Tarr 1996, 13; Middleton 1987). Eager to introduce this new transportation technology widely, American cities opened their streets to multiple transit entrepreneurs, each competing for passengers and hoping to profit from the residential and commercial development their services would spur. As a result, many cities at the turn of

the century were served by a dozen or more streetcar companies,<sup>2</sup> and by 1920 these mostly private entities had paid for the construction of more than 70 000 km of electric track.

The widespread introduction of electric traction coincided with the advent of many other technologies and networks—from elevators and structural steel to public sewers, electricity, air conditioning, and telephones. These transportation, communications, and other technologies would quickly reshape the scale, scope, and even location of urban America (Tarr and Dupuy 1988; Smith 1984). By channeling new development within their corridors, the electric streetcar lines enabled cities to expand outward to absorb the thousands of new residents they were adding each year without the kind of overcrowding experienced at the beginning of the industrial age (Smerk 1992, 14). Residential growth congregated along the mass transportation lines because riders still needed to reach the service on foot (Smith 1984).

At the same time, the many transit lines radiating out 15 km or more from downtowns spurred intense commercial development of city centers. Traveling 10 to 15 km/h, the electric streetcars could bring in thousands of workers to fill office buildings growing taller with the aid of elevators and steel structures. Thus even as urban areas were spreading out, the cores of many central cities were becoming increasingly important centers of employment and economic activity. Indeed, few American cities during the first quarter of the 20th century would have been able to grow as large or as rapidly without the early help of electric rail (Smerk 1992; Saltzman 1992). In the largest American cities, commuter railroads and rapid rail systems contributed even more to this pattern of intense downtown development and residential decentralization; in most U.S. cities, however, the electric streetcar played this role.

By the mid-1920s, the electric streetcar era in the United States had peaked and was beginning to decline (Levinson 1996, 67). Real estate speculators had long since withdrawn their financial support from the industry, attracted by the more lucrative opportunities created by the automobile (Foster 1981; Altshuler et al. 1979, 396–397). Many of the private streetcar companies that had invested heavily in traction at the beginning of the century had been failing since before World War I and were being purchased at a discount and consolidated by large electric utilities and holding companies (Middleton 1987, 78–79; Hilton 1983, 38–39). Saddled with growing debt and subject to burdensome public fare and service regulations, few private companies could offer the return on capital required to expand their services

(Jones 1985). Private automobile jitney operators were attracting riders from the highest-traffic streetcar routes (Middleton 1987, 157–158; Hilton 1983, 40–43). In many small and medium-sized cities throughout the United States, patronage had turned sharply downward, many tracks were being paved over, and streetcars were being replaced with more flexible, free-wheeled trolley coaches and motor buses (APTA 1995, 48; Hilton 1983, 40–43).

In the decade after World War I, the automobile was transformed from a recreational vehicle for the elite and hobbyists into the nation's most popular mode of transportation. Henry Ford's Model T and the affordable automobile revolution it spurred were welcomed enthusiastically by many cities dissatisfied with what they perceived as increasingly unresponsive and obsolete electric rail services. By the mid-1920s, private and for-hire automobiles were nearly everywhere, even in the most transit-oriented, large American cities. In New York City, more than 600,000 automobiles had been registered by 1927—equivalent to 1 car for every 12 residents (Schrag 2000, 58). Cars were owned by 1 in 8 residents in Boston and Chicago and by every third or fourth resident in Detroit, Seattle, and Los Angeles (Foster 1981, 59).

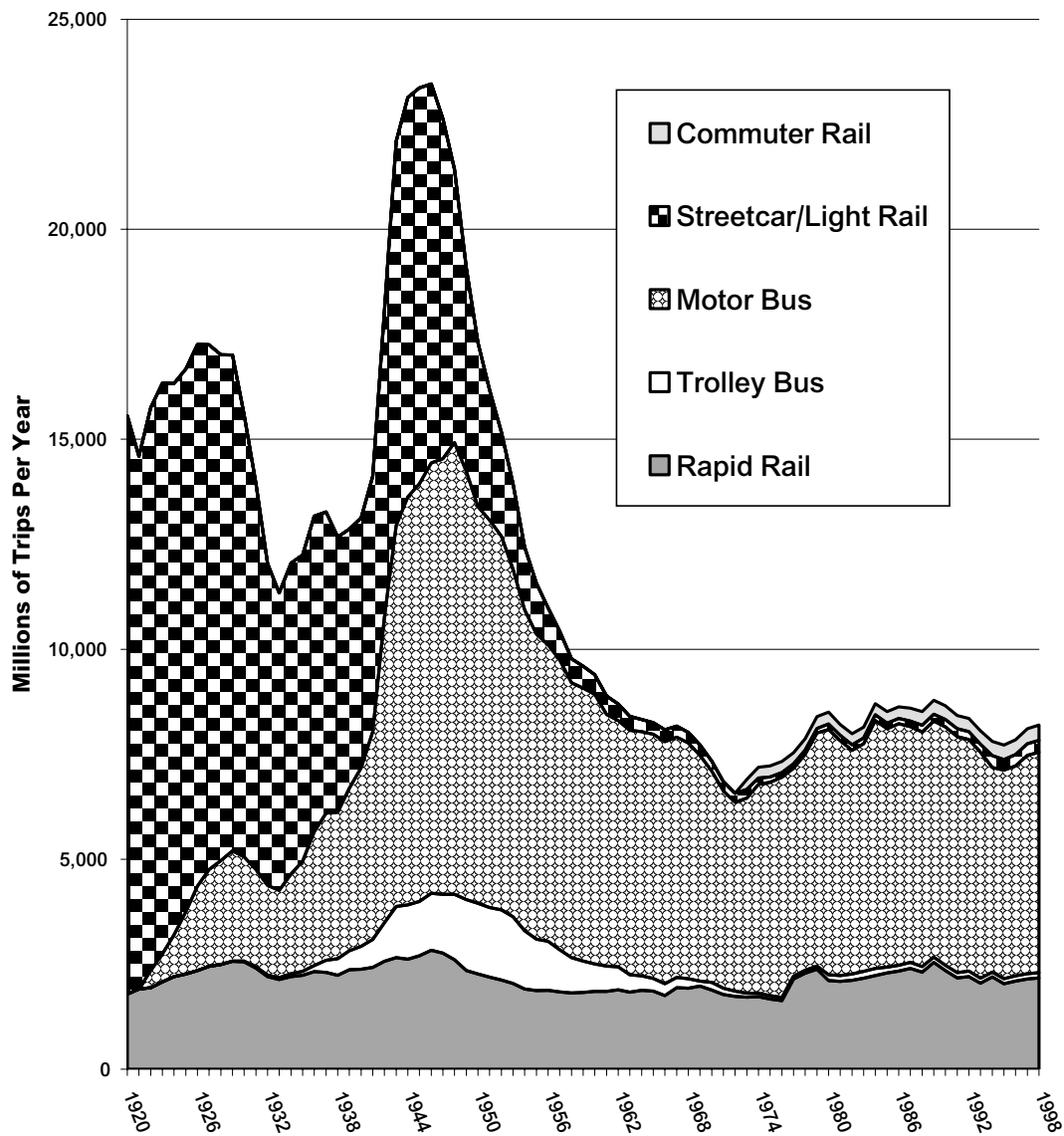
To accommodate the new motor vehicles, American cities began widening their streets, paving them with asphalt, and introducing traffic control devices. Some even began planning the networks of urban freeways that would ultimately be built with the help of state and federal aid. Having only recently invested in the world's largest subway system, even New York City was in the midst of a building boom of new highway bridges, tunnels, and parkways by the 1930s. Although few cities in the midst of the Great Depression could afford to build modern new freeways, automobiles had already become the main mode of travel for most residents of the new and booming cities of the South and West. Miami, Houston, Phoenix, and many other cities that were only small towns when electric streetcars were introduced 40 years earlier were being shaped almost from scratch by automobiles and the highways that accommodated them.

Though still rare at the time in Western Europe, more than 25 million automobiles were registered in the United States by 1935 (AAMA 1997, 8). One in two American households owned a car, and ownership rates were especially high in small and medium-sized cities, where transit ridership was fast declining (Jones 1985; AAMA 1993, 24). Electric streetcar ridership had dropped precipitously in these cities through the 1920s, eclipsed not only by the automobile but also by the more efficient and flexible motor

bus (Smerk 1992, 18; Levinson 1996; Saltzman 1992, 26). By the onset of World War II, disinvestment in electric streetcars was well under way, with half the nation's original electric streetcar network having been taken out of service (Pushkarev et al. 1982).

Buttressed by demand from World War II, public transportation enjoyed a respite during the early 1940s. By decade's end, however, the downward trend in ridership had resumed at an accelerated pace (see Figure 2-1). Operations were increasingly hindered by downtown traffic, and in the eyes of many motorists and city officials, the lumbering streetcars and rough trolley tracks were a major source of congestion (Middleton 1987, 168; Vuchic 1999, 9–10). Most cities continued to charge private streetcar companies for the street space they used and for a portion of street maintenance costs. On streetcar lines with declining patronage, passenger revenues could not cover these costs, hastening abandonment. Domestic production of streetcars ended in 1951, by which time less than 16 000 km of electric streetcar track remained in service (Middleton 1987, 169). During the next decade, another 10 000 km was abandoned (Pushkarev et al. 1982, 6–7). Most street rails were paved over, while many interurban rail lines were dismantled and rights-of-way sold or converted to highways. By the 1960s, buses had become the main mode of public transportation, except in a handful of American cities that had retained limited streetcar service (Boston, New Orleans, Philadelphia, Pittsburgh, and San Francisco) or more extensive rapid rail systems (Middleton 1987, 170; Saltzman 1992, 31; Levinson 1996, 72–73). Most of the remaining rail lines were separated from automobile traffic, operating in tunnels, on elevated track, or on exclusive rights-of-way.

Though too late to save most streetcar lines, federal aid introduced in the mid-1960s enabled many state and local governments to purchase private bus companies and consolidate their operations within metropolitan transit authorities. Nevertheless, patronage continued to decline into the 1970s. By this time, suburban expansion, declining central cities, and the withdrawal of private capital from the transit industry had been under way for several decades. Increasingly dispersed urban populations, retail services, and other businesses, often accompanied by the desertion of many downtown commercial areas, made large concentrations of riders difficult to find. Inner-city crime, racial tensions, and concerns about the quality of city schools further undermined the traditional base of city riders (Meyer and Gómez-Ibáñez 1981, 41, 223).



Note: Data on commuter rail ridership are not available for the period before 1973.

FIGURE 2-1 U.S. trends in annual passenger trips by transit mode, 1920–1998 (APTA, selected years, 1977–2000).

Though women were entering the labor force in record numbers and many maturing baby boomers were reaching adulthood, few would choose transit over automobiles. Indeed, the proliferation of female workers and two-income households during the 1970s enhanced the appeal of office buildings located closer to suburban residential communities accessible almost exclusively by the automobile (Garreau 1991, 112).

Growing federal infusions of funds for new transit infrastructure and equipment, coupled with other government aid to reduce fares, helped stem the absolute decline in ridership during the mid-1970s. Ridership has increased only slightly since, however, and transit's share of all trips has continued to drop in most urban areas, even where government aid has grown. Having accounted for about 18 percent of urban travel in the United States as late as 1950, transit's share had declined to less than 3 percent by 1975 (Pushkarev and Zupan 1977; Altshuler et al. 1979, 21–22). Today it is at about 2 percent.

### **Relative Stability in Western Europe and Canada**

Compared with American cities, the more established Western European cities at the turn of the century introduced electric streetcars at a slower pace and on a smaller scale.<sup>3</sup> Many Western European cities had strictures against land speculation that made private investment in electric traction less appealing than in the United States (Jacobson and Tarr 1996, 13). Streetcar operators often held long-term, exclusive citywide franchises for transit services and therefore were not compelled by competition to invest widely in the new electric technology. Even by the 1890s, transit operators in many Western European cities were heavily regulated or owned outright by local governments. These arrangements provided little incentive and opportunity for private investment in the new electric streetcar technology (McKay 1988, 6; McKay 1976, 191).

Many large Western European cities did invest heavily in underground and elevated rapid rail systems at the turn of the century, and an extensive network of passenger and commuter railroads was in place by this time. Acceptance of electric streetcars was slower, however. The task of planning and installing the lines was more difficult on the narrow and meandering city streets of Western Europe than on the newer, wider, and straighter streets found in most American cities (McKay 1988, 8–9; McShane 1994). Western Europeans in small and medium-sized cities were more reluctant to





Historic plaza of Amagertov in Copenhagen. (© UITP.  
Reprinted with permission from *Public Transport International*,  
No. 5, 1999, p. 43.)

permit the conversion of their public squares and “walking” streets into traffic ways for streetcars, while officials in large cities spent much time trying to blend the new tracks and electric wires into their stately boulevards and historic plazas (McKay 1976, 84). They also took seriously the potential hazards of the overhead power lines and carefully studied alternative means of distributing power safely and in an aesthetically acceptable manner (McKay 1976, 84).<sup>4</sup> Thus by the turn of the century, electric streetcar use was two to three times higher in the United States and was still higher some 20 years later (McKay 1988; McShane 1988).

By the 1920s, however, the pattern had changed. Transit ridership had risen in Western Europe and was still heading upward as patronage was flattening and about to decline in the United States. The need to attract and retain private capital—a daunting challenge for rail operators in the United States—was less of a factor in Western Europe. One reason is that Western European governments had already become a primary source of transit funding. Although private transit companies were common in Western Europe at first, competition among operators was generally eschewed in favor of publicly owned or subsidized regional franchises. Municipal ownership, tried first in Glasgow in 1894,<sup>5</sup> was the norm even before World War I, by which time publicly owned transit systems in Western Europe carried four times more passengers than private operators (McKay 1988; Jacobson and Tarr 1996).

Many Western European transit systems also suffered losses in ridership even before World War II. As in the United States, motor buses replaced service on thousands of kilometers of lightly traveled streetcar lines beginning in the 1930s. In Sweden, France, and Great Britain especially, many entire systems were replaced with buses. Western European bus and rail transit systems, however, did not encounter the same degree of competition from private automobiles after World War II. Hence a number of Western European cities (e.g., Nantes) were successful in reacquiring these old streetcar rights-of-way for modern light rail systems.

Indeed, by the time automobiles arrived en masse in Western Europe during the 1960s, environmental concerns had made road building far more difficult and costly than in the pre- and early postwar years. Preservation of the transit infrastructure that remained in place became a priority for Western European governments as the addition of new infrastructure grew increasingly costly and complicated to achieve.



Luxembourg's tram system in the 1950s. (© UITP. Reprinted with permission from *Public Transport International*, No. 4, 1998, A. Groff, *Tramways in Luxembourg: The End of an Era and a New Beginning*, p. 22.)

Much as in the United States, transit systems in Canada suffered sharp declines in patronage from the 1950s through the early 1970s (see Table 2-1). Since then, however, Canadian transit systems have experienced gains in ridership as measured on a per capita basis. Such a sharp reversal of fortune—though not accompanied by increased transit mode share—eluded transit agencies in the United States.

## **TRANSIT USE AND AVAILABILITY TODAY**

By all measures, public transit use today remains several times higher in Western Europe and Canada than in the United States. Transit typically accounts for 10 to 20 percent of urban trips in Western Europe, but only 2 percent in the United States (see Table 2-2). Transit's mode share is highest in Switzerland, where it accounts for about 1 in 5 urban trips and is used about half as often as automobiles. Even in the Netherlands, where biking is popular, transit is used for 7 percent of trips (Pucher and Lefevre 1996, 16). Canadians also use transit about 10 percent of the time, or about once for every 8 urban trips by car. By comparison, about 45 trips are made by automobile for each trip made by transit in the United States.

Of course, transit ridership figures vary from place to place, both within the United States and across Western Europe and Canada. Ridership in New York is exceptionally high by American standards. The more than 16 million people living and working in greater New York average more than 140 transit rides per year.<sup>6</sup> Though transit usage in New York compares favorably with that in many large Western European cities, few other large American cities have ridership levels even half that of greater New York. Only five other urban areas—metropolitan Boston, Chicago, San Francisco, Philadelphia, and Washington (D.C.)—have annual transit ridership levels exceeding 75 trips per capita. Consequently, a small number of large urban areas account for the majority of transit usage in the United States. These six cities generate more than 65 percent of the country's transit rides even though they account for only 20 percent of its urban population. They are also unusual by American standards since they have retained strong downtowns and extensive urban rail and bus systems that are used by both transit-dependent and discretionary riders.<sup>7</sup> Arguably, these city centers could not function as they do now without the rapid transit systems that carry thousands of workers each business day. However, residents of most urban areas in the United States average between

**Table 2-1 Total Annual Public Transit Ridership in Canada and the United States, 1950–1995 [Pucher 1994 (for pre-1980 Canadian data); APTA 2000]**

Year	Canada			United States		
	Total Trips (millions)	Population (millions)	Trips/Capita <sup>a</sup>	Total Trips <sup>b</sup> (millions)	Population (millions)	Trips/Capita <sup>a</sup>
1950	1,396	14	100	17,301	150	115
1960	973	17	57	9,395	178	53
1970	980	22	45	7,332	203	36
1980	1,315	25	53	8,567	225	38
1990	1,532	27	57	8,800	249	35
1997	1,379	29	48	8,374	267	31

<sup>a</sup> Trips per capita is calculated by including the urban population living outside official transit service areas.

<sup>b</sup> After 1977, transit ridership reported in the United States consists of “unlinked” trips, or boardings, whereby passengers transferring between transit vehicles or from one mode to another are counted as having made more than one trip. The American Public Transportation Association estimates that this reporting change has raised passenger trip counts by about 20 percent in the United States since 1977. Canadians have continued to report “linked” trips. A more uniform reporting measure would therefore show an even larger difference in transit ridership between the two countries.

**Table 2-2 Travel Mode Split for Urban Trips,  
Selected Countries, 1995 (Pucher 1999)**

Country	Percent of Trips by Each Mode, All Purposes				Automobile Trips per Transit Trip
	Automobile	Transit	Bicycle	Walk/Other	
United States	89	2	1	7	44.5
Canada	76	10	2	12	7.6
Denmark	42	14	20	24	3.0
Great Britain	65	14	4	17	4.6
France	56	13	5	25	4.5
Germany	49	16	12	23	3.1
Netherlands	45	7	28	20	6.4
Sweden	46	11	10	33	4.2
Switzerland	46	20	9	26	2.3

*Note: Modal split distributions for different countries are not fully comparable because of differences in trip definitions, survey methodologies, and urban area boundaries. Moreover, in compiling distributions for a few countries without official national surveys, it was necessary to piece together information from various sources and adjust for trip types surveyed and geographic coverage. The percent distributions are intended to show the approximate differences among countries and should not be used for exact comparisons. The "other" category includes motorcycles, school buses, and most forms of paratransit, although even this varies from country to country and could not be fully standardized.*

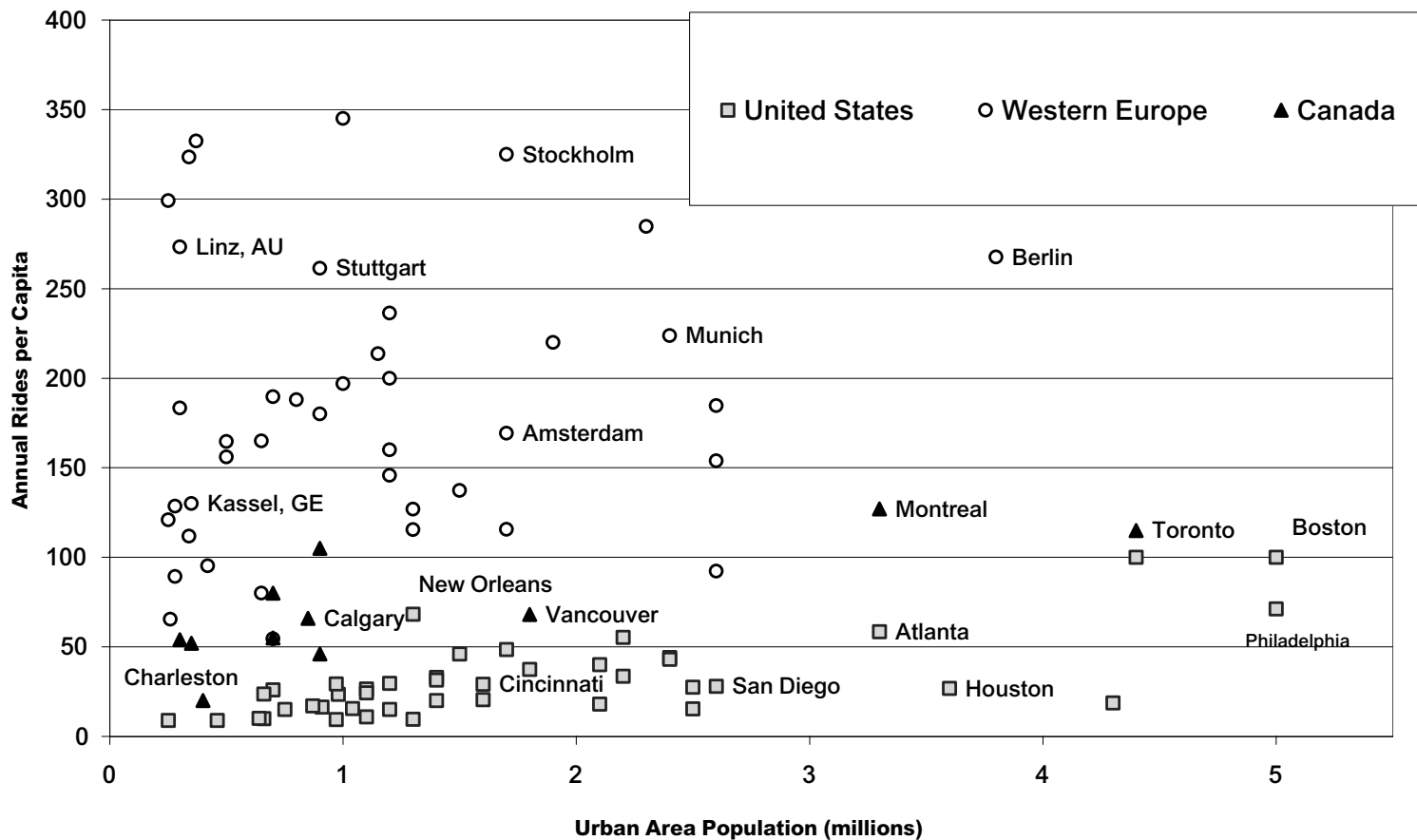
20 and 60 transit rides per year. In most cities, transit has a relatively small—often niche—role in the overall transportation system.

In contrast, it is nearly impossible to find a Western European city of any size that averages fewer than 100 transit rides per capita each year. Figure 2-2 shows a comparison of annual ridership levels in a sample of 43 American, 10 Canadian, and 42 Western European cities with populations in their urbanized areas ranging from 250,000 to 5 million.<sup>8</sup> Urban areas in that population range were sampled because their large numbers allow for meaningful comparisons across several countries. Ridership levels in Western Europe are consistently higher than in the United States by a factor of about five, though with some variability among cities. Even the smaller Western European cities (population of less than 50,000) have ridership levels much higher than those of large American cities.

Ridership levels in Canadian cities are roughly double those of American cities. Toronto and Montreal average well over 100 rides per capita. Whereas transit usage is lower in Western Canadian cities, it is still higher than in most American cities of comparable size and age. Calgary and Winnipeg, for instance, average about three times as many rides per capita (65 to 80 annually) as Oklahoma City, Omaha, and Salt Lake City. Ridership levels in these Canadian cities are comparable with those in much larger American cities with extensive rail transit systems, such as Atlanta and Philadelphia. Whereas fewer than 5 percent of urban Americans use transit for work trips, double-digit transit mode shares for commuters are common in Canadian urban areas, both large and small (see Table 2-3).

### **Service Availability and Ridership**

Transit operators in small and medium-sized U.S. cities tend to have low ridership levels, and very few riders are middle-income commuters. Service in these communities is often skeletal and infrequent as compared with Western Europe. Figure 2-3 shows a comparison of annual transit vehicle-hours on a per capita basis in urbanized areas of Western Europe and the United States. The comparison indicates consistently higher levels of service in the Western European cities, irrespective of city size. Even the smallest Western European cities have more transit service than many larger American cities.



Note: Per capita ridership levels calculated by dividing total (unlinked) transit rides by total population of urbanized area (including population outside official transit service areas). Data are for years between 1990 and 1997. Urban areas selected based on data availability.

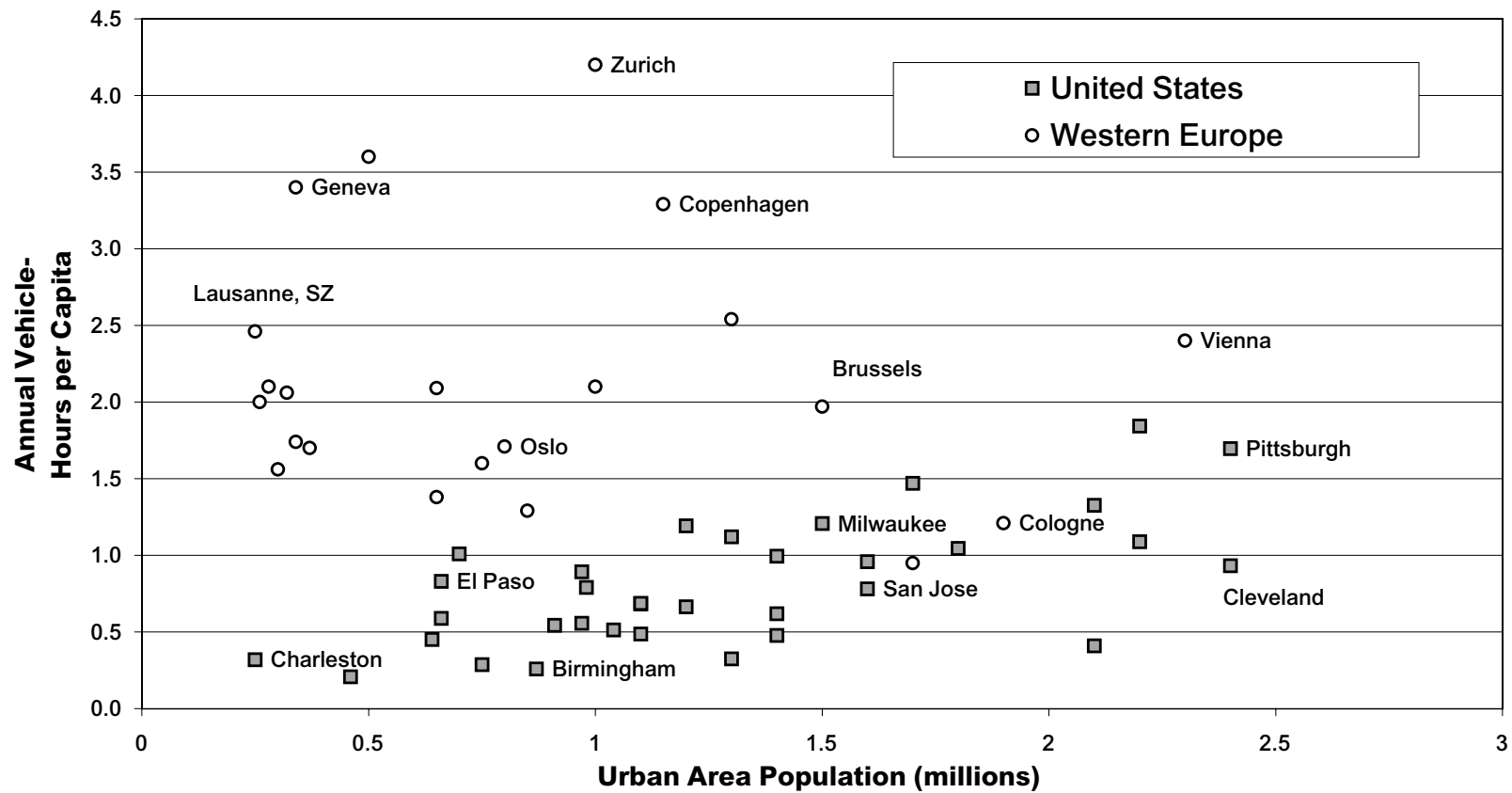
FIGURE 2-2 Annual transit ridership levels for selected U.S., Canadian, and Western European urban areas (UITP 1997; Jane's Information Group 1997; Bureau of the Census 1996; NUREC 1994; 1996 data from National Transit Data Base).



Table 2-3 Mode of Travel to Work for Largest Urbanized Areas in Canada, 1996

Urbanized Area	Urbanized Area Population	Mode of Travel to Work (Percent of Trips)				Median Commute Distance (km)
		Car	Transit	Walk	Other	
Toronto	4,263,000	72	22	5	1	9.3
Montreal	3,326,000	73	20	6	2	8.2
Vancouver	1,831,000	78	14	6	3	7.7
Ottawa-Hull	1,010,000	73	17	7	3	7.8
Edmonton	862,000	84	9	5	2	7.6
Calgary	821,000	80	13	5	2	7.5
Quebec	672,000	82	9	7	1	6.8
Winnipeg	667,000	77	14	6	2	6.1
Hamilton	624,000	85	8	5	1	7.4
London	398,000	85	6	7	2	5.4
Kitchener	383,000	89	4	6	2	5.3
St. Catherines–Niagara	372,000	91	2	5	2	5.3
Halifax	332,000	77	11	10	2	5.2
Victoria	304,000	73	10	10	6	4.7
Windsor	278,000	89	3	5	2	5.9
All	17,864,645	77	15	6	2	7.4

Source: Statistics Canada ([www.statcan.ca](http://www.statcan.ca)).



Note: Per capita service hours calculated by dividing total vehicle-hours of service by total population of urbanized area (including population outside official transit service areas). Data are for years between 1990 and 1997. Urban areas selected based on data availability. Comparable data not available for Canadian urban areas.

FIGURE 2-3 Annual transit vehicle-hours of service per capita for selected U.S. and Western European urban areas (UITP 1997; Jane's Information Group 1997; Bureau of the Census 1996; NUREC 1994; 1996 data from National Transit Data Base).

In general, per capita transit use is lowest in those cities in which transit has a minor role in serving commuters. These systems concentrate on serving the urban poor; the elderly; and other transit-dependent travelers, such as students, with limited access to cars. About one-quarter of transit riders are from households with very low incomes (under \$15,000 in 1995) (APTA 1998). In cities where suburban commuters rarely use transit, the large majority of riders, usually more than 70 percent, are from low-income households (APTA 1998). For the United States as a whole, low-income households use transit for 5 to 10 percent of their trips—two-thirds of the time during off-peak periods (Pucher et al. 1998). As a group, more affluent urban residents (with household incomes exceeding \$50,000 per year) rely on transit for only about 1 in 100 trips—mostly during peak commuting times, and often by rail and express bus between the city center and suburban locations.

Though Western Europeans and Canadians also use transit predominantly for work trips, the transit market tends to be less segmented. A broader spectrum of the population uses transit for a wider variety of purposes. Still, Western European transit systems are finding it increasingly difficult to compete with automobiles for nonwork travel, such as shopping and recreation (Korver et al. 1993; Stern and Tretvik 1993). Even in the more compact Western European cities, automobiles offer tremendous flexibility and convenience for such transportation needs.

## **Funding**

State and local jurisdictions provide most operating subsidies in the United States, whereas the federal government contributes mainly to capital equipment and infrastructure (except in small communities, where federal aid covers a large share of operating costs) (see Table 2-4). Public subsidies finance most transit systems in Western Europe except in Great Britain. As in the United States, Western European governments fund nearly all capital requirements. However, funding responsibilities vary by country: in some cases national and regional governments and in others local governments have the main responsibility. In Canada, the provinces have the main responsibility for providing funding aid for transit operations and capital needs.

Revenues from passenger fares cover more than half of the operating costs of most Western European transit systems, which is a higher share

**Table 2-4 Sources of Operating Revenue for U.S. Transit Agencies  
by Size of Urbanized Area, 1996**

Population Size of Urbanized Area	Source of Operating Revenue (%)					
	Passenger Fares	Other Commercial Revenue	Federal Aid	State Aid	Local Aid	Other Dedicated Aid
Under 200,000	21	6	18	24	24	7
200,000 to 1 million	22	6	10	19	27	16
More than 1 million	40	7	3	21	21	8
National average	38	7	4	21	22	8

*Source: 1996 data from National Transit Data Base, Federal Transit Administration.*

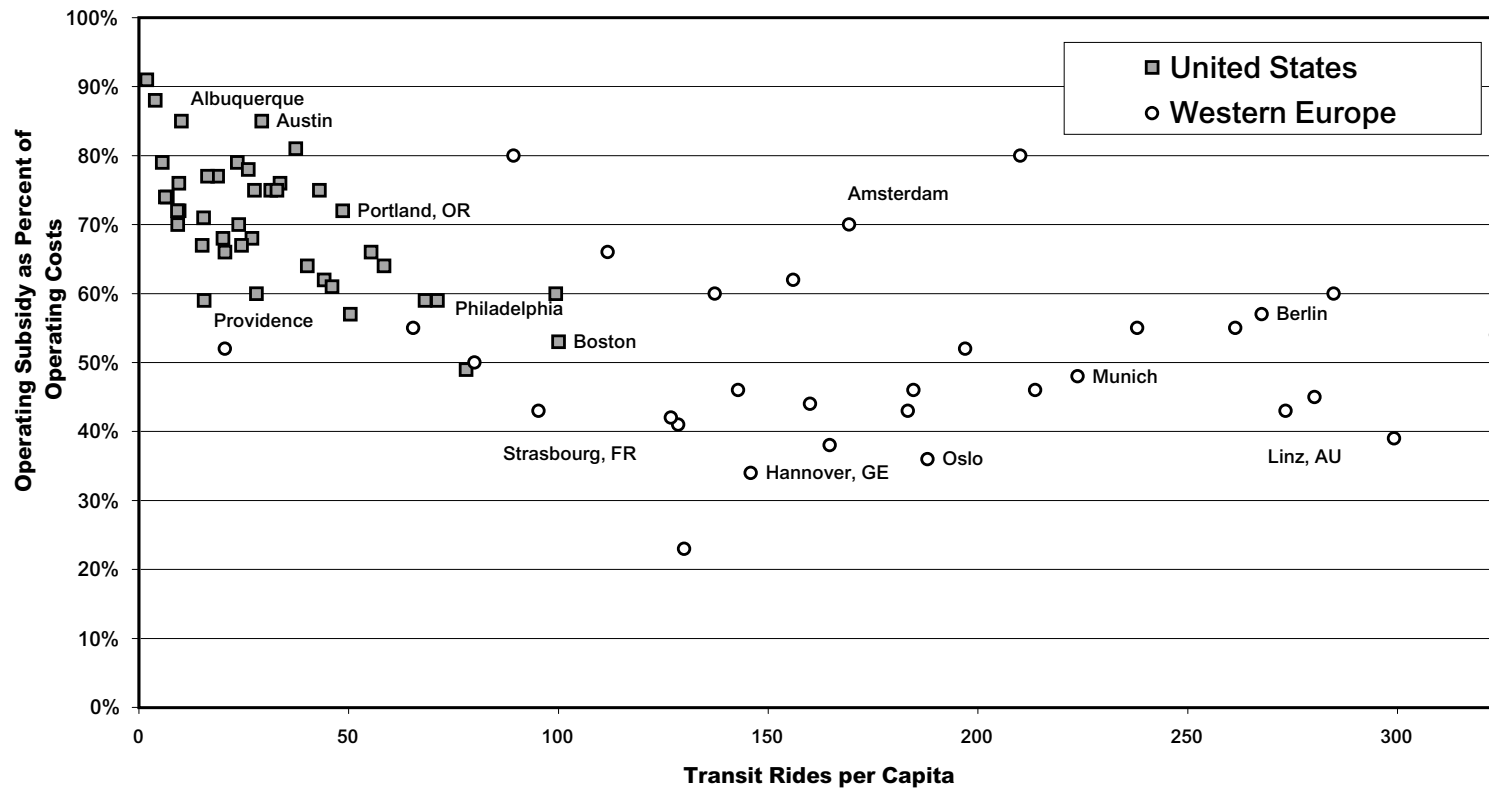
than for most U.S. systems (see Figure 2-4).<sup>9</sup> It is important to recognize, however, that U.S. transit systems often must provide service in areas with low employment and population densities, in which there are few, if any, significant concentrations of potential riders. Even large public subsidies cannot compensate for the operating inefficiencies inherent in serving such light transit markets. For the most part, Western European transit operators serve areas with the demographic potential for significant patronage. This fundamental difference in market characteristics reveals the importance of examining factors other than transit funding levels when considering the reasons for lower ridership in the United States.

## **TRANSIT AND URBAN FORM**

In general, as urban employment and residential densities increase, so does transit use. More than 20 years ago, Pushkarev and Zupan (1977) estimated that density explains nearly 60 percent of the variations observed in transit ridership. They found that strong central business districts and high concentrations of employment near transit lines, especially rail lines, are especially critical factors in American cities. With regard to residential densities, they found that about seven dwellings per acre (or three per hectare) are required to maintain transit's mode share above 5 percent. These empirically derived figures remain oft-cited rules of thumb for transit planning.

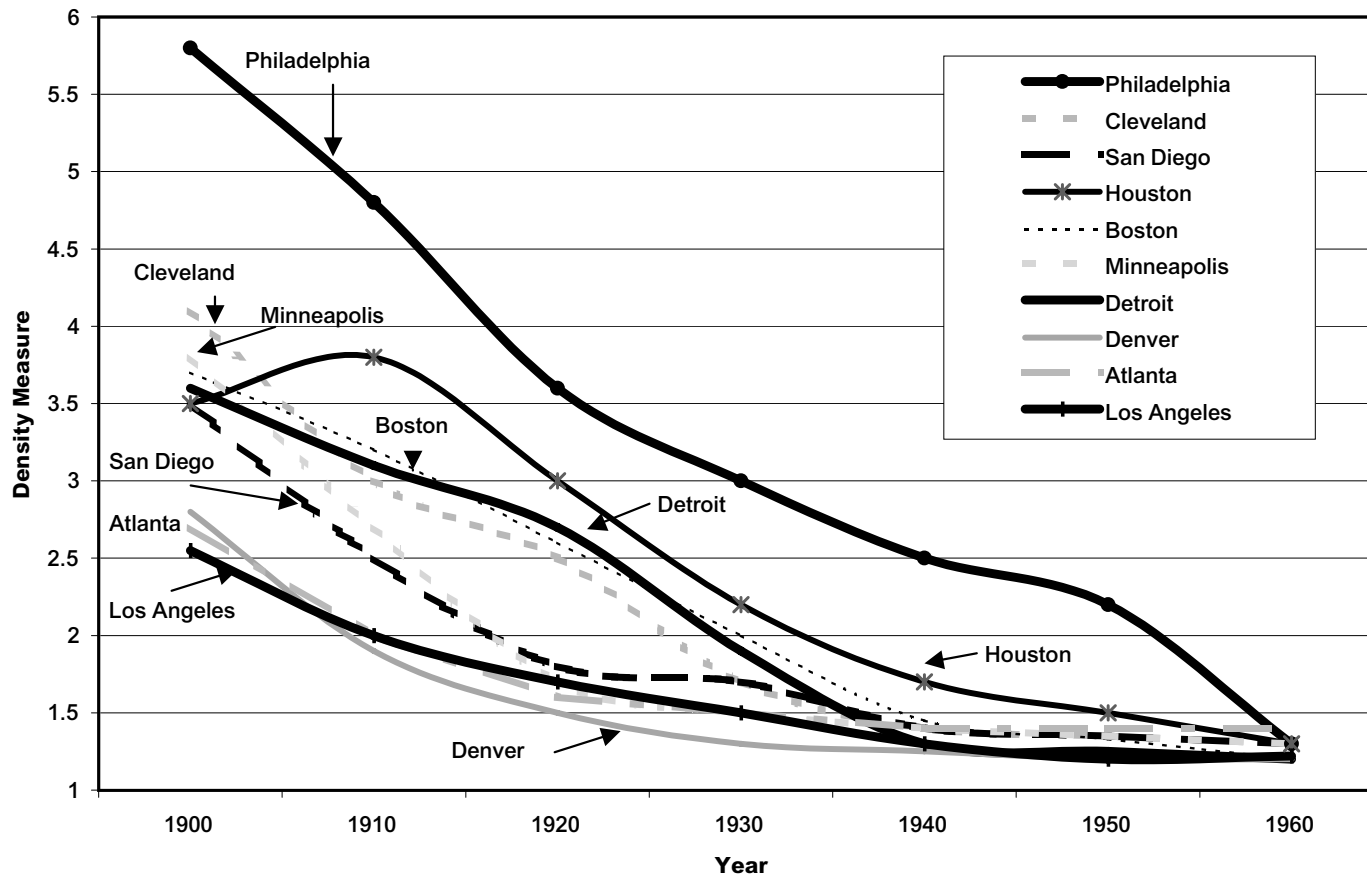
The importance of high population and employment densities for transit operations has been recognized for decades. This relationship had become evident by the 1950s when declining urban densities and transit ridership were coincidental in many older American cities (Levinson and Wynn 1963; Meyer et al. 1965). Meanwhile, many newer American cities were maturing without ever having attained the high densities traditionally needed for successful transit services.

As urban historians and geographers often point out, however, declining urban population and employment densities are not a post-World War II phenomenon, but a long-term trend observable in the United States for more than a century. Even earlier evidence of urban household decentralization can be found. The "bedroom" communities that sprang up along Boston's commuter railroads in the mid-1800s and Manhattan workers commuting by steam ferry from "rural" Brooklyn two decades before are often cited as the beginnings of U.S. suburbanization. Figure 2-5 shows declining densities in



Note: Per capita subsidies calculated by dividing total operating subsidies by total population of urbanized area (including population outside official transit service areas). Data are for 1990–1997. Urban areas selected randomly, but influenced by data availability.

FIGURE 2-4 Public operating subsidies and transit ridership levels for selected U.S. and Western European urban areas (UITP 1997; Jane's Information Group 1997; Bureau of the Census 1996; NUREC 1994; 1996 data from National Transit Data Base).



Note: Density is measured as the reciprocal of the share of new dwellings that are single-family detached (e.g., 2 = 50 percent share).

FIGURE 2-5 Historical trends in the density of new residential development in selected U.S. urban areas, 1900–1960 (Pickrell 1999, 413).

new residential development in several large American cities since at least the beginning of the 20th century.

To be sure, trends toward household decentralization and dispersal in urban areas have been observed in other industrialized countries for many decades;<sup>10</sup> however, U.S. urban areas have spread out farther and faster than their counterparts elsewhere. For nearly a half century, the American suburbs, not the central cities, have accommodated nearly all the country's urban population growth. Retailers, then other businesses, soon followed households outward. In 1950, about 60 percent of urban residents and 70 percent of jobs were located in central cities; by 1990, these figures had declined to 37 and 45 percent, respectively (Mieszkowski and Mills 1993). Over a 40-year period, the population of most central cities fell—despite 3 percent annual growth in the country's urban population overall (Pisarski 1996, 8–18).<sup>11</sup> This pattern of decentralization has undermined many transit systems long configured to serve people working or living in central cities.

As shown in Figure 2-6, net migration has remained negative in U.S. central cities in recent years, even though metropolitan areas as a whole have gained population. Moreover, many of the fastest-growing cities in the United States today—from Phoenix to Tampa—have emerged with no dominant cores, and most can be described as multicentered and suburban in character. Even urbanized areas that have retained strong centers, such as Chicago, Boston, and Washington (D.C.), have become encircled by low-density suburbs and satellite activity centers situated far outside the traditional downtown. Washington lost more than 70,000 residents from 1980 to 1997, while its outer suburbs (counties farther than 30 km from the center) gained more than 400,000. Meanwhile, many suburbs have attracted commercial development, making the central cities even less dominant as loci of employment and further diffusing travel. For instance, the city of Atlanta's share of jobs in the urban area fell from 40 to 24 percent from 1980 to 1995 (Katz and Bradley 1999).

Whereas much of the suburban office floor space in the United States is clustered in satellite centers, or "edge cities," a larger share is dispersed throughout the expanding suburbs. According to Lang (2000), more than 35 percent of office space in the 13 largest U.S. metropolitan areas is in solitary (unclustered, low-rise) suburban office buildings, compared with about 43 percent in central city business districts and 20 percent in suburban satellite centers (see Table 2-5). In 1999, New York and Chicago were the only



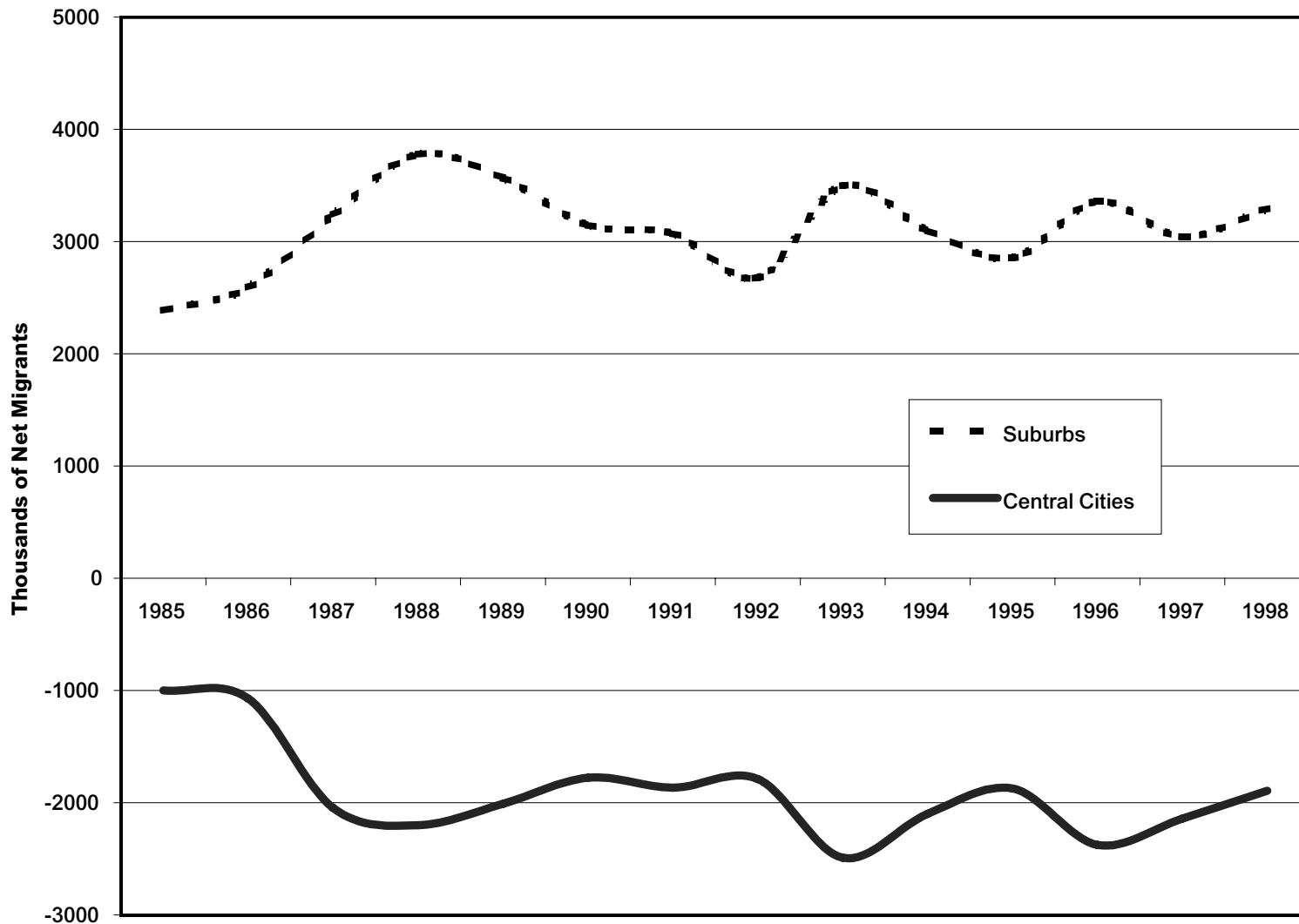


FIGURE 2-6 Net immigration into U.S. central cities and suburbs, 1985–1998. (Source: J. D. Kasarda, unpublished analyses of Bureau of the Census Current Population Survey, Table A-3, [www.census.gov](http://www.census.gov).)

**Table 2-5 Office Space Locations in 13 Largest Urban Areas of the United States, 1999 (Lang 2000)**

Urban Area	Percentage of Total Urban Area Office Space		
	Central City Primary and Secondary Downtowns	Satellite Office Clusters in Suburbs	Other Suburban Locations
Chicago	54	20	26
New York	64	6	30
Boston	42	19	39
Washington	42	27	32
Denver	34	29	36
Los Angeles	38	25	37
San Francisco	43	14	43
Dallas	26	40	35
Houston	23	38	39
Atlanta	34	25	41
Detroit	21	40	39
Philadelphia	37	9	54
Miami	18	17	66
Average	43	20	37

large urban areas where a majority of the office space was located in the central city's downtown areas.

The decentralization of both businesses and households has reduced the number of residents and workers located within the service boundaries of major public transit systems. As an example, the Washington Metropolitan Area Transit Authority estimates that its system covers about 73 percent of the 4.4 million people in greater Washington, D.C. More than half (39 of 76) of the stations in its rapid rail system—which was planned in the late 1960s—are located within the District of Columbia. When construction began on this system in 1970, 53 percent of the jobs and 26 percent of the residents in greater Washington were located in the District of Columbia; today these shares have fallen to 36 and 13 percent, respectively.<sup>12</sup>

Although Western European and Canadian cities have not been immune to the forces of decentralization, they have been able to maintain

more dominant central cities and urban cores.<sup>13</sup> Many retain appealing residential neighborhoods in central areas, as well as functioning commercial districts that attract a large portion of metropolitan workers, shoppers, and others who use transit to get there. To illustrate the differences in urban form, Table 2-6 shows the population densities in 10 American and 10 Western European cities with urban areawide populations ranging from about 1 million to 2 million. The data presented in the table show—as do the accompanying maps in Figure 2-7—that the American urban areas typically cover more land than their Western European counterparts. For the American group, the median urbanized land area is more than 1600 km<sup>2</sup>, whereas the Western European median is less than 1000 km<sup>2</sup> (and only two urban areas exceed 1600 km<sup>2</sup>).

The Western European central cities also contain a larger share of the urban population—most containing half or more, compared with a median of less than one-third for the U.S. sample. The median density for the Western European central cities is about 3,400 people per square kilometer, compared with about 2,400 for the American cities. The average for the Western European urban areas is about 0.77 km<sup>2</sup> per 1,000 people, whereas the average for the American urban areas is about 0.95 km<sup>2</sup> (see Figure 2-8). Moreover, what this aggregate data masks is the tendency for Western European suburban populations to be densely clustered, as opposed to the more dispersed suburban development patterns found in the United States.<sup>14</sup>

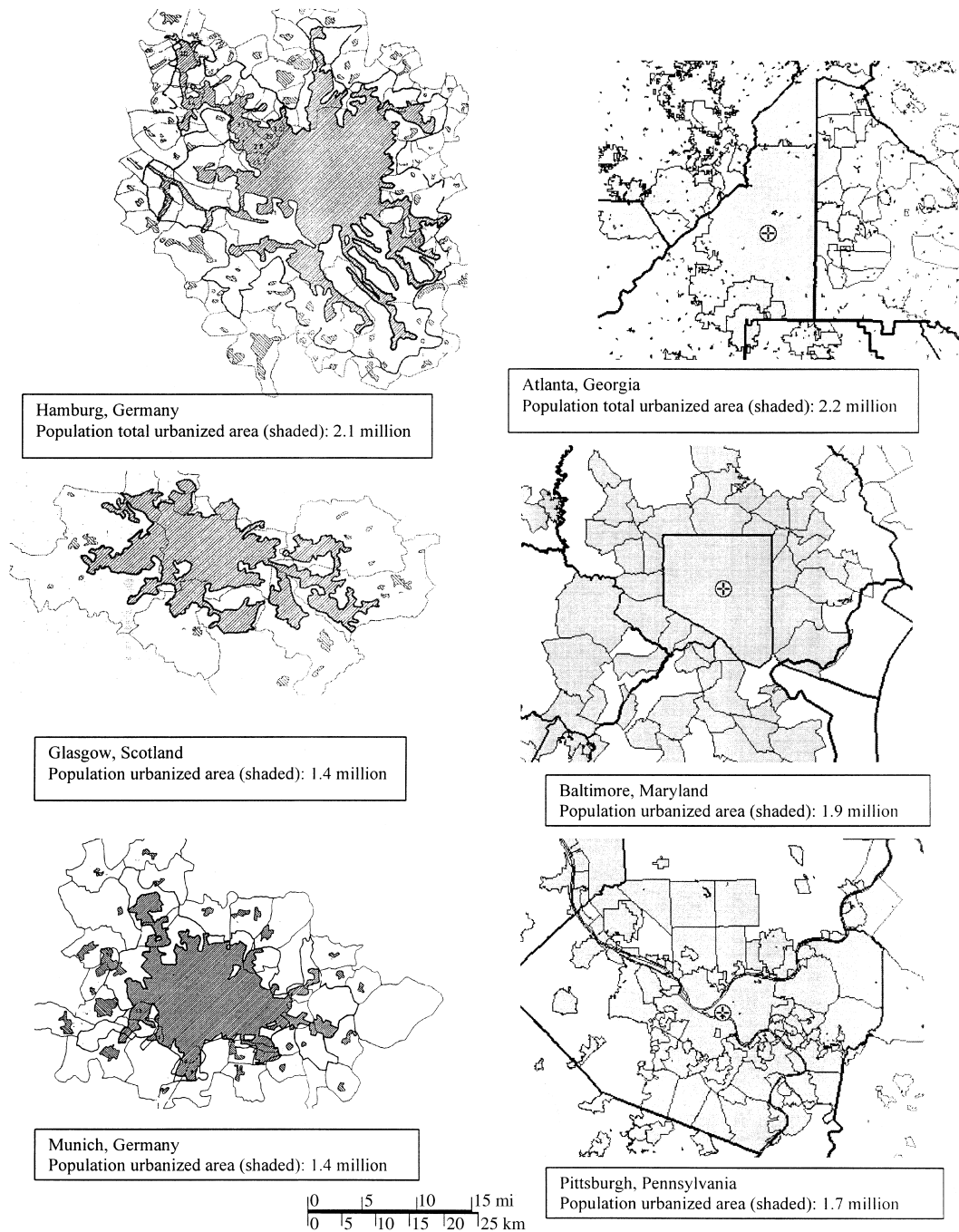
## TRENDS IN URBAN DEVELOPMENT

In the United States, most urban areas that have experienced static or declining central city populations have been gaining population on the periphery. Even urban areas that have experienced minimal growth during the past three or four decades have been expanding outward, yielding lower population densities on average. For instance, greater Cleveland encompasses one-third more land today than in 1970 even though it has lost 8 percent of its population (Nivola 1999). Similarly, according to the Regional Plan Association, the New York metropolitan area now contains 60 percent more urbanized land than in 1970, even though its population has grown by only 13 percent.<sup>15</sup>

Suburban areas in Western Europe have also experienced disproportionate residential and commercial growth, although at a more modest scale

**Table 2-6 Population Densities and Land Area in Selected U.S. and Western European Urban Areas, 1990 (Bureau of the Census 1994; NUREC 1994)**

Urban Area	Central City Population (thousands)	Central City Land Area (km <sup>2</sup> )	Central City Population Density (persons/km <sup>2</sup> )	Population of Urbanized Area Outside Central City (thousands)	Urbanized Land Outside Central City (km <sup>2</sup> )	Population Density Outside Central City (persons/km <sup>2</sup> )	Land Area (km <sup>2</sup> ) per 1,000 People for Entire Urban Area
<b>Western Europe</b>							
Lyons	415	48	8,646	891	862	1,034	0.70
Copenhagen	551	97	5,680	765	844	906	0.72
Nice	342	72	4,750	608	764	796	0.88
Munich	1,185	310	3,823	185	222	833	0.39
Marseilles	855	241	3,548	425	943	451	0.93
Glasgow	654	197	3,320	762	1,247	611	1.02
Stuttgart	551	207	2,662	528	431	1,225	0.59
Frankfurt	618	248	2,492	567	512	1,107	0.64
Hamburg	1,592	755	2,109	485	838	579	0.77
Sheffield	499	367	1,360	443	626	708	1.05
<b>United States</b>							
Miami	638	160	3,988	1,276	753	1,695	0.48
Baltimore	735	209	3,517	1,155	1,325	872	0.81
Pittsburgh	370	144	2,569	1,308	1,871	699	1.20
Cleveland	504	199	2,533	1,096	1,448	757	1.03
St. Louis	396	160	2,475	1,544	1,726	895	0.97
Seattle	515	217	2,373	1,225	1,305	939	0.87
Denver	467	287	1,627	1,043	897	1,163	0.78
Phoenix	981	733	1,338	1,019	1,186	859	0.96
Tampa	617	499	1,236	1,083	1,183	915	0.99
Atlanta	394	341	1,155	1,763	2,603	677	1.36



**FIGURE 2-7 Comparison of urbanized land areas in selected U.S. and Western European cities. [Sources: Bureau of the Census TIGER Map Server ([www.census.gov/cgi-bin/gazetteer](http://www.census.gov/cgi-bin/gazetteer)) and European Union's Atlas of Agglomerations (NUREC 1994) ([www.uni-duisburg.de/duisburg/atlas.htm](http://www.uni-duisburg.de/duisburg/atlas.htm)).]**

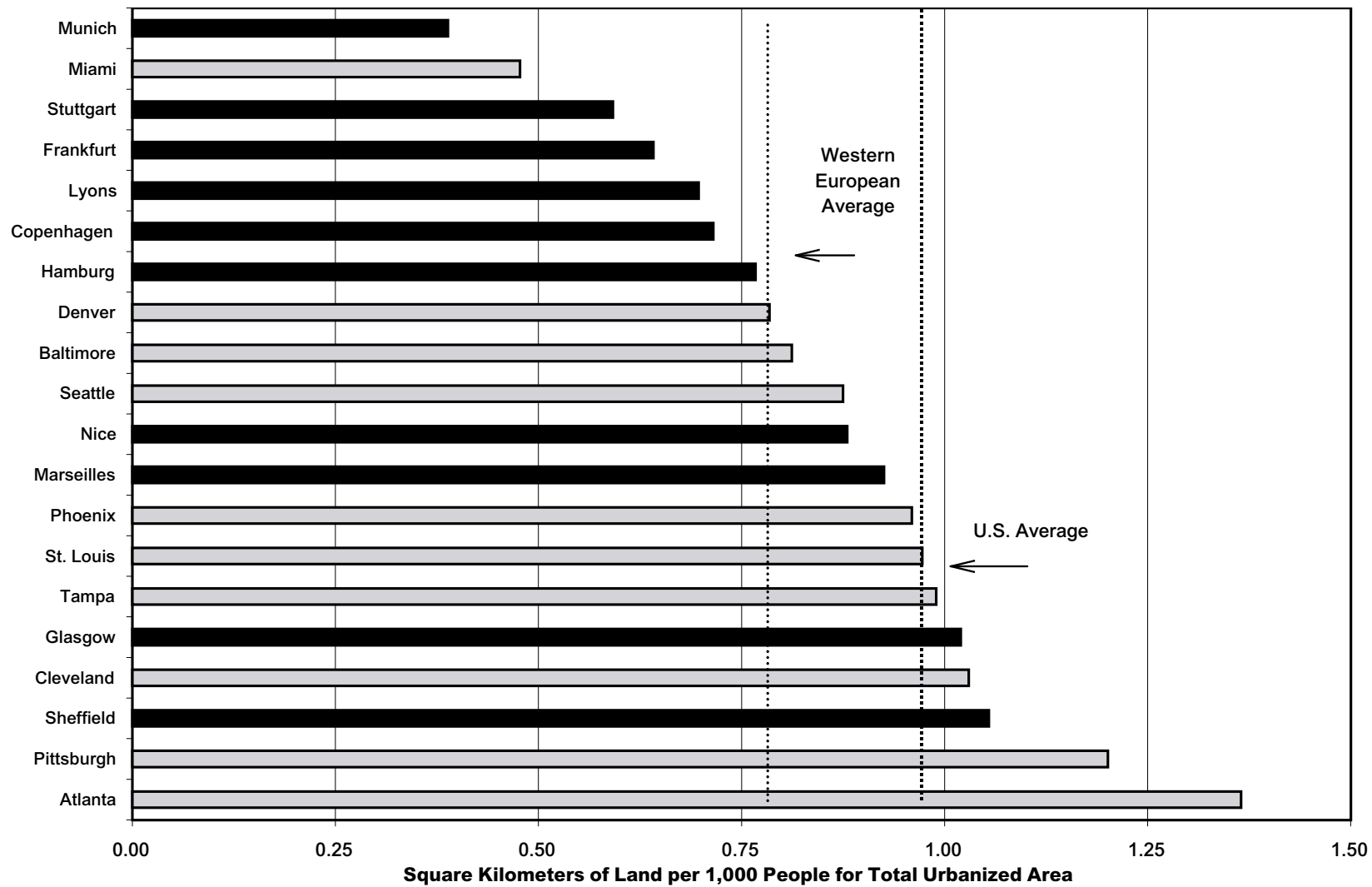


FIGURE 2-8 Population densities for selected U.S. and Western European urban areas, 1995.

and pace. Except for a few declining industrial regions, the central cities of Western Europe have lost relatively few inhabitants, and some have even gained population.

An examination of historical patterns for 112 urban areas in five Northern and Western European countries (Belgium, Great Britain, Luxembourg, the Netherlands, and West Germany) shows that more than half were still growing faster in their central cities than in their suburbs during the 1950s (see Table 2-7). By the 1970s, most central cities were losing population. During the 1980s, however, many regained population. Indeed, when the 38 largest cities of France are included in the tabulations, more than half (53 percent) of the 150 largest central cities of these six countries of Western Europe (excluding Scandinavia, for which comparable data were not available) gained population during the decade (see Table 2-8).

Though still growing more rapidly than their central cities, the suburbs of Western Europe have not gained population as rapidly as American suburbs. This is explained in part by the fact that urban population growth (and population growth in general) has been more modest in Western Europe during the past 20 years, thereby placing less pressure on suburban land devel-

**Table 2-7 Historical Trends in Central City Population in 112 Urbanized Areas of Belgium, Great Britain, Luxembourg, the Netherlands, and West Germany, 1951–1991 (Cheshire 1999, 572–573)**

Period	Percent of Central Cities Gaining Population Faster Than Their Suburbs	Percent of Central Cities Gaining Population, But More Slowly Than Their Suburbs	Percent of Central Cities Losing Population
1951 to 1961	55	32	13
1961 to 1971	18	47	35
1971 to 1975	30	8	62
1975 to 1981	4	18	78
1981 to 1991	18	28	54

**Table 2-8 Trends in Central City Population Change in  
150 Urbanized Areas of Western Europe,  
1981–1991 (Cheshire 1999, 573)**

Cities with Population Exceeding 330,000	1981 to 1991	
	Central Cities Gaining Population	Central Cities Losing Population
Belgium, Netherlands, Luxembourg (25 cities)	15	10
West Germany (51 cities)	33	18
France (38 cities)	27	11
Great Britain (36 cities)	4	32
Total (150 cities)	79 (53%)	71 (47%)

opment. Among the 25 largest American urban areas, 16 grew by more than 10 percent during the 1980s, and 7 of these grew by more than 25 percent (see Table 2-9). Growth of this magnitude has been rare in Western Europe. Only 4 of West Germany's 25 largest urban areas grew by as much as 10 percent during the 1980s, and 11 grew less than 5 percent. On an even longer time scale, no Western European city can match the tremendous growth that has occurred in many American cities, such as Houston, during the past 50 to 100 years (see Figure 2-9).

Canada's largest urban areas have more in common with those of the United States in both the pattern and magnitude of growth. Many urban areas in Canada have burgeoned in recent decades. For instance, greater Edmonton's population has increased by more than 500 percent since 1950 and by more than two-thirds since 1970. Likewise, greater Vancouver's population is 3.5 times higher today than in 1950 and three-quarters higher than 30 years ago. As in many parts of the United States, rapid growth continues in these Canadian urban areas. For instance, in just the 5 years between 1991 and 1996, greater Toronto grew by more than 9 percent, Ottawa–Hull by more than 7 percent, and Vancouver by more than 14 percent.

Although these fast-growing Canadian cities have managed to remain more compact and monocentric than their U.S. counterparts, most of their



**Table 2-9 Percent Change in Population in 25 Largest Urbanized Areas of the United States and West Germany, 1980–1992 (Bureau of the Census 1995; NUREC 1994)**

Largest 25 Urbanized Areas in the United States	Percent Change in Population	Largest 25 Urbanized Areas in Germany	Percent Change in Population
Phoenix	42	Freiburg	12
San Diego	38	Augsburg	12
Atlanta	34	Stuttgart	10
Dallas–Fort Worth	30	Osnabrück	10
Tampa	28	Ulm	9
Seattle	25	Karlsruhe	8
Washington, D.C.	22	Nuremberg	8
Los Angeles	20	Munster	7
Houston	20	Rhine-Neckar	7
Norfolk	20	Berlin	7
Miami	19	Munich	7
Minneapolis	16	Rhine-Main	6
Kansas City	16	Bielefeld	5
San Jose	15	Cologne-Bonn	5
San Francisco	13	Hamburg	4
Denver	12	Kassel	4
Baltimore	8	Aachen	4
St. Louis	5	Kiel	3
Boston	3	Braunschweig	2
New York	3	Bremen	2
Philadelphia	3	Rhine-Mark	2
Chicago	0	Hannover	2
Detroit	-3	Ruhr	0
Pittsburgh	-7	Lubeck	0
Cleveland	-9	Saar	0

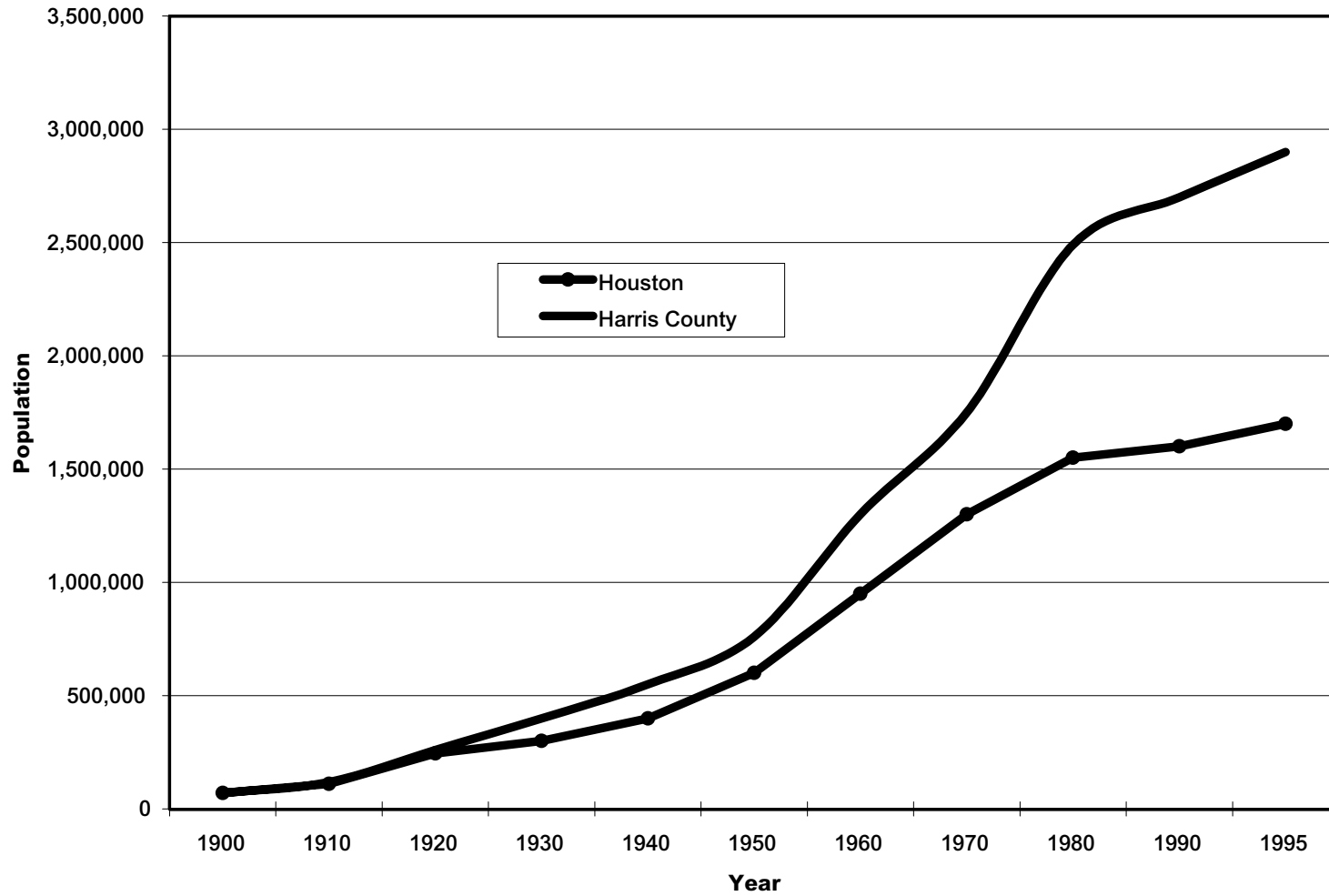


FIGURE 2-9 Population trends in Houston and Harris County, Texas, 1900–1995 (Thomas and Hawes 1998, 327).

population growth has been outside the central city. Maps of greater Toronto, shown in Figure 2-10, illustrate how Canada's largest urbanized area is centered by the city of Toronto. They also demonstrate, however, how the outer suburbs have been the site of most of the region's growth. Indeed, the population of the city of Toronto has fallen by nearly 10 percent since 1950, when it accounted for more than half of the residents in the urban area. Today, with about 650,000 residents, it accounts for about 15 percent of the region's population, as greater Toronto's suburban population has grown by more than 3 million in the same period.<sup>16</sup>

Perhaps the most distinguishing characteristic of Canadian urban development is that population growth in the outer suburbs tends to be in more concentrated and clustered patterns than in the United States. As shown in Figure 2-11, the Ottawa–Hull region has experienced minimal population gains in the central area in recent years, but it has managed to guide significant suburban growth along designated corridors and in planned subcenters. Ottawa's regional land use plan has designated a greenbelt around the central city, as well as several suburban centers outside the greenbelt that are slated to receive most new public infrastructure to accommodate additional residential and commercial growth.<sup>17</sup>

Such coordinated land use and infrastructure planning at the regional level differentiates Canadian and American cities (see the discussion later in this chapter and in Chapter 4). Indeed, this difference is often given as the main reason why large Canadian urban areas have managed to remain more conducive to transit usage despite large suburban population gains and the early proliferation of automobiles.

## **AUTOMOBILES, CITIES, AND TRANSIT**

More than any other factor, the automobile has been linked to the dispersed and decentralized urban landscape found in the United States. Whereas the electric streetcar greatly altered the shape and size of many American cities during the first quarter of the 20th century, the automobile has had more profound and lasting effects. Whereas the electric streetcar accelerated the movement of residents away from city centers, most residential areas were clustered along trolley lines that radiated out from downtown employment centers. By enabling faster door-to-door transportation, the automobile greatly reduced the need for such clustering, spawning residential development both beyond and between the

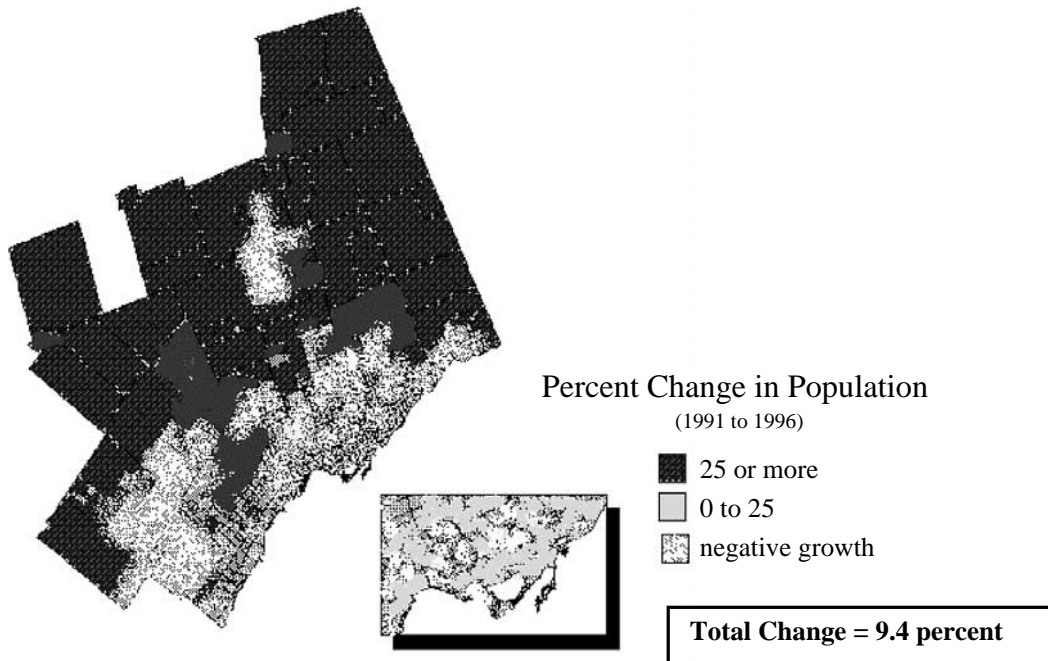
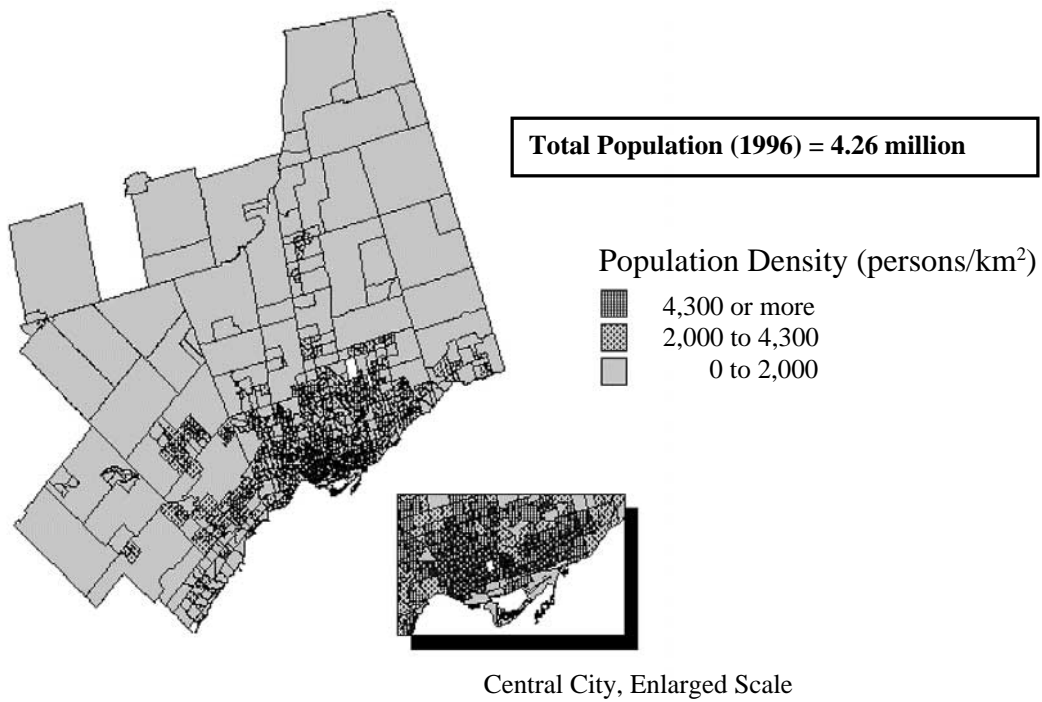


FIGURE 2-10 Metropolitan Toronto's population density in 1996 and change in population from 1991 to 1996. [Source: Statistics Canada (www.statcan.ca).]

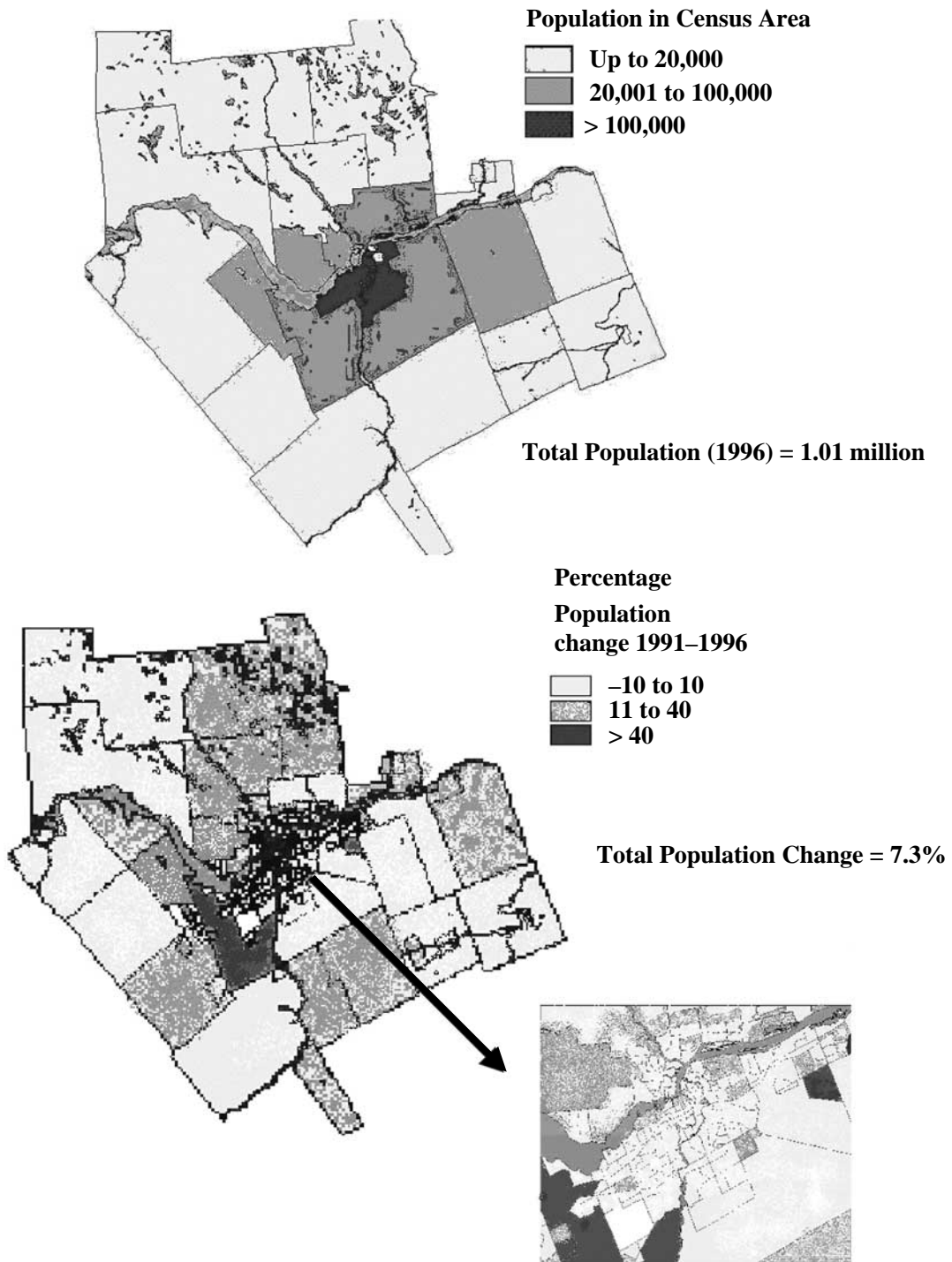


FIGURE 2-11 Ottawa–Hull metropolitan area’s population changes, 1991–1996. [Source: Statistics Canada (www.statcan.ca).]

electric trolley lines (Pushkarev and Zupan 1977, 4–5). Retailers and other consumer-oriented businesses soon followed suit. Likewise, larger freight-hauling trucks, introduced widely in the 1930s, permitted land-intensive manufacturers to move farther from city ports and railheads, often to the suburban periphery, spurring further outward movement of workers (Anas and Moses 1979).

Hence while many American urban areas—including many booming “frontier” cities such as Houston and Los Angeles—were shaped initially by the electric streetcar early in the 20th century, all have been fundamentally reshaped by the decades-long dominance of the automobile. Indeed, most large urban areas in the United States have grown significantly since the mass introduction of the automobile during the 1920s. With rare exceptions, even the slowest-growing urban areas have experienced large population gains during this time, all formed in large measure by the automobile.

Meanwhile, urban population growth has been modest in Western Europe since the widespread introduction of the automobile there, beginning in the 1950s and 1960s. In fact, all of Western Europe’s largest cities of today were mature when automobiles arrived 40 years ago. Certainly none has emerged in the same manner as Phoenix, Orlando, or Charlotte in the United States—cities that have been thoroughly shaped by the automobile, essentially from their inception.<sup>18</sup>

When large numbers of Western Europeans began driving cars 40 years ago, they did so mostly in mature cities with infrastructure and settlement patterns influenced largely by walking and later by public transit (Tarr 1984; McKay 1988). Even those Western European cities rebuilt following World War II had to meet the needs of residents who at the time had little access to automobiles. Figure 2-12 shows that less than one-third of all passenger travel was by automobile in Great Britain as late as 1952. Travel by bus and bicycle was more popular then, and cars did not account for more than half of all travel until early in the next decade.

Such sharp differences in the timing of urban development and the mass introduction of transport technologies are important when considering why Western European cities have remained more conducive to public transit. As shown in Figure 2-13, nearly all of the 10 Western European central cities sampled earlier had attained at least half of what would be their maximum population by 1920. Moreover, it was during the electric streetcar era, which lasted from about 1900 to 1950 in Western

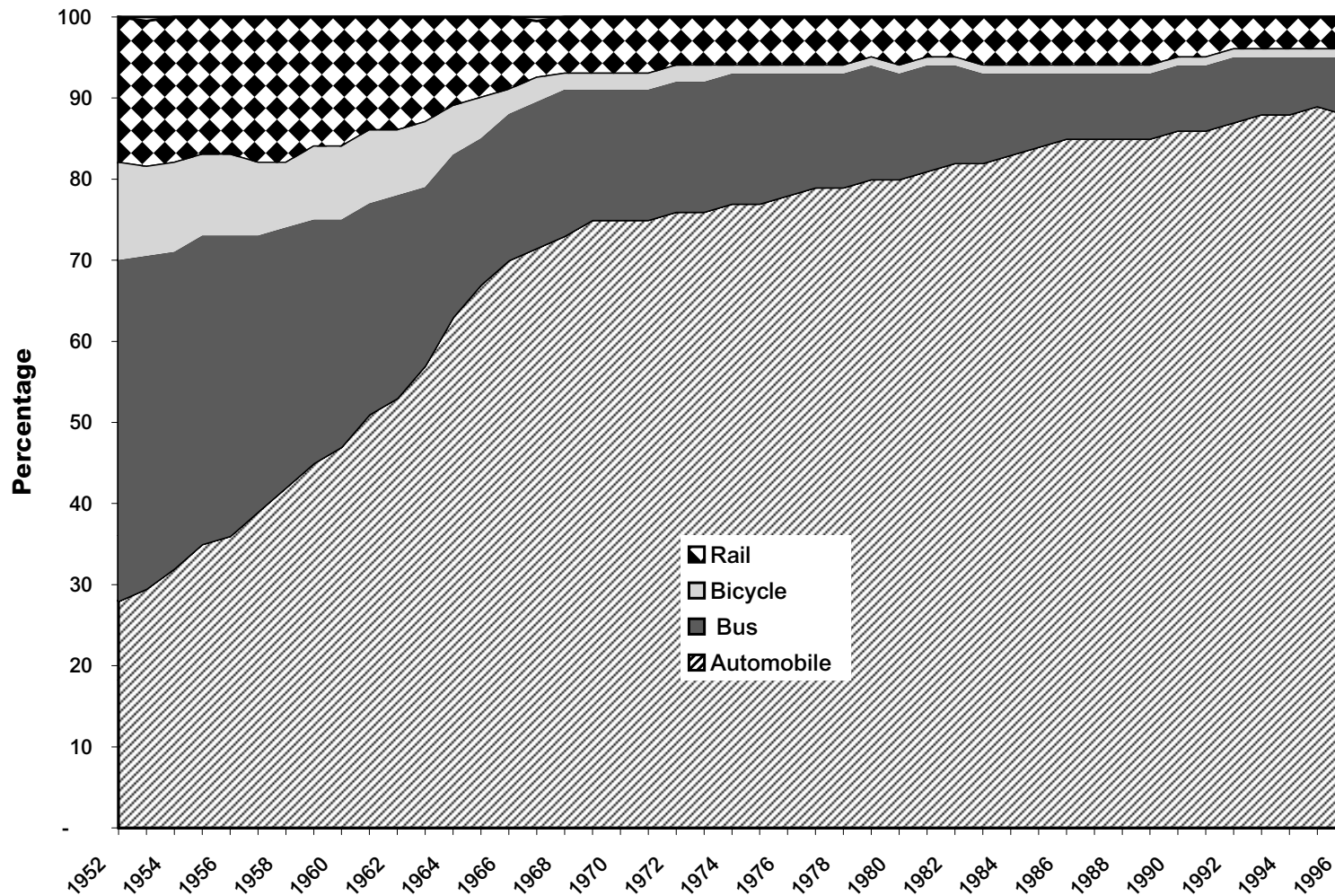


FIGURE 2-12 Share of passenger travel by mode in Great Britain, 1952–1996. [Source: U.K. Department of the Environment, Transport, and Regions ([www.detr.gov.uk](http://www.detr.gov.uk)).]

100 = Historical Maximum  
City Population

Automobiles per 1,000  
People

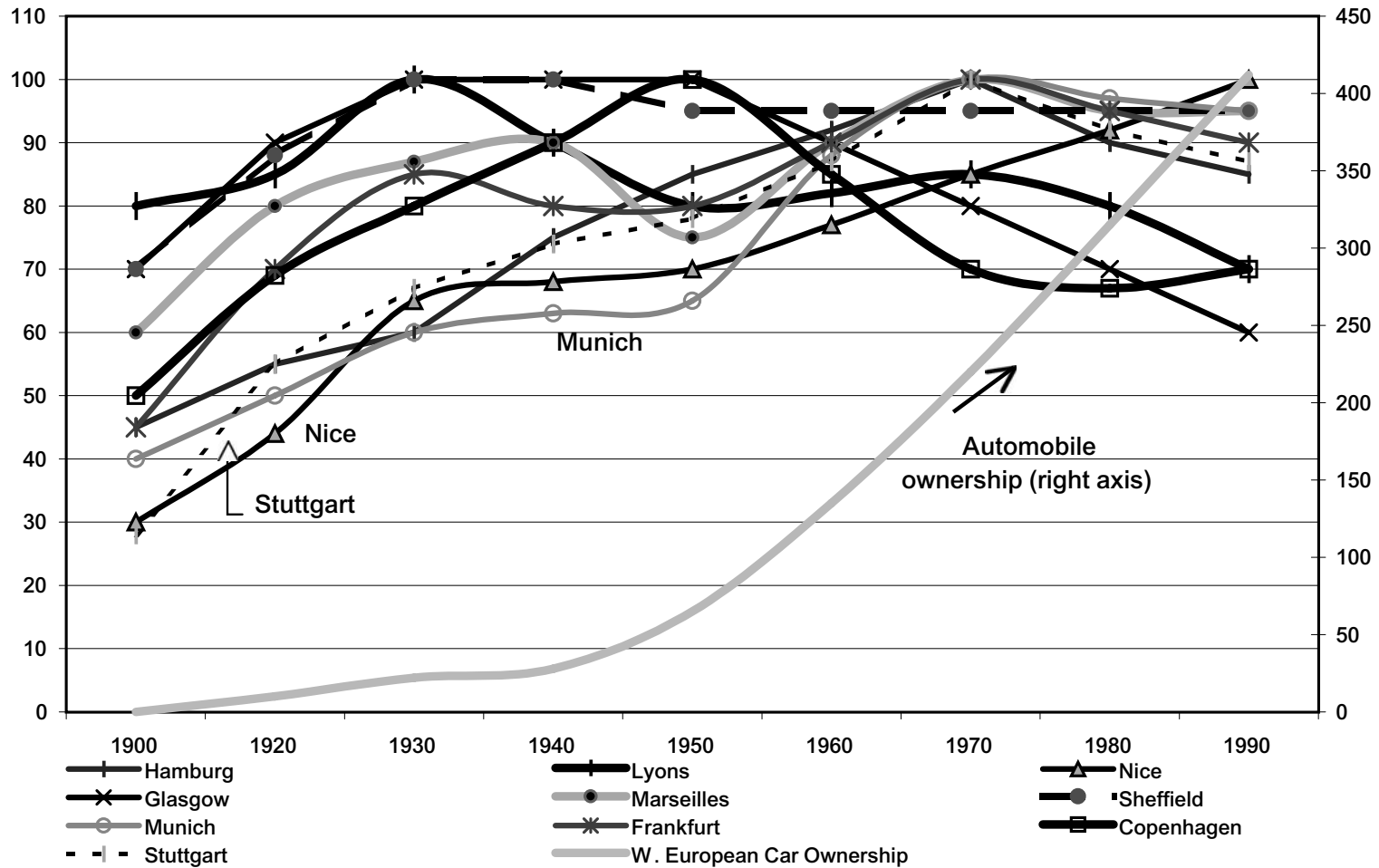


FIGURE 2-13 Timing of central city population growth and automobile ownership for selected Western European cities, 1900–1990.



Europe, that these 10 cities grew the most. All had reached 75 percent or more of their maximum population before 1960, when automobiles were just starting to be used widely.

By comparison, only 4 of the 10 sampled American central cities had reached 75 percent of their maximum population by 1930, when automobiles were being introduced widely in the United States (see Figure 2-14). These four—Pittsburgh, Cleveland, St. Louis, and Baltimore—are older, industrialized cities. Three of the other six central cities examined—Tampa, Miami, and Phoenix (all three being in their incipency)—had not even reached 40 percent of their peak population by 1930, and the other three were still 25 to 50 percent short of their eventual maximums.

Such differences in the timing of urban growth in the United States and Western Europe, especially in relation to the widespread use of the automobile, suggest the importance of historical developments in explaining variations in transit usage today. Automobiles have long dominated the urban landscape of the United States, but they are relative newcomers in the older cities of Western Europe (see Table 2-10). Whereas this observation suggests a possible convergence of American and Western European rates of car use and ownership, future trends will undoubtedly be affected by factors in addition to income growth.

More difficult to explain on the basis of historical and economic circumstances is the persistent gap in transit use among U.S. and Canadian cities. Although Canadian central cities have suffered less population decline than American cities, cars were introduced early in Canada. The most rapid growth in Canadian urban areas, as in the United States, occurred after the widespread introduction of automobiles. Yet despite these similarities, transit usage is two to three times higher in Canada.

In the next chapter specific policies and practices employed abroad to promote public transit are reviewed. Although Western Europe is the focus, the discussion also indicates the many factors that differentiate Canada from the United States.

100 = Historical Maximum  
City Population

Automobiles per 1,000  
People

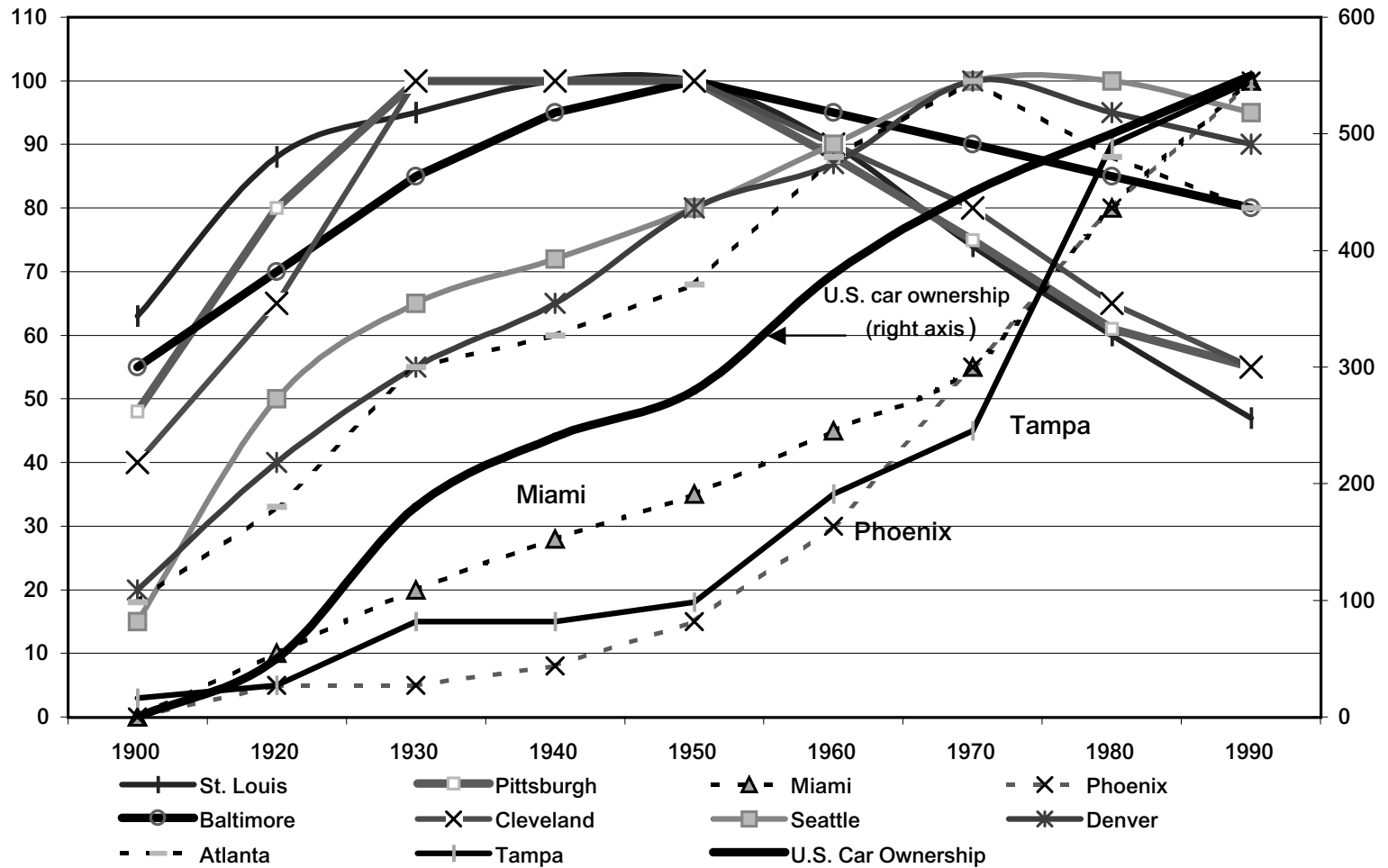


FIGURE 2-14 Timing of central city population growth and automobile ownership for selected U.S. cities, 1900–1990.

**Table 2-10 Historical Trends in Passenger Car Ownership per Capita: United States, Canada, and Selected Western European Countries**

Country	Year				
	1960	1970	1980	1990	1995
<b>Registered Cars (thousands)</b>					
Belgium	1,503 <sup>a</sup>	2,059	3,158	3,833	4,239
Canada	4,104	6,602	10,255	12,662	13,182
France	4,950	11,860	18,440	23,010	24,900
West Germany	4,558	13,298	21,454	27,217	40,499 <sup>b</sup>
Great Britain	5,650	11,801	15,632	22,527	24,306
Netherlands	1,272 <sup>a</sup>	2,405	4,240	5,196	5,633
Sweden	NA	2,443	2,882	3,600	3,630
United States	61,671	89,243	121,600	143,459	148,500
<b>Cars per 1,000 Persons</b>					
Belgium	167 <sup>a</sup>	210	322	387	424
Canada	241	300	417	455	455
France	110	237	343	405	429
West Germany	83	218	346	439	494 <sup>b</sup>
Great Britain	109	215	278	395	411
Netherlands	116 <sup>a</sup>	185	301	349	368
Sweden	NA	305	347	419	408
United States	352	435	533	563	571

Note: NA = not available.

<sup>a</sup>1965 data.

<sup>b</sup>Unified Germany.

## NOTES

1. The American Public Transportation Association (APTA 1995, 13–14) observes that transit systems in the United States serve the following two distinct markets: (a) nondiscretionary (transit-dependent) riders, consisting of individuals who do not have regular access to a private automobile, including the elderly, disabled, students, and members of households unable to afford a motor vehicle or more than one car; and (b) discretionary (transit-choice) riders, consisting of people who elect to use transit for travel speed, comfort, and convenience, often to avoid traffic congestion and parking difficulties.
2. By 1910, however, many of these smaller companies had consolidated into single citywide franchises because of the advantages of having a single coal-powered electric production facility (Hilton 1983, 34).
3. Although few Western European cities introduced electric streetcars as rapidly as American cities, German cities were the fastest to do so, while the cities of Great Britain were among the slowest (McKay 1976, 67–73).
4. Decorative support poles and underground supply lines were installed in many Western European cities as a result (McKay 1976, 74). A few large U.S. cities, most notably Manhattan and Washington, D.C., also required underground conduits for power lines in certain locations, but such requirements were generally less common (Schrag 2000).
5. When Glasgow “municipalized” private streetcar operations in 1894, the streetcar fleet was all horse-drawn. Electric service did not begin until 1898.
6. Per capita transit ridership measures are often calculated using the subpopulation within the transit service territory, usually excluding the unserved but fastest-growing populations in the outer urban fringe. To provide a more complete picture of transit’s transportation role for the entire urban region, the ratios used here were derived on the basis of the total population in each urbanized area.
7. In the very largest U.S. cities with rapid transit systems, middle- and high-income riders account for a larger portion of ridership, especially during the peak commuting periods. Transit accounts for about 85 percent of the peak-hour entrants in Manhattan; about two-thirds in downtown Chicago; and more than half in the central business districts of Boston, Philadelphia, San Francisco, and Washington, D.C.
8. Larger cities (population exceeding 5 million) were excluded because of the small number available for comparison. Cities were selected largely on the basis of data availability.
9. As shown in Table 2-4, passenger fare revenues accounted for 38 percent of operating costs for the United States as a whole because of the disproportionate effect of New York, Chicago, and several other large systems on national aggregate figures. These systems recover a higher share of their operating costs from fare box revenues.
10. For instance, see Mieszkowski and Mills 1993.
11. Even in fast-growing central cities in the Western United States, such as Denver,

- population gains have been greater in surrounding suburbs (Katz and Bradley 1999).
12. Although the Metro rapid rail transit system has contributed to the development of some suburban regional centers, the Washington Area Metropolitan Transit Authority is challenged to better serve (with a combination of rail and bus services) the growing amount of suburb-to-suburb travel in the region.
  13. Still, subcenters, or edge cities, can be found in Western Europe—from the “new towns” outside London and Stockholm to the “metropolises” outside Paris (Meadows 1998).
  14. It should be recognized in making such cross-national comparisons that varying definitions are used to delineate urban boundaries. The data provided for the Western European cities are based on Western European Union (EUROSTAT) measures of urbanized areas or “agglomerations” (NUREC 1994). Buildings separated by less than 200 m are defined as being part of the contiguous built-up area comprising and bounding an urban agglomeration. American urbanized areas, as defined by the U.S. Bureau of the Census, comprise contiguous territory with a density of at least 625 people per square kilometer. Because city parks, greenbelts, and other close-in land that does not meet these density requirements are included by the Census Bureau as part of urbanized areas (to eliminate enclaves or to close indentations in the boundary), the comparability of the maps in Figure 2-8 is limited. Nevertheless, the maps of three American and three Western European urban areas offer visual evidence of how the latter remain more concentric and compact.
  15. See Regional Plan Association of New York, New Jersey, and Connecticut, “Building a Metropolitan Greensward,” available at [www.rpa.org](http://www.rpa.org).
  16. Initially, the municipal region of greater Toronto consisted of a city center of about 170 km<sup>2</sup> and a suburban region consisting of about 600 km<sup>2</sup>. Many governmental functions and services were shared by the center city and the suburbs that comprised the municipal region. However, most metropolitan-area growth has occurred outside this region during the past 30 years. Today, nearly half the metropolitan population of greater Toronto resides outside the original boundaries of the municipal region.
  17. See Official Plan for the Region of Ottawa-Carleton, April 1999 ([www.rmoc.on.ca/planning](http://www.rmoc.on.ca/planning)).
  18. Of the 40 largest urban areas in the United States in 1995 (all exceeding 1 million in population), nearly half had urbanized area populations of less than 100,000 in 1900. Moreover, more than one-third barely registered as towns 100 years ago, having a combined population of less than 400,000. Together, these 14 urban areas—Charlotte, Dallas, Greensboro, Houston, Las Vegas, Norfolk, Oklahoma City, Orlando, Phoenix, Sacramento, Salt Lake City, San Antonio, San Diego, and Tampa—had a total population of more than 25 million in 1995.

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AAMA	American Automobile Manufacturers Association
APTA	American Public Transportation Association
NUREC	Network on Urban Research in the European Community
UITP	Union Internationale des Transports Publics

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# 3



## Policies and Practices Favorable to Transit in Western Europe and Canada

A number of factors have contributed to high demand for public transit in Western Europe and to the many public policies aimed at preserving and strengthening this demand. Historic, geographic, and demographic circumstances, as discussed in the preceding chapter, explain in part why transit enjoys greater popularity in Western Europe than in the United States. However, government policy making has also been important. For many decades, Western European governments have emphasized the provision of high-quality transit services, discouraged automobile driving by raising the cost of owning and operating private cars, and promoted more compact and centralized forms of urban development that are conducive to transit operations. Thus, many of the trends discussed previously have not been merely accidental.

This chapter begins with a review of various actions taken by Western European and Canadian transit agencies to increase transit usage, mainly by enhancing the quality, coverage, and reliability of the service. The discussion then broadens to consider government tax and regulatory policies affecting use of the private automobile, which both competes with rail and bus service and contributes to the dispersed and decentralized forms of urban development that are difficult to serve efficiently with transit. The chapter concludes with a comparison of the institutions and processes for coordinating transit, highway, and land use decisions in Western European, Canadian, and American cities.

## **DEPENDABLE, HIGH-QUALITY TRANSIT SERVICE**

American travelers often remark on how Western European and Canadian transit systems are easy to use, reliable, and generally more inviting than American systems. This section offers some examples of ways in which customer-minded Western European and Canadian transit systems have sought to ensure service dependability, convenience, comfort, and safety and to expand transit's public appeal.

### **Reliability and Frequency**

An important attribute for transit users is timely and fast service. Large gaps in network coverage, low schedule frequency, chronic delays, and excessive transfer waits are troublesome, especially for time-sensitive commuters (Syed and Kahn 2000; Lyons and McLay 2000).

Service speed and reliability have long been important to transit agencies in Western Europe, most notably in Germany. German cities are renowned for their extensive and frequent urban rail service, even in small and medium-sized cities. Traditional streetcars operating in mixed traffic, modern light rail lines that operate on both streets and dedicated rights-of-way, and commuter railways are found throughout Germany, and rapid transit is provided in the largest cities. Perhaps the most innovative urban rail system in Germany is that of Karlsruhe, whose light rail vehicles also operate on mainline track. This system of shared track usage has attracted international attention because it allows the expansion of light rail services without the need to acquire additional rights-of-way (Orski 1995). From the standpoint of users, this versatility has the important advantage of reducing time-consuming interline transfers between commuter and distributor rail and bus lines.<sup>1</sup>

Among bus transit systems, the comprehensive busway of Ottawa, Canada, has been widely acclaimed. Like the Karlsruhe rail system, Ottawa's system of dedicated busways offers versatility and travel speed by combining mainline express, feeder, and distributor services, thus reducing the need for time-consuming interline transfers (TCRP 1997b, 22–23; Syed and Kahn 2000, 3).

It is important to keep in mind, however, that the main form of public transport in Western Europe and Canada is the same as in the United States—conventional buses operating in mixed traffic. Therefore, a major concern for most transit operators is to keep buses moving on schedule



Light rail cars in Karlsruhe, Germany, can be used on existing mainline and streetcar lines for commuter and local service without transfers. (© UITP. Reprinted with permission from *Public Transport International*, No. 4, 1999, J. Vivier, The Consumer Is the Centre of Interest, p. 31.)



Buses on the rapid transitway in Ottawa, Canada, are used for commuter and local passenger service. (© UITP. Reprinted with permission from *Public Transport International*, No. 2, 1999, O. Sawka, Ottawa's Transitway: 750 Million Riders and Counting!, p. 27.)

through traffic, often accomplished through a combination of routing and scheduling modifications and technological aids, and sometimes with priority treatments (Reilly 1997). Among the simplest practices, prevalent in Germany, Austria, and Scandinavia, is widening the spacing of bus stops to reduce the number of times a bus must decelerate, accelerate, and reenter traffic flows. Transit operators in these countries typically space bus stops every 300 to 500 m, or about two to three stops per kilometer. U.S. transit bus operators, by comparison, place stops about every 200 m, creating five stops per kilometer.

Another way to increase bus travel speed is to reduce dwell times during passenger boarding and alighting. With this objective in mind, transit agencies in Western Europe have built special bus loading platforms on median islands that reduce the frequency of buses exiting and reentering travel lanes. In Great Britain, extensions from the sidewalk into the curb lane, known as "bus-boarders," have been constructed at many bus stops to prevent obstructions from parked cars, create more space for queuing riders, and reduce the need for buses to maneuver into and out of the traffic stream.<sup>2</sup>

Western Europe has also seen a proliferation of low-floor buses, which have extra-wide doors, often three doors, and no cumbersome steps to climb at the entrances. These vehicles—still rare in the United States but common in Western Europe for more than a decade—have the side benefit of speeding boarding and alighting in addition to improving bus accessibility by the elderly and disabled (King 1994, 12–14).

Prepaid transit tickets and passes also accelerate boarding. For this and other reasons, most Western European transit systems have long offered self-service ticketing and advance-purchase fare cards. To further minimize on-board fare collection, most Western European transit agencies charge a premium for single-ride tickets purchased on the vehicle.

Even with such measures, Western European bus and streetcar schedules are prone to disruptions caused by traffic congestion. Western European and Canadian transit agencies, in concert with local highway departments, have therefore taken many innovative steps to give transit vehicles priority in traffic (Brilon and Laubert 1994). To a greater extent than in the United States, Western European and Canadian traffic management practices are designed to discourage car use, both to facilitate transit operations and to deter city driving in general. Among the first large cities in the world to formally espouse a decidedly transit-first approach to



Modern fare payment machines like this one in Paris make transit ticketing easier and boarding faster. (© UITP. Reprinted with permission from *Public Transport International*, No. 3, 2000, A. Ampelas, The RATP and the Transition to the Single Currency, p. 6.)

traffic management were Zurich, Switzerland; Gothenburg, Sweden; and Bremen, Germany (Cervero 1998). Zurich has given traffic priority to transit for more than 30 years.

Transit priority programs include traffic rules that give buses priority when reentering traffic, staggered stop lines and special bus lanes and traffic signals that give transit vehicles a head start in traffic queues at intersections, and technologies that allow buses to activate green lights on traffic signals (TCRP 1997a). More than 90 percent of the intersections in Zurich and Vienna are equipped with sensors that detect approaching transit vehicles. Bus-activated signals are also common in Toronto and Quebec City. In greater London, a demand-responsive traffic control system known as BUSCOOT gives intersection priority to traffic lanes with heavy bus flows. Lower-technology solutions include longer green light settings on routes served by transit and special bus turning provisions, such as allowing buses to

make unimpeded left turns from center or curb lanes (e.g., in Ottawa). Though traffic control measures, such as bus lanes, have also been adopted in some American cities to give transit vehicles priority, they are seldom as well coordinated or routinely enforced as in Western European and Canadian cities.

### **Comfort, Safety, and Convenience**

Whereas creative marketing and promotion can attract more riders, transit agencies in Western Europe and Canada recognize that comfort, personal safety, and convenience are essential to retaining customers (Syed and Kahn 2000; Lyons and McLay 2000). Accordingly, they appear to spare no expense in equipping vehicles with amenities such as ergonomic seats and state-of-the-art suspension systems. Even simple amenities such as wall clocks on board vehicles and pay telephones, shelters, mailboxes, and bicycle storage stalls at bus stops are common, as are clean vehicles with good ventilation and pleasant and knowledgeable drivers (Reilly 1997; TCRP 1997b, 6). In Ottawa, stations along the busway system are integrated with shopping facilities. Transit stations in many Western European cities serve as connecting points for a variety of activities; many contain restaurants, news kiosks, bakeries, flower shops, and other retail services that are complementary to their transit function. Many transit stations are attractive places to visit in their own right.

Transit operators in Western Europe and Canada usually provide convenient means for riders to purchase tickets. Many offer tickets for sale in post offices, student unions, and shopping malls, often supplemented by hundreds of automated vending machines at rail and bus stations. Sidewalks leading to transit stops, intersection controls that allow safe street crossings, and well-lit and secure waiting areas are also the norm throughout much of Western Europe and Canada. Ensuring the safety of public transit riders and maintaining the perception that riding on transit is safe are of particular importance to transit operators in Western Europe and Canada.

In German cities, transit services are often supplied by more than one public or private operator. However, regional transit associations, known as *verkehrsverbunds*, play a central coordinating function, establishing complementary routes, setting uniform fare structures, and allocating government subsidies among individual operators (Pucher and Kurth 1995). These regional transportation entities provide uniformity and consistency in levels and quality of service, helping to make transit riding convenient and uncom-

plicated. In general, Western European transit services are treated as vital components of the regional transportation system. They are well connected to airports, commuter railroads, and intercity rail and motor bus stations.

Considered individually, such customer amenities and conveniences may not appear to be important. Their combined effects on service quality are significant, however. Many of these practices can be found in the United States, but not as routinely or in combination with one another.

### **Innovative Marketing**

Western European and Canadian transit authorities believe that public transit is, or can be made, suitable for everyone—not just an option for downtown-bound commuters or inner-city residents without cars. This attitude manifests itself in the many innovative marketing approaches aimed at broadening transit's appeal and promoting its use by travelers outside the traditional customer base.

Western European transit agencies have turned to innovative marketing practices in part because they have large amounts of spare capacity to fill during off-peak hours. Hence many transit agencies, especially in Germany, Austria, and Switzerland, work closely with promoters of museums, theaters, and sports events to incorporate a heavily discounted transit fare into the price of admission, thus entitling patrons to transit rides to and from large public events without additional charge (Pucher and Kurth 1995, 124–125; TCRP 1997a). Many hotels include 2- or 3-day transit passes in their room rates. Although these “kombi-tickets” are often promoted as a means of curbing automobile congestion, they also provide an opportunity for transit to attract infrequent or new riders, some of whom may decide to use transit more often. Users of such niche services increase use of public transit in their own right; however, if these strategies are truly effective, they will also cause some new riders to use transit more often (Cronin et al. 2000).

With such longer-term goals in mind, many Western European transit systems sell heavily discounted passes to university students. The idea is to instill a habit of transit use—one that remains long after entering the workforce, even when the automobile becomes a more affordable option. This practice also exemplifies how Western European transit agencies have personalized marketing by providing information and ticketing packages tailored to the needs of individuals and households.





Winnipeg's Graham Avenue shopping mall includes priority transit service and many customer amenities. (© UITP. Reprinted with permission from *Public Transport International*, No. 2, 1999, B. Hemily, *Canadian Transit in Transition*, p. 10.)

Many Western European and Canadian transit operators recognize the benefits that can flow from eliminating a well-known deterrent to transit use by the unaccustomed rider—the lack of information on transit fares and routings, especially for bus operations (Cronin et al. 2000). Some operators publish bus schedules in newspapers, on the Internet, and in brochures mailed to the general public. Others color their buses to match color-designated routes depicted on easy-to-read maps placed in bus shelters and on board vehicles (TCRP 1997b, 10). The idea is to create a clear identity for bus lines in the same manner as for rail transit lines.

To further simplify schedules, many buses (especially in Switzerland and Germany) are timed to arrive and depart at regular intervals, for instance, every 15 or 20 minutes before or after the hour (Cervero 1998, 300–318). Many also provide travelers with real-time information on vehi-

cle status. Advanced vehicle locator systems that relay bus status and position information to central dispatching stations also provide arrival updates to waiting travelers through special phone booths or computer displays in kiosks (TCRP 1997a; TCRP 1998). Even medium-sized transit operators in Western Europe and Canada (e.g., in Hull and Halifax) use vehicle locator systems in this manner. All of these approaches and technologies are intended to make transit services more transparent and simple for users, including new and infrequent riders.

Nevertheless, most transit agencies abroad recognize that they cannot accommodate all travel needs. Some have found ways to incorporate the automobile and other transport modes into their promotional activities. For instance, some agencies (e.g., in Bremen, Vienna, and Zurich) give regular users discounts on weekend car rentals; others (e.g., in Berlin) help sponsor "public car" cooperatives that allow participants to share cars for periodic use (Orski 1995; TCRP 1997a); still others allow holders of monthly passes to travel by transit with family members and friends free of charge during weekends and other off-peak times (Pucher 1998, 300–302; Pucher and Kurth 1995). In Sweden and Germany, many transit operators will call ahead for taxis to carry passengers to points beyond the regular network, and others will arrange for night taxi service after regular transit service hours (Orski 1995; TCRP 1997b). By and large, these practices are aimed at giving urban households one less reason to purchase a second, or even first, car, thereby retaining transit as the primary option for more kinds of travel.

### **Enhancing Service Through Procurement Innovations**

A number of the service enhancements discussed above are expensive to provide. Concerned about rising costs and seeking to retain high levels of service with greater efficiency, most Western European governments have introduced or have been exploring alternative means of organizing and delivering their transit services. Many have turned to the private sector, taking advantage of the efficiencies and innovations that result from competition among service providers.<sup>3</sup>

Traditionally, nearly all transit systems in Western Europe have been publicly owned and operated, administered in much the same way as other government agencies. The approach has been changing, however. In the early 1980s, the French began hiring private companies to manage



Innovative night buses like this one in Münster, Germany, are popular transit services. (© UITP. Reprinted with permission from *Public Transport International*, No. 2, 1998, E. Christ, The Stuff of Dreams: Catch the Bus Until Five in the Morning, p. 35.)

transit services on a regional basis. Other countries have since adopted or have been exploring various means of procuring transit services from the private sector, prompted in part by the European Union's plan to open more domestic markets to private suppliers of transport services.

Most procurement reforms to date have allowed private companies to bid for the provision of services prescribed and subsidized by the government, a practice often termed "competitive tendering" in Western Europe and "contracting out" in the United States (where it is practiced more sparingly, except in smaller communities). In such arrangements, the public transit authority usually retains responsibility for planning the routes, setting fare levels, and specifying the equipment to be used by the successful bidder. During the past decade, Denmark and Sweden have been most active in contracting with private companies for both bus and rail services. Recently, however, transit authorities in Germany, the Netherlands, and elsewhere in Western Europe have been turning to the private sector for more transit services (as discussed later).

Far more dramatic changes have been instituted in Great Britain. In 1986, bus services throughout Great Britain, except in greater London, were deregulated, and the national bus company was privatized. Though a few "socially necessary" routes continue to be subsidized, the British Parliament enacted legislation that ended the national government's role as main provider of public transit services; private companies now have these responsibilities for the most part. Results of British bus deregulation and privatization have been mixed, as some communities gained services and service quality and others lost. In greater London, a more limited form of service tendering was instituted with considerable success in reducing public subsidies. Stockholm, Sweden, and Copenhagen, Denmark, have since followed suit.<sup>4</sup>

Though most of these reforms were instituted to control costs, many were also adopted with the goal of improving service quality. Indeed, in establishing standards of performance for private suppliers, public transit authorities have been compelled to explicitly identify, define, and prioritize their service goals and expectations. Not only have they been forced to isolate the cost of specific services, but they have also had to reach out to their customers to determine the aspects of service quality deemed most important. Customer surveys are now being used increasingly to develop performance standards for private suppliers.

Table 3-1 shows some of the areas in which quality-of-service benchmarks are being developed. The goal of most transit authorities is to retain

Table 3-1 Transit Quality Measures

Quality Area	Quality Component
Service availability	Network scope Schedule frequency
Accessibility	Intermodal interchange Intramodal interchange Ticket purchasing points
Customer information	General service information Travel information—normal conditions Travel information—abnormal conditions
Time	Journey time Punctuality and reliability
Customer care	Service commitment Customer contact Staff qualification Physical assistance Ticketing options
Comfort	Ambient conditions Facility comfort Vehicle ergonomics Ride comfort
Safety/security	Safety performance record Security performance record Perceived safety/security

Source: UITP.

the high quality of service expected by customers while benefiting from the increased efficiency and innovation promised by competition.

## **POLICIES AFFECTING USE OF THE AUTOMOBILE**

Conventional logic holds that transit is popular in Western Europe because of the high cost of owning and operating cars. Gasoline prices are

indeed much higher in Western Europe than in the United States, mainly because of much higher taxes. Moreover, motor vehicle sales and excise taxes, registration charges, license fees, and other government levies are higher, as are vehicle insurance, maintenance, and financing costs in general. Given the many other practical burdens of operating a car in Western Europe—where narrow streets, tightly restricted parking, and recurrent traffic congestion can impede driving—it makes sense that the average Western European would choose public transit, walking, or biking for a larger share of travel than the average American. Taken together, taxes and other policies toward the automobile in Western Europe are far less conducive to driving than is the case in the United States.

### **High Automobile Taxes**

Cars, new and used, are generally more expensive to purchase in Western Europe and Canada than in the United States, not only because of steep excise taxes and registration fees, but also because of a variety of other factors having to do with the vehicles' regulation, production, distribution, and financing (Schipper 1995). Even in the absence of excise taxes and other government fees and surcharges, a Western European car buyer can expect to pay more than an American consumer for a comparable vehicle, mainly because of higher market transaction costs. Nevertheless, a main source of higher vehicle acquisition and ownership costs is government taxation.

Nearly all states and some local governments in the United States impose one-time sales taxes and yearly registration fees on motor vehicles. Some states also levy personal property taxes that apply to motor vehicles. These impositions typically amount to about 1 to 10 percent of the vehicle's sales price or market value (Pucher and Lefevre 1996). In Western Europe, vehicle taxes and registration fees tend to be much higher. Denmark, for instance, levies value-added taxes equivalent to as much as 180 percent of the purchase price of a new vehicle (Schipper and Eriksson 1995, 218). Excise and ad valorem taxes in Norway, Austria, and Germany range from 15 to 50 percent of the purchase price (Pucher and Lefevre 1996; International Roads Federation 1995; Schipper and Eriksson 1995, 218). Similarly, vehicle registration fees are typically several hundred dollars per year, compared with \$25 to \$200 in the United States.

In comparing vehicle sales taxes and registration fees in Western Europe, Schipper and Eriksson (1995) conclude that their main effect—especially in the highest-tax countries, such as Denmark—is to reduce the size of the motor vehicle fleet rather than the intensity of vehicle use (which is influenced more by fuel taxation, discussed below). Denmark, Switzerland, and Norway, which impose large vehicle sale and registration fees, have the lowest rates of car ownership in Western Europe.

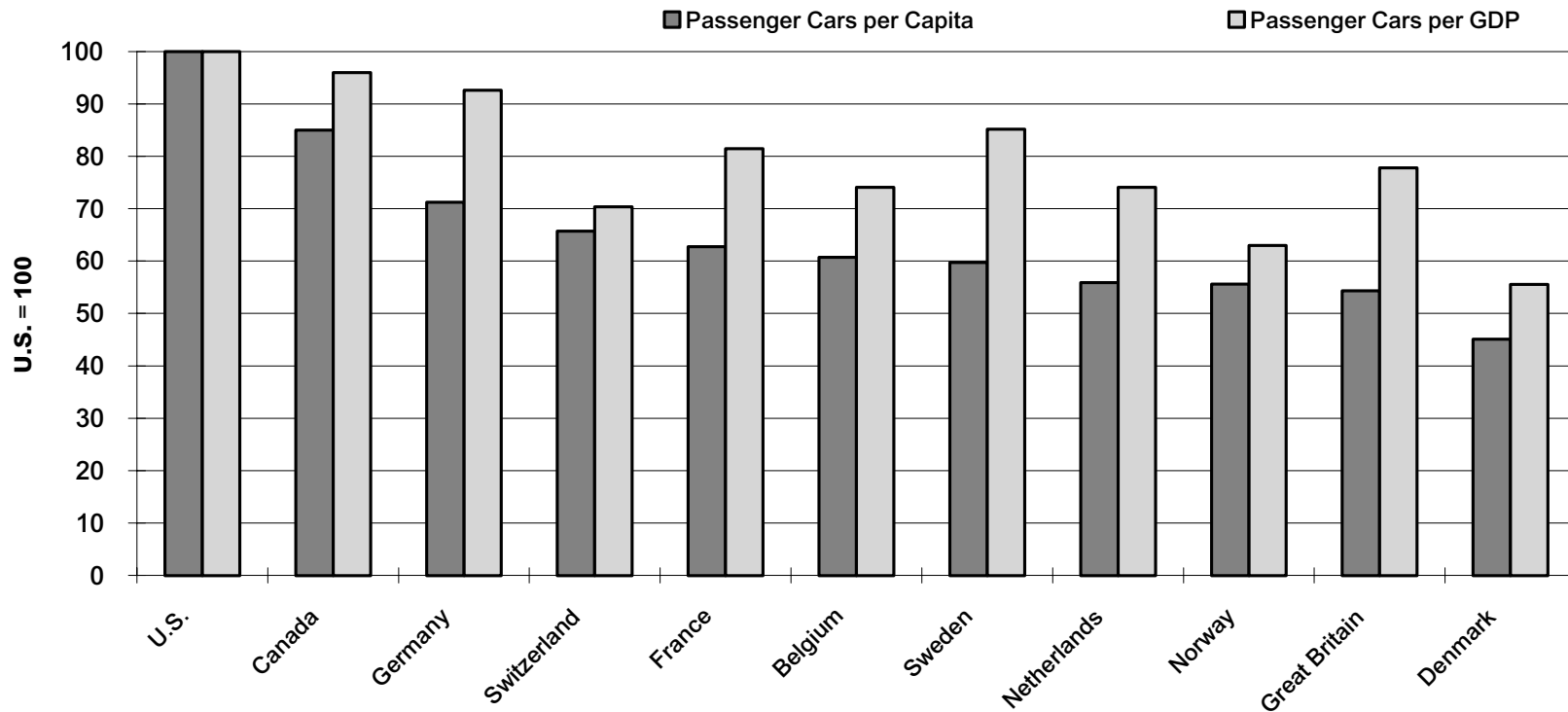
Yet the effect of income must also be considered when comparing automobile ownership rates across countries. Passenger car ownership rates (cars per capita) in several major Western European countries are about 60 percent as high as in the United States, where there are 685 passenger cars per 1,000 people, including pickups, sport utility vehicles, minivans, and other vehicles classified as light trucks but used for personal travel (see Figure 3-1). Germany, for example, has 488 passenger cars per 1,000 people, which is about 70 percent as high as in the United States. This gap closes, however, when differences in income are factored into the comparison, as is also shown in Figure 3-1.

Car ownership levels in Western Europe today are similar to those in the United States during the 1960s, when transit's modal share was in sharp decline. That a similar exodus from public transit has not occurred in Western Europe suggests that other factors have influenced the modal split, including not only the public sector's commitment to transit, but also policies that raise the price of motor fuel and impose other costs and inconveniences on motor vehicle travel.

### **High Taxes on Motor Fuel**

Taxes that increase the price of motor fuel discourage driving and increase consumer demand for motor vehicles with higher fuel economy. The initial response by motorists to rising pump prices is to reduce fuel use by curtailing discretionary driving. If the higher prices persist, people begin purchasing vehicles with higher fuel efficiency. Longer-term responses to sustained higher prices may encompass more fundamental travel behavior, for instance, moving closer to workplaces and using alternative modes of travel such as biking, walking, and public transit (TRB 1997).

All of these patterns are evident in Western Europe to varying degrees. Passenger cars and other motor vehicles there are smaller and more fuel-



Note: Included as passengers in the United States are 70 percent of light trucks, which is the share used for personal travel according to the U.S. Census Bureau's 1997 Vehicle Inventory and Use Survey. GDP = Gross domestic product converted to purchasing power parity.

FIGURE 3-1 Passenger car ownership rates in Canada and Western Europe for 1997, indexed against the United States and in relation to income (GDP). [European vehicle, population, and GDP data obtained from *EU Transport in Figures: Statistical Handbook* ([www.europa.eu.int](http://www.europa.eu.int)).]



efficient. Moreover, Western Europeans drive less partly because they live in more compact urban areas where homes, workplaces, and shopping centers are more closely spaced. They are thus able to walk, bike, and ride public transit for a larger portion of their travel needs.

Figure 3-2 shows a comparison of November 1998 gasoline prices in the United States, Canada, and several peer countries of Western Europe. Prices are three to four times higher in the latter. Canadian prices are one-quarter to one-third higher than U.S. prices. Most of the price gap can be explained by differences in taxation.<sup>5</sup> Together the federal, state, and local taxes on gasoline in the United States account for about one-quarter to one-third of the retail price, ranging from about \$0.08/L to \$0.12/L (the weighted average in 1998 was \$0.10/L, or \$0.38/gal) (FHWA 1998, Table MF-121T). In Canada, taxes account for about one-half of the pump price. By comparison, motor fuel excise taxes (along with 10 to 20 percent ad valorem taxes) account for between 60 and 80 percent of the retail price of gasoline in most Western European countries, with taxes alone totaling more than \$0.80/L (\$3/gal).<sup>6</sup> In Great Britain and Norway, where levies on both gasoline and diesel fuel are among Western Europe's highest, tax impositions approach \$1.00/L.

Precisely how fuel prices have affected observed differences in automobile use across Western Europe, Canada, and the United States is unclear. It is important to keep in mind that a significant part of the response to higher fuel prices is increased demand for more fuel-efficient vehicles, including vehicles powered by diesel fuel. This response is evident in Western Europe, where the automobile fleet averages about 20 percent more kilometers per liter than in the United States. Diesel vehicles are popular in Western Europe (accounting for more than 40 percent of the fleet in France) not only because diesel is taxed less than gasoline, but also because it provides more energy per liter and therefore saves on fuel costs (Schipper 1995, 335–336).

High vehicle fuel efficiencies allow Western European motorists to offset elevated fuel prices to some extent, yet they still drive about 50 percent less than Americans (see Figure 3-3). Cross-national comparisons show that Americans not only take more trips by car, but also drive farther per trip (Schipper 1995), reflecting the fact that motor vehicle travel is affected by many factors in addition to vehicle operating costs, including household size, wealth, and income (see Chapter 4).

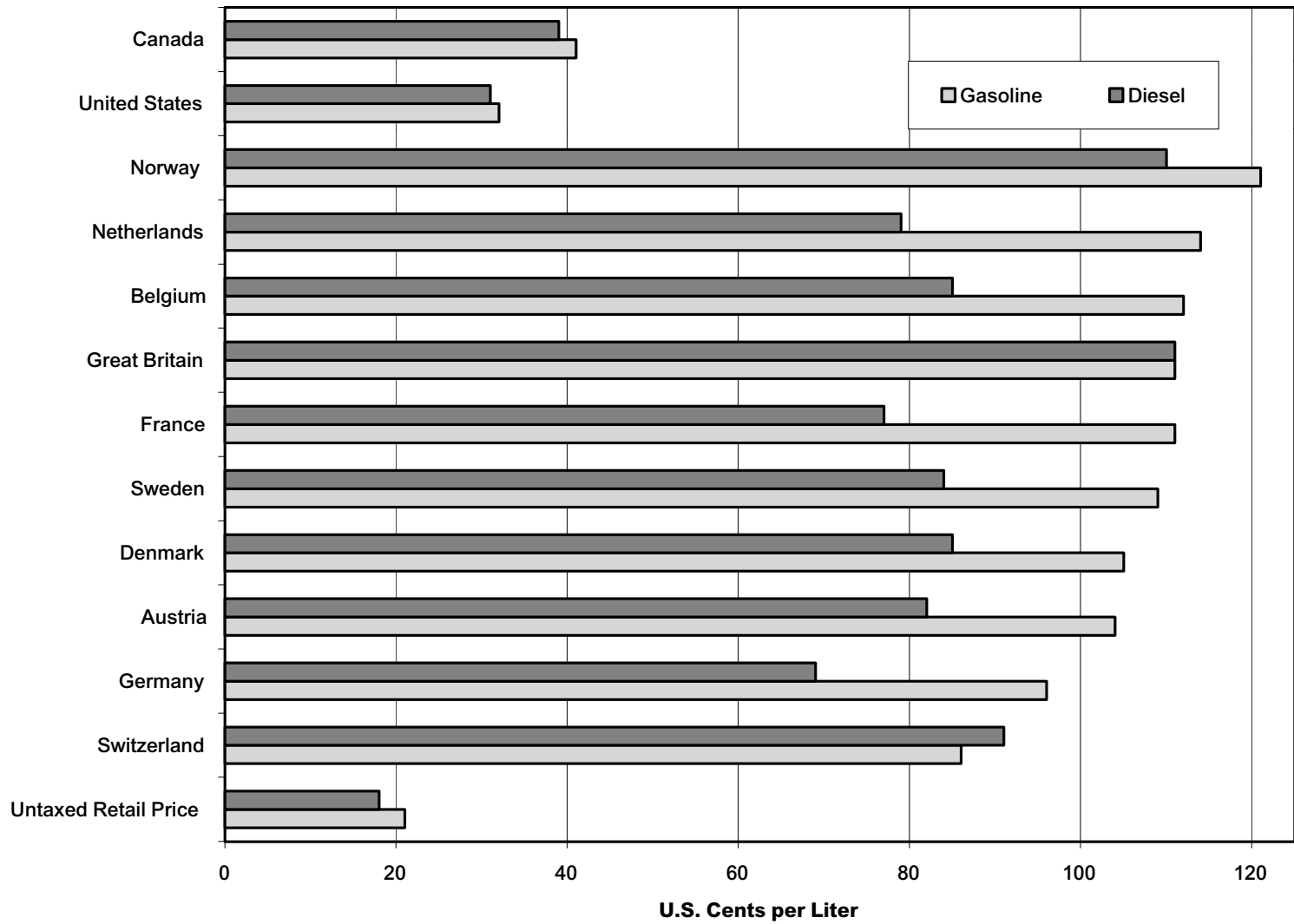
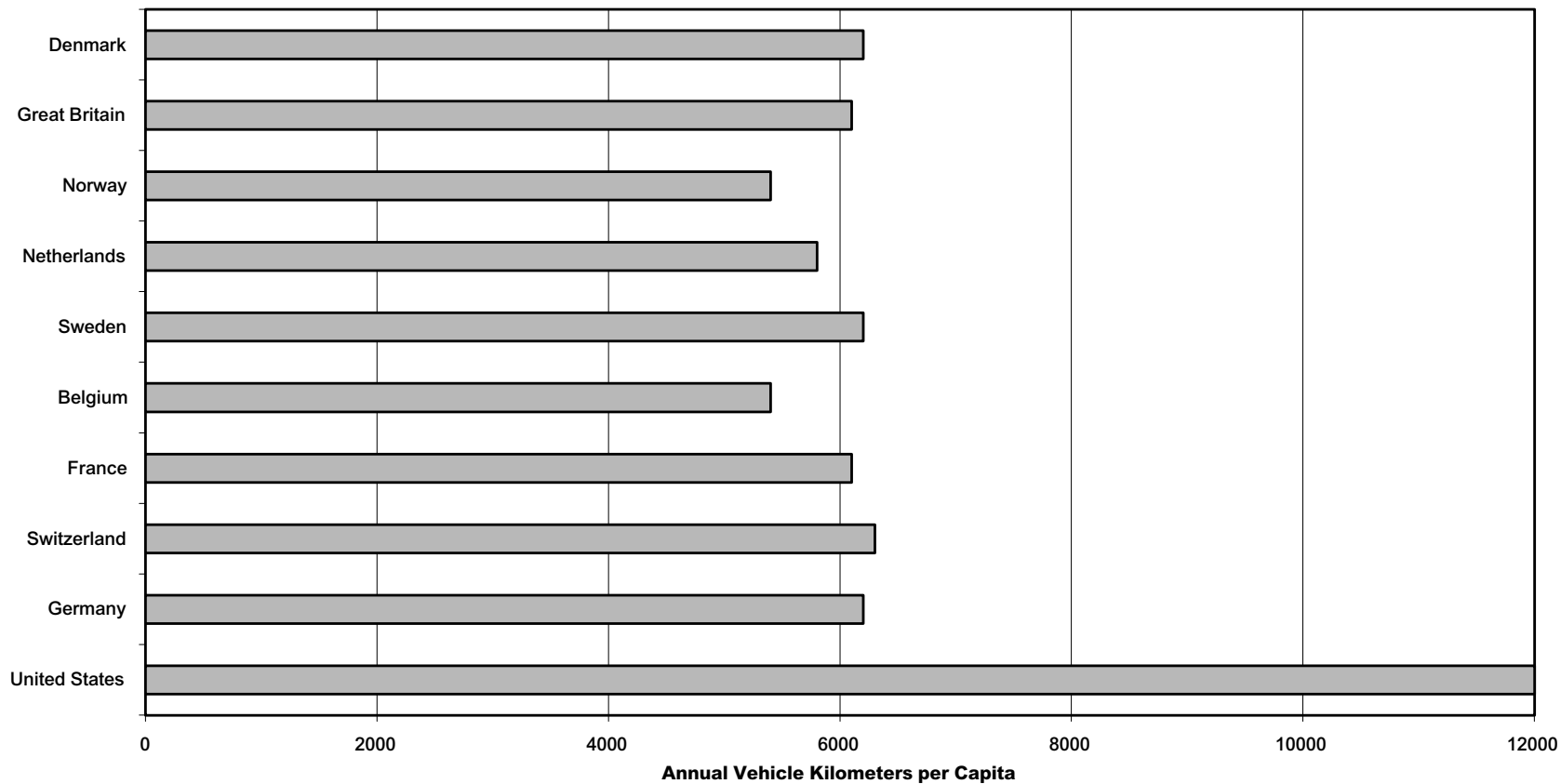


FIGURE 3-2 Average consumer (after-tax) prices for motor fuel, November 1998 (Metschies 1999, 30, 42).



Note: U.S. figures include share of light trucks used for personal travel. Data not available for Canada.

FIGURE 3-3 Passenger car travel per capita, United States and Western Europe, 1996. [European data obtained from *EU Transport in Figures: Statistical Handbook* ([www.europa.eu.int](http://www.europa.eu.int)).]

## Restrictive Parking Policies

Another important, and sometimes overlooked, factor influencing mode choice is the price and supply of parking; indeed, some analysts believe this may be the single most important factor affecting transit ridership (Dueker et al. 1998). To be sure, the difficulty and expense of obtaining parking affects mode choice in busy downtown U.S. locations—most notably in Manhattan, but also in the core activity areas of many other cities, such as San Francisco, Chicago, and Boston. Land scarcity and local restrictions on curbside parking long ago drove up parking costs in the central business districts of these cities. Typically, parking in central business districts costs upwards of \$50 per month—and often much more depending on city size and land value. In a few cases, steep local taxes on commercial parking facilities have raised the cost of parking still further, and in a few instances—such as Manhattan and Portland, Oregon—such taxes are aimed explicitly at reducing downtown driving.

For the most part, however, American motorists do not pay directly for parking on the vast majority of their trips. More than 90 percent of U.S. urban commuters who drive to work are not charged for parking, and the proportion exceeds 98 percent for most other trips (Shoup 1994; Shoup 1999). In most cases, businesses provide parking for their customers and employees, usually for free, but sometimes with nominal charges. Although many Western European businesses also provide free parking for their customers and employees, a higher proportion of businesses are located in commercial districts where parking is limited by available space and government regulations. These regulations are frequently aimed at limiting the supply of workplace parking by establishing a maximum number of parking spaces.

As in the central business districts of many large U.S. cities, metered on-street parking is often limited to short-term use (1/2 to 2 hours) in Western European cities. Longer-term parking is prohibited not only to make space for business and retail parking, but also to discourage driving by commuters and to foster use of public transit. Munich has eliminated metered on-street parking entirely in its central business district (TCRP 1997a, 9). There are also areas in a number of Western European cities where the supply of residential on-street parking is constrained by meters and a fixed supply of permits. In some cases, residential developments prohibit car parking altogether.

Local governments in the United States are also apt to provide convenient public parking facilities to satisfy motorists' demand. Even in land-scarce downtown areas, merchants have often lobbied successfully for such public facilities to attract customers who might otherwise patronize suburban businesses with ample parking (Hamerslag et al. 1995; Levinson and Weant 1998). Whereas Western European and Canadian municipalities have a similar interest in promoting their established central business districts, they employ other means of doing so. For instance, regional land use plans discourage large shopping centers in suburban areas and enforce areawide parking controls (Downs 1999, 18). As an example, the regional plan for the Ottawa metropolitan area permits the development of large-scale shopping centers only when they are located on rapid bus transit routes. By comparison, regulations concerning both parking and land use are nearly always local responsibilities in the United States and are seldom coordinated across jurisdictions in a metropolitan area.

A comparison of the way parking is treated in local zoning is illuminating. Toronto's zoning ordinances, for instance, set a maximum number of parking spots per unit of floor space. In a similar manner, London has a policy limiting the amount of parking that can be provided in new buildings accessible by transit, whereas Munich does not allow the construction of new office buildings with parking garages in its central business district (TCRP 1997a; TCRP 1998, 12–13). These policies represent an attempt to reduce the number of parking spaces available to workers, thereby encouraging more transit use and carpooling (Cervero 1986). In several other German cities (e.g., Hamburg, Stuttgart, Nuremberg), office building owners in congested areas served by public transit are prohibited from constructing new parking spaces; instead, they are assessed a fee to help pay for park-and-ride facilities. The assessment is typically equivalent to 60 to 80 percent of what it would cost to build parking facilities (Topp 1991, 13–15). In the Netherlands, the national government has established targets for maximum numbers of parking spaces per 100 employees. They range from a low of 10 in certain congested areas, such as the Randstad, to 40 elsewhere (Hamerslag et al. 1995, 76–77). In addition, Canadian and Western European cities often encourage developers to reduce demand for parking spaces by offering workers discounted transit passes and encouraging ridesharing (Cervero 1986).

A few U.S. cities limit downtown parking supply; for instance, San Francisco discourages the construction of freestanding garages in its downtown,

and Seattle, Boston, and Portland, Oregon, have prohibited parking or set ceilings on the number of parking spaces in downtown office buildings. In general, however, building codes in most U.S. cities specify a *minimum* number of parking spaces to reduce overflow onto public streets or adjacent private property, although more often it is mortgage lenders and underwriters who require minimum parking ratios out of concern that an office building with few parking spaces will be unmarketable (Dueker et al. 1998).

In the United States, moreover, most workers are exempt from paying federal and state income taxes on parking privileges provided by their employers. This exemption is viewed by some analysts as yet another inducement to drive (Shoup 1994; Shoup 1999; Kessler and Schroer 1995). These analysts maintain that if employer-provided parking were treated as a taxable form of income, more employees would demand higher cash wages in lieu of this fringe benefit. Presumably, some would then ride transit instead of driving to work, provided such transit service were readily available.

### **Road User Fees and Driving Constraints**

Charging motorists directly for the use of roads through tolls and other pricing methods that vary with congestion levels has long been advocated by economists as a means of managing traffic demand, particularly during peak hours. Road pricing for this purpose, however, remains rare in the United States, as well as in Canada and Western Europe.<sup>7</sup> More common, especially in the latter regions, are various physical and regulatory approaches for reducing automobile demand.

Tolls account for about 5 percent of highway revenues in the United States (FHWA 1998, Table HF-1). With few exceptions, tolls are used mainly to generate revenue for financing highway infrastructure; they are seldom used to regulate motor vehicle demand or spur the use of transit and alternative transport modes. Among the exceptions are the Golden Gate Bridge, Highway, and Transportation District in San Francisco and the many toll bridges and tunnels leading into Manhattan and other parts of New York City. In the former case, bridge toll revenues are used to subsidize bus and ferry service. In the latter instance, the Port Authority of New York and New Jersey and the New York City Metropolitan Transportation Authority, which administer the tolled highway facilities, also operate rail, bus, and ferry transit systems in the New York area, and the tolls are used to help finance this service. These joint responsibilities allow for some co-

ordination of tolls and transit fares to influence demand for both transit and highway travel.<sup>8</sup> With few such exceptions, however, the coordination of transit and highway pricing is rare in the United States.

In Canada and Western Europe, tolls are likewise used mainly for raising revenue or financing highways, as opposed to reducing automobile travel and encouraging the use of alternative modes. Several cities in Norway—Bergen, Oslo, and Trondheim—have cordoned off central business districts with a ring of toll stations that have marginally reduced downtown traffic levels, but these tolls were introduced as a means of raising revenues for new road infrastructure (Johansson and Mattsson 1994, 2; Banister and Marshall 2000, 40). And though many road-pricing schemes have been proposed, no Western European cities have adopted such measures specifically to reduce urban congestion, boost public transit use, or otherwise improve the efficiency of urban transportation systems (Gómez-Ibáñez and Small 1994). This situation may change, however, as a number of cities are considering road pricing. For instance, the mayor of London has set a target of late 2002 for the introduction of such charges to generate revenue for improvements to the city's transport infrastructure.

More common in Western Europe, especially in the Netherlands, Germany, and Scandinavia, are efforts to reduce automobile travel through roadway design and traffic regulations, in some cases by slowing and redirecting automobile traffic and in other cases by prohibiting it in certain locations. This is accomplished through a variety of means: by installing paving blocks or speed bumps to make road surfaces unpleasant to drive over; by lowering speed limits; by removing or narrowing traffic lanes to slow vehicles; and by placing hindrances, such as plantings or islands, along the road (Denmark Ministry of Transport 1993; Hass-Klau 1993; Banister and Marshall 2000, 30–32). Encompassed within the broader concept of traffic "calming," such measures were first introduced in northern Western Europe in the 1960s and 1970s when the rapid influx of motor vehicles was beginning to overwhelm many urban street networks. Another measure, long common in towns and cities of the Netherlands, is "woonerven" areas, where cars share the roadway with pedestrians and bicyclists.

Also common in Western Europe are banning through-traffic in busy downtowns, closing streets altogether to automobile traffic at certain times of the day, and permanently converting streets to pedestrian ways. The latter practice is especially popular in Germany and has spread in recent years



Road tolls are used sparingly to manage demand for automobile travel in both North America and Western Europe. (© UITP. Reprinted with permission from *Public Transport International*, No. 5, 1999, J. Groenendijk, Fare Payment for Infrastructure Use, p. 23.)

to Great Britain, France, the Netherlands, and other parts of Western Europe (Hass-Klau 1993; Banister and Marshall 2000, 29–32). In contrast with the United States, where pedestrian malls have been tried only on some street segments, one can find whole commercial districts that have been converted to pedestrian zones in northern and central Western Europe, even in small cities such as Enschede, Netherlands, and Ravensburg, Germany (TCRP 1997b, 8; Banister and Marshall 2000, 31–32). Though transit vehicles are often allowed in these zones, private cars and trucks can enter only at certain times of the day, if at all.

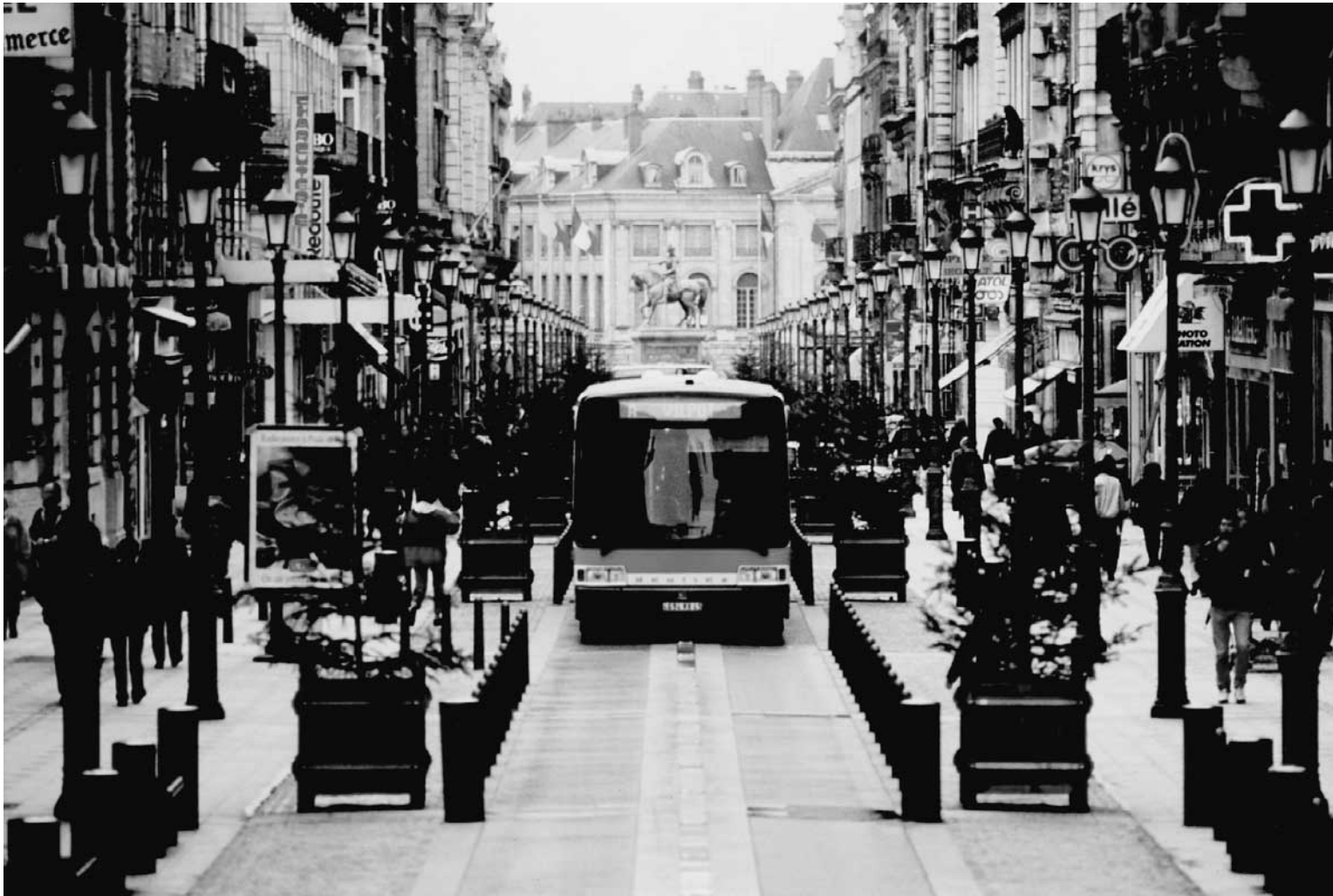
Traffic controls and roadway design methods are seldom if ever used in the United States to deter automobile use; instead, they are typically targeted to reducing through traffic and travel speeds in residential areas (Weinstein and Deakin 1998). The ubiquitous suburban cul-de-sac, cou-



pled with curves, speed bumps, and four-way stop signs, is perhaps the most common physical constraint imposed by U.S. traffic planners on motorists. Its usual purpose, however, is to slow motorists down and encourage them to use main roads for through travel. In fact, the meandering streets and dead-end courts that typify so many newer suburbs in the United States have proven especially problematic for transit services, since these street configurations slow down buses and increase walking distances to bus stops on main routes.

Still, there have been occasional exceptions to the overall reluctance of U.S. traffic engineers to discourage automobile use. One notable example is the decision by Washington, D.C., to turn some of its major arterials into lower-volume collector roads following the start of Metro rail service in the late 1970s. Some main commuter routes (e.g., 13th and 16th Streets connecting suburban Maryland) were converted to two-way streets, while peak-hour restrictions on curb parking were lifted. Portland (Oregon), Baltimore, and several other cities that have introduced light rail lines in recent years have reduced roadway capacity, since these transit lines operate over some city thoroughfares once used exclusively by motor vehicles. In most cases, however, these were lightly used streets.

Overall, a transit-first approach to city transportation is rare in the United States. However, a number of states and localities encourage transit use and other ridesharing options as part of their overall strategies to manage transportation demand, seeking to reduce traffic congestion and air pollution by curbing travel in single-occupant vehicles. Many cities have implemented bus-only lanes, and the number of cities with rail transit lines has grown during the past 25 years. The use of combination express bus/carpool lanes [referred to as high-occupancy vehicle (HOV) facilities] has increased as well. Dozens of HOV facilities consisting of several hundred kilometers of freeway and main arterials have been introduced during the past two decades. The Houston, Washington, and Los Angeles metropolitan areas have extensive HOV facilities. U.S. cities are often described as world leaders in this integrated means of facilitating automobile, vanpool, and bus movements, although bus use is minimal on most such facilities. In some cases (e.g., Washington, D.C.), extensive HOV facilities may be reducing demand for parallel rapid and commuter rail systems. Most HOV facilities serve commuters traveling between suburbs and city centers and therefore do not aid intra-urban transit movements.



Extensive pedestrian malls like this one in Orleans, France, discourage travel by automobile and encourage walking, biking, and transit use. (© UITP. Reprinted with permission from *Public Transport International*, No. 5, 1998, W. J. Tyson, Non-User Benefits of Public Transport, p. 40.)

## **COORDINATION OF URBAN LAND USE AND TRANSPORTATION DECISIONS**

In large American urban areas, there is often a mismatch between changing demands for public services and the traditional boundaries of local governments charged with providing these services. Many urban populations that once fit neatly into cities of a few dozen or hundred square kilometers are today much larger and more dispersed, often covering several thousand square kilometers and encompassing scores or even hundreds of largely autonomous local governments.

Concerned about inefficiencies and inequities in the provision of government services that can accompany such political dispersion and decentralization, urban planners have long urged the creation of metropolitanwide governments and other regional institutions with multiple functions (Meltzer 1984, 102–130). To some urban planners, such arrangements offer a way to control the spread of urban development; protect the green spaces around cities; and preserve the economic, social, and cultural importance of central cities. Except in a handful of cases (e.g., Miami, Nashville, Indianapolis), however, these recommendations have been largely unheeded in the politically fragmented landscape of urban America.

Major reasons for the lack of interest in metropolitan governance among urban Americans include the prospect of losing influence over land use regulation and property values; autonomy in taxation; and control over schools, policing, and other public services (Husock 1998). In most instances, these responsibilities and authorities were long ago ceded by state legislatures to local governments. In the case of land use regulation, state and federal governments have little direct influence. Conversely, local governments have traditionally had secondary roles in the planning and provision of major urban transport systems. Because highway and transit facilities are costly and complex to build and run—and are by their very nature designed to transcend the urban region—state and regional bodies plan and administer them in most urban areas. Meanwhile, the federal government provides financial and technical aid.

Except in some Canadian provinces, regional urban governments with unified control over land use and infrastructure are also rare outside the United States. In many Western European countries, local, regional, and

national governments share these responsibilities more or less equally. In some countries, urban land use and transportation decision-making authorities are held by a single government body—usually the national government. In either case, such arrangements create more opportunities for coordinating land use and infrastructure planning.

Tables 3-2 and 3-3 summarize the various government roles in coordinating urban land use, transit, and other transportation decisions in the United States, Canada, and several Western European countries. These summary points are elaborated in the following subsections.

### **Land Use, Transit, and Highway Planning in the United States**

The number of local governments and the extent of their autonomy vary widely among American cities. Some older urbanized areas, such as greater St. Louis, Chicago, Boston, and Philadelphia, encompass hundreds of governments, and even fan out across several states. In other (often newer) urban areas, such as Indianapolis, Omaha, Oklahoma City, Jacksonville, and Albuquerque, the central city's boundaries have been expanded outward through annexation of once-rural areas to cover most of the metropolitan population.<sup>9</sup> In a few cases, large counties, such as Dade County encompassing Miami, have jurisdiction over much of the metropolitan area.

Though regional government bodies exist in many metropolitan areas, their role is usually limited to providing specific services, such as sanitation, water, parks, toll roads, airports, and public transit. On rare occasions—most notably in Portland, Oregon, and to a lesser extent in Minneapolis–St. Paul and Atlanta—metropolitanwide governments have been granted authority to make certain decisions about land use, transportation, and taxation that affect the entire region (Downs 1999; Eplan 1999; Katz and Bradley 1999). The majority of special-authority districts are established to supply a single commodity-like service most efficiently and have boundaries that encompass only parts of the metropolitan area. The Chicago region, for instance, has more than 500 such special districts that provide dozens of different services (Hemmens 1999, 125).

Most Americans, however, are reluctant to relinquish local control over land use, schools, and certain other public services and responsibilities that directly affect their quality of life (Williams 1971; Baldassare

et al. 1996). Some economists postulate that while such behavior may be parochial, it may also lead to the more efficient provision of public services. Although controversial (partly because it can be used to endorse exclusionary zoning), this theory holds that smaller, decentralized jurisdictions can best provide the type and quality of services (e.g., schools, parks, libraries) preferred by local residents. Competition among local governments for residents and tax-paying businesses, it is argued, can compel greater efficiency in the provision of services and more rational choices about the kinds of public services supplied, as well as the ways local governments exercise certain authorities, such as zoning and land use regulation (Tiebout 1956; Mieszkowski and Zodrow 1989).

By and large, local governments in the United States plan land uses as they wish with little oversight by state governments or coordination with other nearby jurisdictions (Porter 1991). Even when federal, state, and regional bodies (such as environmental agencies) do claim some oversight responsibility, their involvement is often reactive (Bollens 1992). For instance, whereas some states may review, and even preempt, local zoning and land use plans for conformity with statewide guidelines, they seldom participate directly in local planning processes or try to coordinate plans among localities (CBSSE 1999; Porter 1991; Bollens 1992). Because local governments are so dependent on real property taxes for revenue, state governments are reluctant to preempt local authority over land use. Likewise, local communities are often reluctant to accept state or regional intervention in land use, concerned that they will lose their ability both to deter undesirable forms of development and to entice other kinds of development that could raise property values and revenues.

In contrast, major urban transportation planning and programming are almost always handled at the state and regional levels, often with significant federal aid. Most public transit systems, for instance, are governed by a regional authority designated for a specific metropolitan area. Sometimes there is more than one public agency providing transit services in large urban areas, each with responsibility for a particular service (e.g., commuter rail or express bus operations) or for services within subregions.

Most transit authorities are overseen by boards of directors that include representatives from those jurisdictions receiving the service and contributing funding. Directors are often local elected officials; they are responsible for major transit policy and planning decisions; and the tran-

**Table 3-2 Public- and Private-Sector Roles in Providing Public Transit Service  
in the United States, Canada, and Selected Countries of Western Europe**

Country	National Role	State and Regional Role	Local Role	Private-Sector Role
United States	The federal government provides state and local governments with aid for the provision of transit infrastructure and equipment, contributing about half of transit capital funds. A small share of operating revenues is provided by the federal government (the share is largest for small transit systems).	Many states provide revenue for transit capital and operations. A few have state transit agencies with operating authority. Most have established regional transit districts for each metropolitan area. State-approved regional taxes (such as sales taxes) are sometimes used to generate the revenue for major capital improvements or operating subsidies.	County and city governments often provide operating subsidies for regional transit agencies. The revenue is derived from local property taxes, sales taxes, and other local sources. Transit is sometimes organized at the county or city level, rather than the regional level.	Private transit contracting is common in some states and most prevalent in California. Private businesses compete to provide specific transit services (or management functions) that are paid for and prescribed by state and local governments or by public transit authorities. The practice is most common among small transit systems and for specialized transit services such as paratransit and aspects of service such as maintenance. A small number of larger systems (e.g., in Denver and in San Diego and Orange Counties in California) have adopted this approach widely.
Canada	The national government has no role in transit funding, organization, or planning, except for some research and development programs.	The 10 Canadian provinces have traditionally provided significant capital and operating subsidies for urban transit (about half the total), although this responsibility has increasingly been shifted to metropolitan and municipal governments.	Regional metropolitan governments and their constituent municipalities provide most transit services with funding support from the province. Revenues are also derived from property taxes levied in special "transit assessment" districts. Some individual cities and mu-	The private sector has a small role in the provision of transit, except for some contracting with private business to supply services prescribed by the public-sector transit agencies.

Germany	<p>The national government provides states (Länder) with block funds that can be used to subsidize commuter rail services or otherwise employed by local governments to fund mass transit. The federal government also contributes aid to specific capital projects, with state and local government sharing in the cost using revenues derived from motor fuel taxes.</p>	<p>States subsidize commuter rail and provide local government with funds for transit. States cover about half the cost of providing and maintaining railway infrastructure. They also set minimum transit service level requirements that must be met by local governments.</p>	<p>nicipalities also provide transit services, for instance through public utility commissions.</p> <p>Many local governments allocate state and federal transit funds to regional cooperatives of transit operators known as "verkehrsverbunds" (VVBs). The VVBs coordinate the provision of transit services over the entire region and reallocate funds among individual operators.</p>	<p>The private sector is increasingly being called upon to compete for contract work. The Swedish model of private contracting or "tendering" on a route-by-route basis is becoming more common.</p>
France	<p>The national government finances transit directly in Paris and surrounding suburbs. National subsidies are minimal in the provinces, however, with the exception of funding for large rail transit additions or improvements.</p>	<p>Transit is organized at the regional level by the province or by groups of municipalities.</p>	<p>Local governments have the main responsibility for subsidizing bus and rail service (capital and operations) using revenues from employer payroll taxes approved by the national government. Taxes may be as high as 40 percent of an employer's payroll.</p>	<p>A small number of large private bus companies operate service franchises in municipalities. The companies compete to provide service over entire networks (as opposed to routes), and they are subsidized by local governments. These companies usually own their own equipment and have long-term contracts.</p>

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**Table 3-2 (continued) Public- and Private-Sector Roles in Providing Public Transit Service in the United States, Canada, and Selected Countries of Western Europe**

Country	National Role	State and Regional Role	Local Role	Private-Sector Role
Sweden	The national government's contribution is limited mainly to the funding of major rail infrastructure projects.	County governments have primary responsibility for transit operating and capital subsidies and for the planning of services. Subsidies are allocated to local government for the procurement of transit services.	Local governments are responsible for procuring the services of private contractors. They contribute about half of the operating subsidy required (except in the Stockholm area, where the county contributes all of the subsidy and has sole responsibility for planning and procuring transit services).	Private companies bid for service on specific routes, according to fare, service, and schedule parameters prescribed by the local authority. Rail and bus operations are contracted out. The public sector prescribes the route and fare schedules to be adhered to and often owns the equipment and other necessary infrastructure.
Great Britain	The national government has primary responsibility for funding rail and bus transit in greater London. It also subsidizes commuter rail outside London by providing funds to local passenger transport authorities. In other areas, local authorities support some transit services with grant aid from the national government.		Local governments (e.g., counties) subsidize a small number of bus routes designated by passenger transport authorities as "socially necessary." Local authorities also fund concessionary fares for students, the disabled, and the elderly.	Bus services outside London are largely private, unregulated, and unsubsidized except for subsidies provided to private operators for "socially necessary" services. Private bus companies provide lightly subsidized contract services in greater London.
Netherlands	The national government provides most transit subsidies, contributing to both operations and capital. It also sets fare and service policies.		Local governments have minimal funding responsibility but are responsible for tendering private-sector services and ensuring performance.	Private companies are increasingly being called upon to compete for contract services.



**Table 3-3 Urban Governance, Land Use, and Transportation Coordination in the United States, Canada, and Selected Countries of Western Europe**

Country	Urban Governance	Land Use Planning	Transportation Planning	Land Use and Transportation Coordination
United States	Most urban areas contain dozens of autonomous governments, though large counties can form "regional" governments, and some cities have annexed suburban areas. Taxes are seldom levied at the metropolitan level except for specific services, such as transit.	Zoning and other land use powers have been ceded by most states to local governments. Some states review local land use plans, but local autonomy is seldom abridged. Intergovernmental competition for revenue hinders regional land use planning.	Highway and transit planning is usually conducted at the state or regional level. MPOs coordinate federal funding for transit, highways, and other transportation infrastructure in most urban areas.	MPOs are sometimes part of regional councils of governments that prepare long-range land use plans. Seldom, however, have jurisdictions established more formal means of coordinating transportation and land use at the regional level.
Canada	Many provinces (e.g., Ontario) have created regional governments or "municipal regions" that have multiple authorities and responsibilities for the urbanized area as a whole. They often have taxing authority; carry out regional land use and infrastructure planning; and provide many public services, such as policing and transit.	Land use plans developed by metropolitan governments (municipal regions) must comply with land use guidelines developed by provincial boards. The specific zoning regulations of local governments must conform to the land use plans developed by the metropolitan governments and approved by the province.	Provinces have traditionally funded and planned most urban transportation infrastructure, although in recent years, much of the funding and planning responsibility has been shifted to metropolitan governments.	Municipal regions have significant responsibility for both urban land use and transportation planning. Responsibilities for both often reside in the same government office, facilitating the coordination of planning and decision making.
Germany	Urban areas can contain dozens of local governments. State and local governments have taxing authority. There are few metropolitanwide governments. Local governments	The German constitution calls for the federal government to establish a national land use plan to serve as a guide for state and local governments. Local regulations must con-	The federal role in urban transportation planning and funding is diminishing, although the federal government has a national transportation plan. State and local governments	Formal links exist between state and local transportation and land use planners. All of these plans must comport with national land use and transportation guidelines.

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**Table 3-3 (continued) Urban Governance, Land Use, and Transportation Coordination in the United States, Canada, and Selected Countries of Western Europe**

Country	Urban Governance	Land Use Planning	Transportation Planning	Land Use and Transportation Coordination
Great Britain	<p>receive much of their revenue from state and federal grants.</p> <p>The national government has considerable influence on local governance. Local councils have limited authority, and there are no metropolitanwide governments. Most taxes are collected at the national level and distributed to local governments.</p>	<p>form to these federal and state guidelines.</p> <p>Land use planning is the responsibility of local officials but is subject to national guidance. Most regions have land use planning conferences that produce advisory land use strategies for their areas. Local authorities determine zoning in their urban development plans, which are subject to approval and revision by the national government.</p>	<p>are responsible for most urban transportation planning.</p> <p>The national government establishes overall transportation policy and funding. Local authorities produce local transport policies and programs designed to implement nationally developed and funded policies. Highway and transit rail infrastructure is funded by the national government. Bus services are generally private and uncoordinated by government.</p>	<p>The coordination of urban transportation and land use policies occurs at the national level; however, local coordination is managed through local transport plans that are part of broader urban development plans linking transportation programs with education, health, welfare, and other public services.</p>
Netherlands	<p>Local governments function mainly as service providers, rather than policy makers. They are funded largely by the national government through grants and revenue-sharing programs that have many stipulations.</p>	<p>The national government establishes land use directives for regions and has the authority to review all local land use plans and regulations for compliance. Local governments develop zoning ordinances in accordance with these national directives.</p>	<p>Most transportation financing and planning are managed by the national government's ministry of transportation. Local governments have a largely advisory role, as well as responsibility for implementation.</p>	<p>Because the national government has the main responsibility for land use and transportation planning, the two can be closely coordinated.</p>

*Note: MPO = metropolitan planning organization.*

sit agency's professional staff report to them. RTA in Chicago, MARTA in Atlanta, WMATA in Washington, and SEPTA in Philadelphia are examples of large, regional transit authorities overseen by elected officials from throughout the metropolitan area. Frequently, these regional authorities span two or more states. In a few cases, such as Maryland, New Jersey, and Rhode Island, a single statewide transit agency—usually housed in the state department of transportation—administers transit services in several urban and rural areas.

By comparison, urban highway programs are typically administered by state transportation departments or toll authorities (and sometimes by multistate authorities, such as the Port Authority of New York and New Jersey). Since the 1930s, most states have enacted laws requiring that revenues from gasoline and diesel taxes be used largely or almost exclusively for highway construction, maintenance, and operations, an approach emulated by the federal government (Rose 1979, 34–36). Given their ability to impose such taxes over wide areas, state governments have been in a better position than local governments to raise the large sums of money needed to fund highway infrastructure and match federal grants (Wachs and Dill 1999; Rose 1979, 96).

The prominent state role in highway planning, funding, and operations has often been criticized for resulting in neglect of local needs and concerns. Beginning in the late 1960s, the federal government required states to establish metropolitan planning organizations (MPOs) to coordinate state and local transportation planning. MPOs were specifically charged with integrating and unifying federal-aid programming for both highway and transit projects. Most local governments in urbanized areas now participate in an MPO. Although organizational approaches vary by area, MPOs in most major urban areas are overseen by boards of directors consisting of local officials drawn from several counties and dozens of municipalities.

In recent years, the role of MPOs in allocating federal and state funds for urban highway and transit projects has been enhanced by federal legislation such as the Intermodal Surface Transportation Efficiency Act of 1991. The MPO's traditionally small role in developing and implementing land use plans has changed very little, however. For the most part, transportation plans developed by MPOs are reactive to many local and private-sector land use plans and decisions. Whereas regional transportation investments may subsequently affect land use (e.g., by prompting highway-

oriented development), such effects are examined mainly at the local level. As the only regional institution in many urban areas, MPOs offer a rare opportunity for local jurisdictions to discuss and possibly coordinate their local land use plans (Porter 1991). However, MPOs seldom have any direct jurisdiction over local land use, and most have few operational or implementation capabilities (Wachs and Dill 1999, 307).

Because the majority of local governments depend on land and real property taxes for much of their revenue, they are generally unwilling to relinquish to regional institutions any authority over land use planning and decision making. Competition among local communities for tax-producing development can render land use decision making even more complicated and unwieldy to coordinate regionally (Howitt and Altshuler 1993).

Only a few governments in the United States have shared or sole control over highway, transit, and land use decisions.<sup>10</sup> The most notable example is the multiple powers vested by the state of Oregon and local voters in the Portland area's metropolitan service district, known as Metro. In addition to being an MPO responsible for allocating funds for transportation facilities in the metropolitan region, Metro has been charged with developing a regional land use plan that sets limits on development outside a state-designated "urban growth boundary." Governed by an elected council, Metro has the authority to compel local governments to adopt land use plans that are in conformity with its regional plan—a power that few if any other MPOs enjoy. For instance, Metro can require local communities to allow high-density, transit-oriented development in the vicinity of transit stations. Although the long-term results of this approach are not yet evident, Portland's regional planning efforts and urban growth boundary are often cited as models for other American cities and states to follow.

Environmental concerns in major metropolitan areas—particularly with regard to air pollution and the need to meet federal air quality standards—have prompted some other states to gradually place limits on local land use control, particularly on major land use decisions. Compelled to meet federal air quality standards in greater Atlanta, for example, the state of Georgia has created the Georgia Regional Transportation Authority (GRTA), which encompasses 80 local jurisdictions. Although regarded primarily as a transportation planning agency, GRTA has been authorized by the state to develop a regional growth strategy. It has also been given power to review and approve all land use decisions in the Atlanta metropolitan area

that have a “regional impact” and require federal or state aid for road improvements (including those as simple as a curb cut) (Eplan 1999). It is noteworthy, however, that GRTA—unlike most regional planning bodies in Western Europe and Canada—cannot overrule efforts by local jurisdictions to exclude growth, such as prohibitions on high-density development near transit lines and stations.

Such regionally coordinated approaches to urban land use and transportation decision making are extraordinary and even interventionist by U.S. standards. Yet they are modest compared with practices in Western Europe and Canada.

### **Urban Land Use, Transit, and Highway Planning in Western Europe and Canada**

As in the United States, the organization and responsibilities of local governments in the large urbanized areas of Western Europe and Canada vary by country, region, and city. This variability is in large part a reflection of different historical circumstances, political institutions, and constitutional frameworks. Germany, for instance, has a long tradition of provincial governance, dating back to its formation from many city-states and principalities. Sweden and Great Britain, in contrast, have a long history of local governance (i.e., municipalities and counties), but a near absence of any intermediate or larger regional forms of government. Still, the national governments in all three of these countries, as in most other Western European countries, have a strong role in many local affairs, including land use planning and regulation. Indeed, the best-known cases of metropolitan planning in Western Europe—the planned creation of suburbs and greenbelts outside the national capitals of Stockholm, London, and Paris—have generally been stimulated and even directed by the national governments seeking to provide amenities for city dwellers (Heidenheimer et al. 1983, 260). The desire of many Western European national governments to preserve agricultural areas around cities has likewise had a significant effect on metropolitan form (Downs 1999).

As in the United States, metropolitanwide governance is not the norm in Western Europe, where dozens of local jurisdictions can coexist within a single urbanized area (Parr 1999, 237).<sup>11</sup> Throughout Western Europe, however, urban land use planning is a national and regional prerogative as much as a local responsibility. This approach differs greatly from that in the

United States, where such shared responsibility is unusual. More than in the United States, national governments of Western Europe have shown a willingness to intervene in local land use planning and regulation. It is probably an accurate observation that Western European local officials are no less interested in controlling commercial and residential development within their jurisdictions, but they simply do not have the autonomy to exert the singular influence of local officials in the United States (Heidenheimer et al. 1983).

National governments in Western Europe exercise influence on land use planning and decision making through various means. The German federal government, for instance, has enacted legislation that discourages localities from competing with one another for development through local property tax concessions, a practice that has become commonplace in the United States. In implementing a constitutionally mandated policy of regional "equalization," the German government transfers local revenues among states (Länder). The states, in turn, must distribute the revenues evenly among local governments—a policy considered essential for local self-determination (CBSSE 1983, 149; Nivola and Crandall 1995, 81; Konukiewitz and Wollman 1982). The federal government has also established national guidelines for state and local authorities to follow when devising land use plans (Heidenheimer et al. 1983). As a practical matter, though, what binds local governments to these national plans is the practice of local revenue redistribution—grant programs with conformity requirements and spending stipulations (Mackensen 1999, 298–301).

Local governments in France, Great Britain, and the Netherlands have even less direct control over land use, including very limited zoning authority. Indeed, the Netherlands has a national Ministry of Land Use. In contrast with the United States, local governments in these countries do not depend heavily on taxes for a significant share of their revenue; they receive grants from the national government. This practice presumably reduces the incentive to use land use controls to influence property values and the local tax base. In Great Britain, Parliament abolished metropolitanwide councils in the mid-1980s; hence most important land use decisions are now likewise made by the national government. While local authorities prepare land use plans, these plans must conform with national guidelines and be approved by the national government, which is also the arbiter in any disputes.

In Canada, the provinces have absolute authority over local government entities and a strong influence on local decision making and institutional arrangements. The provinces have exercised this power by creating and funding metropolitanwide forms of government with wide-ranging powers, including regional land use planning (Rothblatt 1994). In some cases—such as Edmonton and Calgary—a single government entity covers all or most of the metropolitan region, whereas in others—such as Toronto and Ottawa—multifunctional metropolitanwide governments have been superimposed over a tier of local or municipal governments. Though many metropolitan areas consist of several municipalities that are authorized to provide certain local services, such as fire protection and libraries, the regionwide metropolitan governments formed by the provinces have multiple responsibilities that transcend the region, such as public transit, water supply, waste disposal, and policing. They also serve a regional revenue-sharing function and review local land use plans for consistency with regional land use and infrastructure plans.

As an example, the Regional Municipality of Ottawa-Carleton (RMOC), which encompasses 11 cities, townships, and villages, directs local land use through its regional master plan. RMOC was established by the province of Ontario, which requires the creation of a regional plan that integrates area-wide land use, transportation, and other infrastructure decision making (RMOC 1999, 2). In carrying out this planning, a stated goal of the regional municipality is to “maintain and enhance the central area as the region’s focus for economic, cultural, and political activities” (RMOC 1999, 5). Local municipalities may adopt their own land use plans, but these must conform with the regional plan.

Regional plans in Canadian cities not only are strategic in nature, but also offer guidance about land use and transportation policies at a specific and practical level. As an example, the RMOC master plan calls for local communities to adopt specific zoning ordinances that locate new employment-related development near public transit stations. When planning land use and infrastructure facilities and reviewing applications for development, local officials must ensure the following (RMOC 1999, 28):

- Collector roads link several adjacent developments with direct transit routes.

- Local road systems minimize the use of cul-de-sacs.
- All potential building sites are located within 400 m of a public transit station or stop.
- Locations for high-density development are close to existing or proposed public transit stations.
- Direct and safe pedestrian and cycling ways are provided between residences and transit stops.

The Ontario plan—which emphasizes compact corridor development and suburban “centers”—calls for the location of future public transit stations in those locations targeted by the regional plan to be employment centers and areas of mixed-use and compact development (RMOC 1999, 26). By having such coordinated control over regional land use and transportation planning, Canadian urban planners are better positioned to anticipate future transit needs and purchase rights-of-way in corridors before this option is lost or becomes too expensive (Cervero 1986).

Conversely, coordination of urban land use and transportation decision making is possible in much of Western Europe not because these two responsibilities are controlled by a single government, but because governments at several levels share aspects of each—from their funding and implementation to their administration. With no single government unit in charge, all must work together. In Germany, for instance, the federal government has shifted more responsibility for urban highways to the state and municipal governments, which also share responsibility for land use planning and regulation. To assist with funding, the federal government provides states and localities with block grants (derived in large part from motor fuel taxes) that can be used for any transportation purpose. These grants are often accompanied by spending stipulations that give federal agencies influence over land use and transportation decisions.

In some Western European countries, coordination of land use and transportation is possible because one level of government, usually the national government, has almost complete responsibility for major decisions. In Great Britain, for instance, the national government has primary control over both land use and highway decision making (though transit provision is largely a private-sector responsibility outside greater London). Before 1986, when privatization laws were passed by Parliament, regional passenger transport authorities (PTAs) had been responsible for providing all public transit in metropolitan areas. Although PTAs still



exist, their main role is in planning and funding subsidized supplemental bus services (essential services not provided by the private market) and distributing national subsidies for some commuter and light rail services. In general, urban areas (outside of greater London) lack strong regional transit planning organizations, whereas highway and land use planning remain largely national responsibilities.

Other means by which land use, transit, and other transportation policies and programs are coordinated in Western Europe and Canada were summarized earlier in Tables 3-2 and 3-3. The variability noted above makes it difficult to generalize about organizational and jurisdictional approaches. If there is a common denominator, it is that responsibilities for transportation and land use decision making are held by one government or shared among several governments, not divided categorically among several levels of government as in the United States. Whereas coordination of land use and transportation planning does take place in the United States, the usual emphasis is on minimizing the adverse effects that a new development will have on local roadway traffic. In established areas, "in-fill" development proposals are often hindered by zoning ordinances forbidding new development that will increase local traffic volumes. The cumulative effects of these many local actions—usually eschewing higher-density development—on regional and metropolitan-wide land use and transportation patterns are seldom considered in formulating these plans. The local news article in Box 3-1 illustrates the difficulties that arise from these conflicting demands.

The existence of a more broadly oriented national or state role in land use decision making is perhaps the single most important factor distinguishing the transit-related policies and practices of Western Europe and Canada from those of the United States. Possible factors underlying this difference are considered in the next chapter.

## Box 3-1

News Article Illustrating the Difficulties of  
Regional Land Use and Transportation  
Coordination in U.S. Urban Areas

***Fairfax Weighs Buildup Around Metro Stations***

When Metro riders get off at the Wiehle Avenue Station—one of four stops envisioned along a future train line down the Dulles Toll Road—they will be greeted by towering office and apartment buildings, urban-style restaurants and shops, and a design that all but eliminates the need for a car. That's the vision of a small group of Fairfax County business leaders, activists and politicians who have been meeting for six months to determine what the area around the stations should look like once they arrive—scheduled for 2006. Picture a smaller version of Ballston, the mini-city that rises around the Orange Line in Arlington. Or maybe a larger version of the Reston Town Center, with its upscale feel, pedestrian-friendly avenues and piazza dominated by a burbling fountain. Imagine high rises atop the Metro stations, with shops, museums, health clubs, dry cleaners and banks built on bridges arching across the Dulles airport and toll roads.

Members of the Dulles Rail Land Use Task Force are to report in March to the Board of Supervisors on changes that may be needed in the county's long-range plan. Not everyone is on the same page.

Residents living near the future Metro sites worry they will wake up one day to find that traffic has worsened, thanks to those huge buildings shadowing the swing sets in their yards. Likewise, county planners advising the Dulles Rail Land Use Task Force warn that if development is too intense, it will overwhelm nearby roads because most people who live or work in the new buildings will drive. Planners are suggesting that less development be considered.

"We have been looking at what the planned transportation network capacity is for that area," said Heidi Merkel, the county planner in

charge of supporting the task force. "Our fundamental assumption is that a considerable majority would continue to arrive in a car."

In addition, county planners oppose putting development on top of the Metro stations or across the toll road—which would require the complicated acquisition of air rights from several agencies, including Metro and the Metropolitan Washington Airports Authority. John Palatiello, who sits on both the county Planning Commission and the Dulles task force, said many task force members believe the staff is being too cautious. He said the Metro station development needs to be big enough to inject an urban feel into the heart of suburbia. Building close to, or on top of, the Metro stations may be essential to that atmosphere, he said. "There's a philosophical difference, and there's going to continue to be some different view of the world," he said. "Our job is not to make political assessments as to what is politically doable. Our job is to create a vision, create a situation where once someone is there, they can walk to a place to have lunch, walk to a dry cleaner, walk to a bank."

Fairfax County has been criticized in the past for not achieving that kind of development around its Metro stations. Construction around the Vienna stop, for example, consists largely of two-story town houses. Just this week, another multitier parking garage opened at the station to accommodate the army of commuters who arrive by car each day. Stuart Schwartz, director of the Coalition for Smarter Growth, praised the task force for seeking a better way, but faulted Fairfax officials for not addressing the county's overall land policies as they discuss the Dulles corridor. Concentrating people in high rises around Metro stations will ease congestion on nearby roads only if accompanied by large-scale reductions of development in other parts of the county, Schwartz said.

"Yes, development around the Metro stations is very important. But ideally, this corridor shouldn't be looked at in isolation," he said. "Ideally, you'd look at the county as a whole and eastern Loudoun together. If we shifted office development and residential development out of other areas and put it in this corridor, our traffic problems would be reduced." County officials note that would be difficult given centuries-

Continued ▶

**Box 3-1 (continued) News Article Illustrating the Difficulties of Regional Land Use and Transportation Coordination in U.S. Urban Areas**

old laws and legal precedents in the state that often favor the rights of landowners over local government.

Supervisor Gerald E. Connolly (D-Providence) said board members might be willing to reduce the amount of development in one part of the county in exchange for increasing it elsewhere—if such a trade-off were legal. “People do have land rights in Virginia, and it’s not an easy task to be more directive about development,” he said. “We are trying to do it with carrots. We don’t have many sticks.” Still, some people, like Joe Caravella, say they want the task force, and later the supervisors, to think hard before approving a plan that would permit large new developments so close to existing neighborhoods. Caravella lives in Hunters Green Cluster, a community of 118 homes just south of the proposed Wiehle Avenue station. He and his neighbors would be concerned if the six- and eight-story buildings near their neighborhood suddenly were doubled in size, he said. And all are holding their breath over what that might do to their roads. “The traffic is an absolute disaster now,” Caravella argued. “You’ve got gridlock at 5:15.” While Hudgins expressed confidence that the task force and supervisors will listen carefully to concerns, she said the new communities must include homes, businesses and shops. “Some folks have shared the view that they have moved out here because it is ‘out here,’” she said. “They recognize that as we have grown, we have to accommodate the growth. To what level? All of these issues need to be explored to know what the impact is in the community.”

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**NOTES**

1. Karlsruhe officials estimate that the elimination of interline transfers has reduced travel times by more than 35 percent for affected travelers (TCRP 1997a, 6).
2. Similar devices have been installed on a limited basis in some American cities, such as San Francisco.
3. For a more detailed review of organizational and institutional changes in Western European public transit, see UITP (1997).

4. Outside greater London, transit bus services are completely privatized, subject mainly to safety regulations. Private companies are free to set fares and schedules and enter and exit routes as they see fit. Within greater London, London Transport contracts with private companies for the provision of bus services and therefore continues to control or have significant influence over bus fares, routes, schedules, and many aspects of service quality.
5. A small portion (around 10 percent) of the gap is attributable to differences in production, transportation, and distribution efficiencies (Metschies 1999, 90).
6. Diesel fuel, not shown in this table, is not taxed as heavily as gasoline in many Western European countries. The relatively low tax on diesel, combined with its greater fuel efficiency, has resulted in a large share of diesel-powered automobiles in France, the Netherlands, Germany, Sweden, and several other Western European countries. In these countries, diesel prices are 20 to 40 percent lower per liter than gasoline prices. In effect, this differing tax treatment, coupled with the large share of diesel passenger cars, makes motor fuel prices marginally closer to those in the United States overall, but still much higher on average.
7. In a few instances in the United States—most notably on the San Diego carpool lanes and the New Jersey Turnpike—tolls are added or varied by time of day to influence levels of traffic. The public's response to these programs, promoted as "value pricing," is being followed closely to determine the potential for further application.
8. For instance, the Port Authority of New York and New Jersey, which sets tolls on the Hudson River (west-side) crossings between New Jersey and Manhattan, is also responsible for the PATH railway, the main transit connection over the river. The New York Metropolitan Transportation Authority administers the tolls on the east-side crossings into Manhattan (and in the other boroughs of New York City) and runs New York City's subway, bus, and northern and eastern commuter rail lines.
9. For instance, the cities of Dallas, Columbus, and Albuquerque have increased their land area by 25 percent since 1970 (Ladd 1999, 329–331).
10. According to Downs (1994, 132), fewer than a dozen of the nation's more than 300 metropolitan areas have metropolitan regional governance.
11. Parr (1999) identifies the exceptions of the Berlin, Bremen, and Hamburg Länder, which are closely matched with each metropolitan area.

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### ABBREVIATIONS

CBSSE	Commission on Behavioral and Social Sciences and Education
FHWA	Federal Highway Administration
RMOG	Regional Municipality of Ottawa-Carleton
TCRP	Transit Cooperative Research Program
TRB	Transportation Research Board
UITP	Union Internationale des Transports Publics

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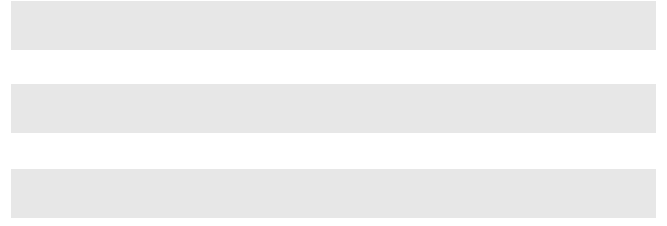
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# 4



## External Policies and Factors Affecting Transit Use

A central aim of this study is to explore the broader external factors that contribute to higher rates of transit usage in Western Europe and Canada than in the United States. Some of the patterns and policies discussed in the previous chapters have been the result of factors well beyond the control of individual transit agencies. These factors, reviewed in this chapter, include differences in basic demographic and economic conditions, in history and tradition, in public attitudes and institutions, in urban highway and housing programs, and in transit management and funding environments.

To be sure, the abundance of historic cities—settled long before the mass introduction of automobiles—has made the provision of public transport especially critical throughout much of Western Europe. Limited urban infrastructure to accommodate automobiles can make driving costly and inconvenient. Yet there are numerous other reasons why Western Europeans use transit more than Americans. Their governments have a long history of taxing automobiles as luxury goods, tightly regulating urban land use, and controlling the supply and location of housing—policies and practices that have tended to encourage both compact urban areas and limited automobile usage. Moreover, the timing, character, and size of population and economic growth have differed markedly in Western Europe and the United States, having deep-seated effects on urban form, consumption patterns, and travel behavior.

In this chapter, these external factors and their possible role in causing the significant differences observed in the extent of transit-supportive policies and in transit availability and usage among cities in the United States, Canada, and Western Europe are reviewed. In the course of this review, it

becomes evident that far fewer such factors differentiate the United States from Canada than from Western Europe. Yet while the United States and Canada have shared many of the same economic, demographic, and historical trends, Canadians continue to make better use of public transit. More than the countries of Western Europe, therefore, it would appear that Canada can provide insight into how American policies and practices can be made more supportive of public transit. To this end, the salient differences between the two countries are examined in the final section of the chapter.

## **DEMOGRAPHIC AND ECONOMIC CONDITIONS**

### **Pressures from Population and Social Change**

Basic demographic data reveal major differences in population trends in North America and Western Europe, especially since World War II. Western Europe's population has been static as compared with that of the United States and Canada during this period (see Figure 4-1). The U.S. population has doubled since 1950, up by more than 130 million people. Nearly all of this growth has occurred in metropolitan areas, placing greater pressure on undeveloped land. Since 1950, the share of the country's population in metropolitan areas has increased from about 65 to 80 percent (Bureau of the Census 1999, 46).

In contrast, the combined population of France, Great Britain, and Germany (including the former East Germany) has grown by about 40 million since 1950, or about 25 percent. This total has been surpassed by the three U.S. states of California, Texas, and Florida, which have gained more than 45 million inhabitants during the same period.

Other demographic differences are notable and likely to have had an important effect on urban settlement and travel patterns. In Germany, Belgium, France, the Netherlands, and Great Britain, more people are over age 65 than are under age 18—a demographic pattern that has persisted for more than two decades. In contrast, nearly twice as many Americans are under 18 as are older than 65. During the 1960s—as millions of young Americans in the baby boom cohort were reaching adulthood—there were three times as many Americans under 18 as over 65. The maturing baby boom generation

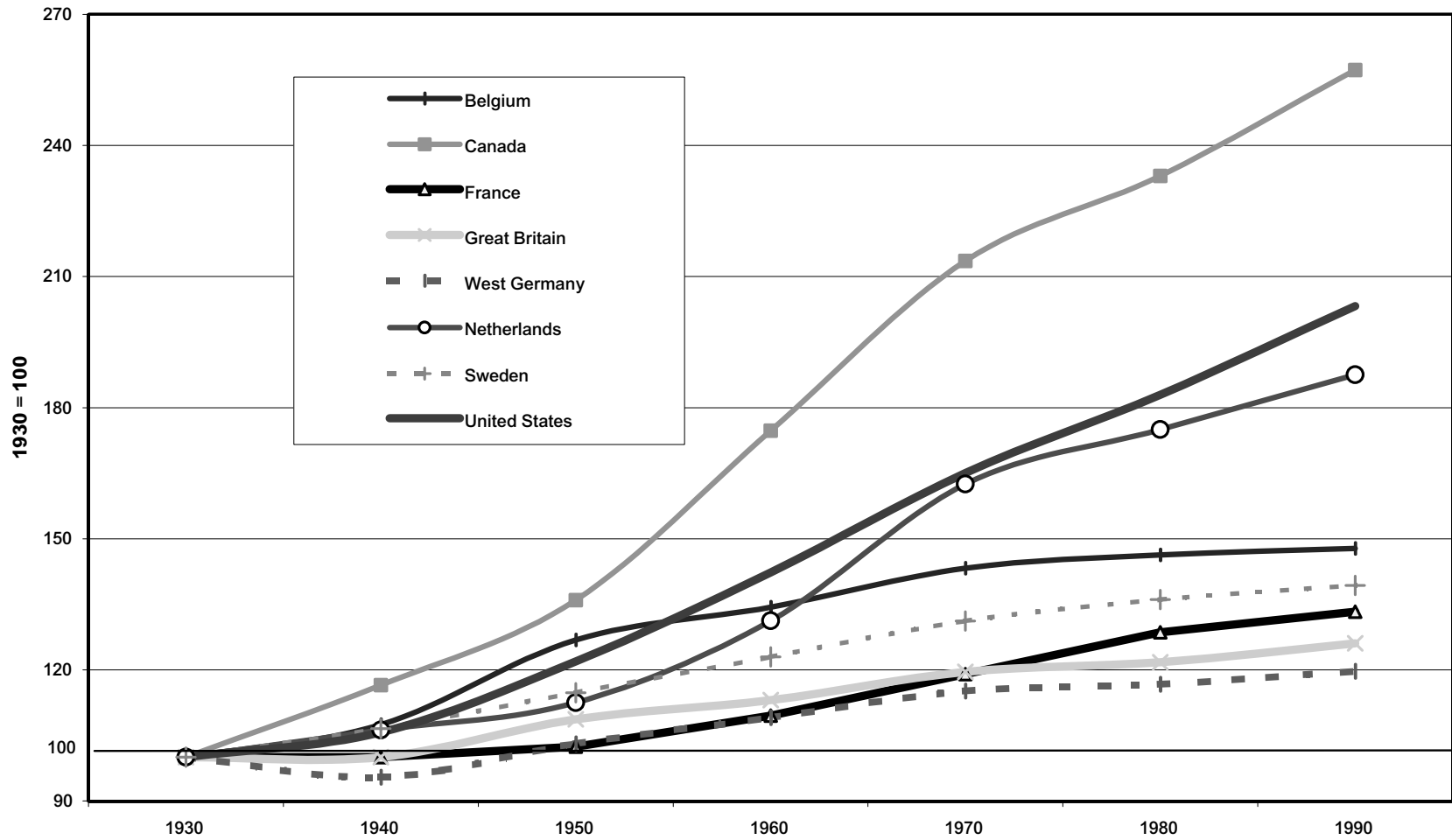


FIGURE 4-1 Population growth in the United States, Canada, and Western Europe, 1930–1990 (Bureau of the Census 1970–1995).

entered the workforce, the housing market, and concomitantly the driver population during the mid-1960s to mid-1980s.

During this period, the U.S. economy produced many more jobs than did the economies of Western Europe. Between 1960 and 1995, the U.S. workforce nearly doubled, growing by about 60 million (Bureau of the Census 1971; Bureau of the Census 1998). By comparison, nearly as many people left the workforce each year as entered it in Western Europe. From 1960 to 1995, the combined workforces of Germany, Great Britain, and France grew by only 20 percent, an increase of about 15 million workers (Bureau of the Census 1971; Bureau of the Census 1998). Given these disparities in population and economic growth, it is sensible to question their effects on the differing patterns of urban development that have been observed in the United States and Western Europe.

Another important difference in demographic patterns is that a large share of the newcomers in American cities after World War II consisted of immigrants from Asia and Latin America, as well as African Americans from the rural South. Because many of the urban immigrants were poor and belonged to minority racial groups, social tensions in cities were exacerbated. Seeking better housing and schools, many middle-class whites left center cities in favor of the newer suburbs. Many older cities not only lost residents and jobs, but also suffered declining tax bases, eroding city services, and growing crime and poverty, making it increasingly difficult to retain and attract new home owners and businesses. Such social problems were largely absent or occurred on a smaller scale in Western European cities (Downs 1999, 24).

To be sure, the social and economic stresses that plagued U.S. cities contributed to the continual outward expansion of metropolitan America and to the difficulty of instituting public policies designed to reverse or slow this trend. The many complex and interrelated forces associated with the declining American central city cannot be evaluated here.<sup>1</sup> Yet inasmuch as transit systems traditionally have been configured to serve cities, the shift of residents and workers to suburbs, coupled with concerns about urban crime, has exacerbated ridership declines. Whereas Western European transit operators have not been immune to such problems, they have not been as profoundly affected. With so many economic, demographic, and social factors differentiating urban America, Canada, and Western Europe, it is certainly reasonable to question their comparability.

## **Affluence and Consumerism**

Many Americans have long been able to afford automobiles and to own their own homes. Like automobiles, nearly all major consumer goods, from televisions and kitchen appliances to central air-conditioning, were mass introduced years earlier in the United States than in Western Europe.

Throughout much of the post–World War II period, the array of consumer choices available to Western Europeans was limited, not only because of public policies, but also because of economic conditions. Few Western Europeans had sufficient income to buy their own home, much less a single-family house on a large lot outside the city. Rationing initiated during the war remained in effect into the 1950s, and by 1960, per capita purchasing power in nearly all Western European countries was only a fraction of that in the United States: 60 percent lower in France and West Germany and two-thirds lower in Austria and the Netherlands. Only Sweden, which escaped significant war damage, had a per capita income (measured in purchasing power) at least half that of the United States (Bureau of the Census 1998).

Not until the mid-1960s did Western Europe begin to close the gap, and by this time American and Western European urban forms had diverged further. Today the income levels of most of the major Western European countries have climbed to within 25 percent of that in the United States.

Household income is positively correlated with automobile ownership and use (Lave 1992; TRB 1997, 65). As mentioned earlier, Germany now averages nearly one car for every two people—equivalent to the level attained in the United States during the 1970s. France is also approaching one car for every two people, as are several other Western European countries. Despite high levels of car ownership, however, Germans still drive, on average, about as much as Americans did in the late 1960s. Although they own many cars, they do not use them at the same high rate as Americans. One would have to go back to the 1950s and early 1960s to find U.S. driving levels comparable with those currently found in Great Britain, Denmark, Sweden, and France. For the most part, however, Western European automobility and suburbanization are increasing with economic growth. These trends will continue to test the ability of Western European policy makers to regulate urban land use, preserve center cities, and encourage use of public transit.

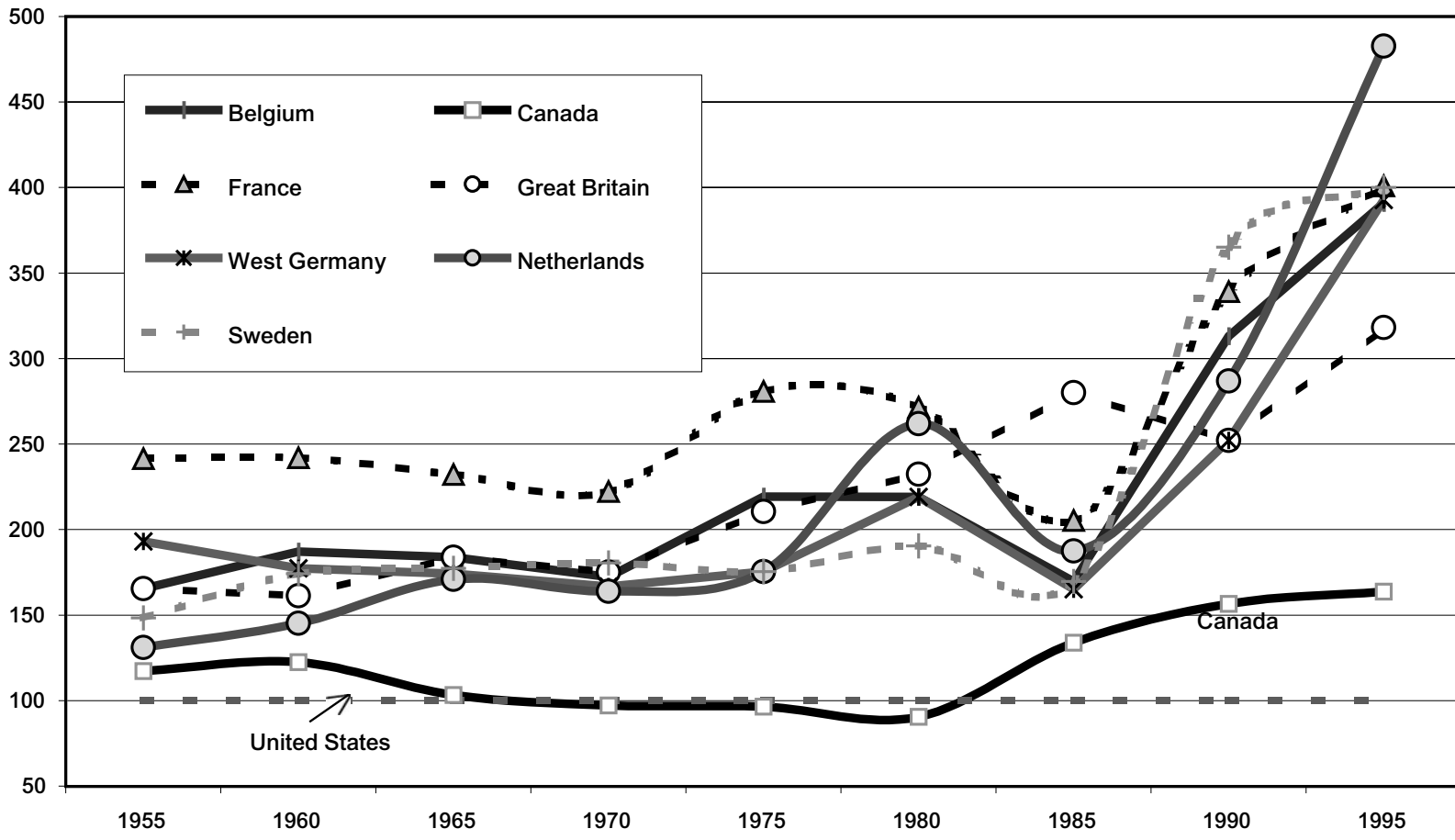
## HISTORY AND TRADITIONS

### Tradition of High Automobile Costs

History and tradition have also played important roles in the differing policies that affect urban form and transportation choice in the United States, Canada, and Western Europe. As Nivola and Crandall (1995) point out, the origins of high petroleum taxation in Western Europe can be traced to various sources—from centuries of monarchy-imposed excise taxes to the perceived need for greater energy self-sufficiency after World War I. Whatever their origins, taxes on motor fuel and automobiles in Western Europe have been high in comparison with U.S. levels for many decades (see also Chapter 3). In 1960, for instance, the average cost of a liter of gasoline (in 1960 dollars using exchange rates at the time) was \$0.15 in West Germany, \$0.12 in the Netherlands, \$0.13 in Great Britain, and \$0.20 in France. Taxes accounted for 50 to 75 percent of these prices. Meanwhile, American motorists paid about \$0.08/L, around one-third of which comprised federal and state taxes.<sup>2</sup> Figure 4-2 shows gasoline prices (indexed to U.S. prices) in several countries from 1955 to 1995. Canada is the only country whose fuel prices have been comparable with those in the United States, although its prices have increased more rapidly since 1980 because of rising taxation.

High taxes predated widespread car ownership and use in Western Europe. Because few Western Europeans owned motor vehicles until the 1960s and 1970s, it is doubtful that many paid much attention to early fuel tax policies. As late as 1960, there were only 4.5 million automobiles in West Germany, or about 1 for every 12 people (see Figure 4-3). Other Western European countries averaged 1 car for every 8 to 12 people. Thus for most Western Europeans, levies on gasoline were probably viewed as being luxury taxes until at least the 1960s, and so perhaps as providing a politically acceptable source of government revenue. In contrast, by 1960 more than 60 million passenger cars were registered in the United States, or about 1 for every 3 persons. By then, most Americans viewed cars as necessities and had grown accustomed to low fuel taxes. Instead of being regarded as a source of general government revenue, these impositions were viewed as user fees to be reinvested in the highway system.

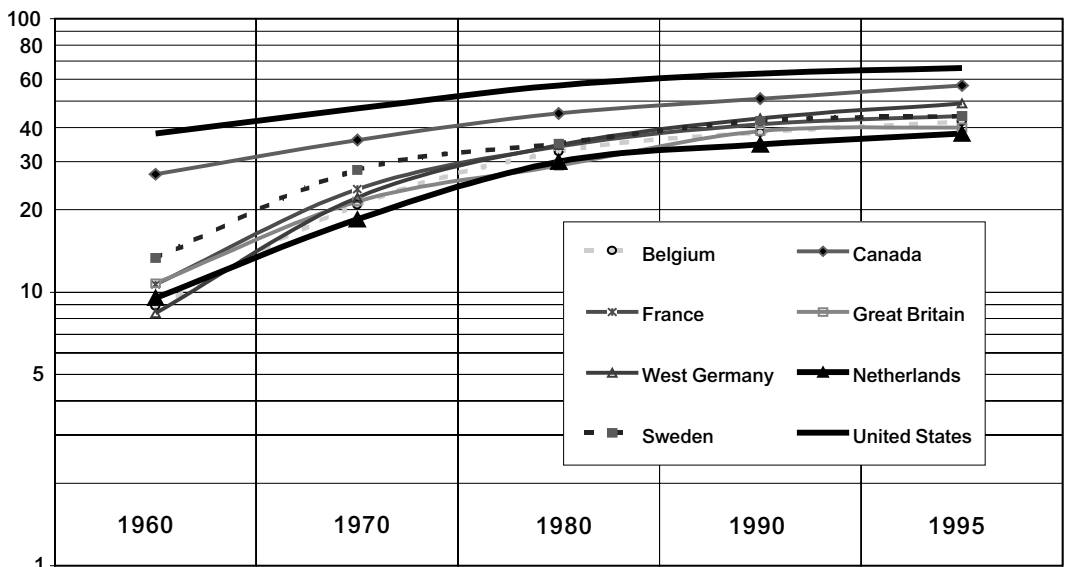
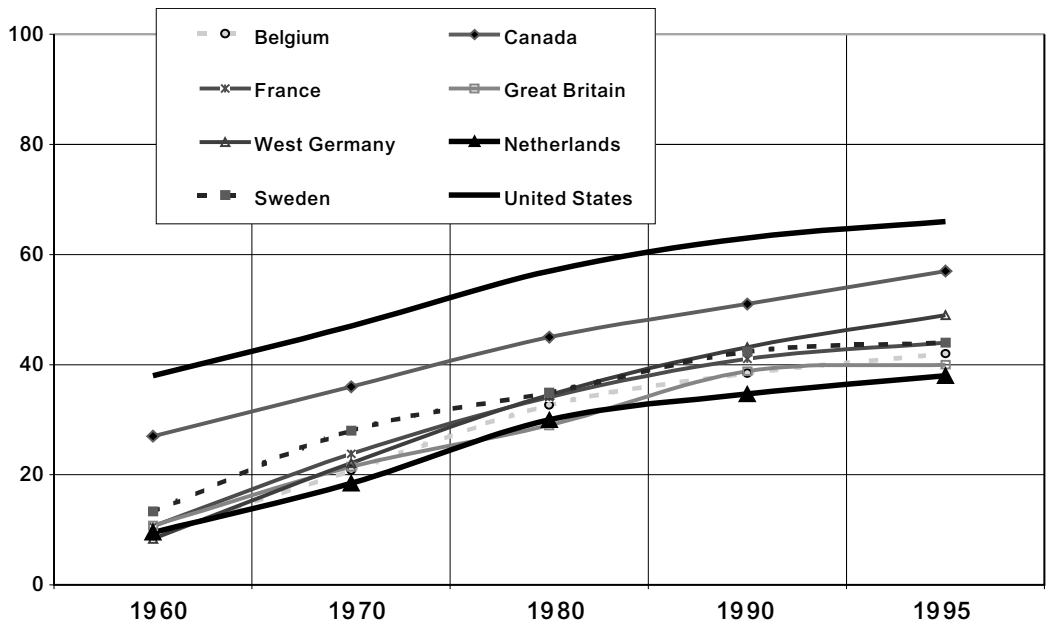
The number of cars has grown dramatically in Western Europe since the 1960s. For instance, in 1995 Great Britain had 1 car for every 2.5 people, while the ratios in West Germany and France were 1 to 2.1 and 1 to 2.3, respectively. As might be expected, from the late 1960s to the early 1990s,



Note: U.S. prices based on contemporary foreign exchange rates. Historical data for purchasing-power parity are not available.

FIGURE 4-2 Index of retail (after-tax) gasoline prices in selected Western European countries compared with the United States (API 1959; API 1967; MVMA 1980; IEA 1991; IEA 1996).





Note: Vertical axis is logarithmic. Light trucks used for personal travel are included as passenger cars for the U.S. data.

FIGURE 4-3 Passenger cars per 100 people in the United States, Canada, and major Western European countries, 1960–1990 (AAMA 1997).

passenger car travel per capita increased greatly throughout Western Europe—tripling in most instances (see Figure 4-4).

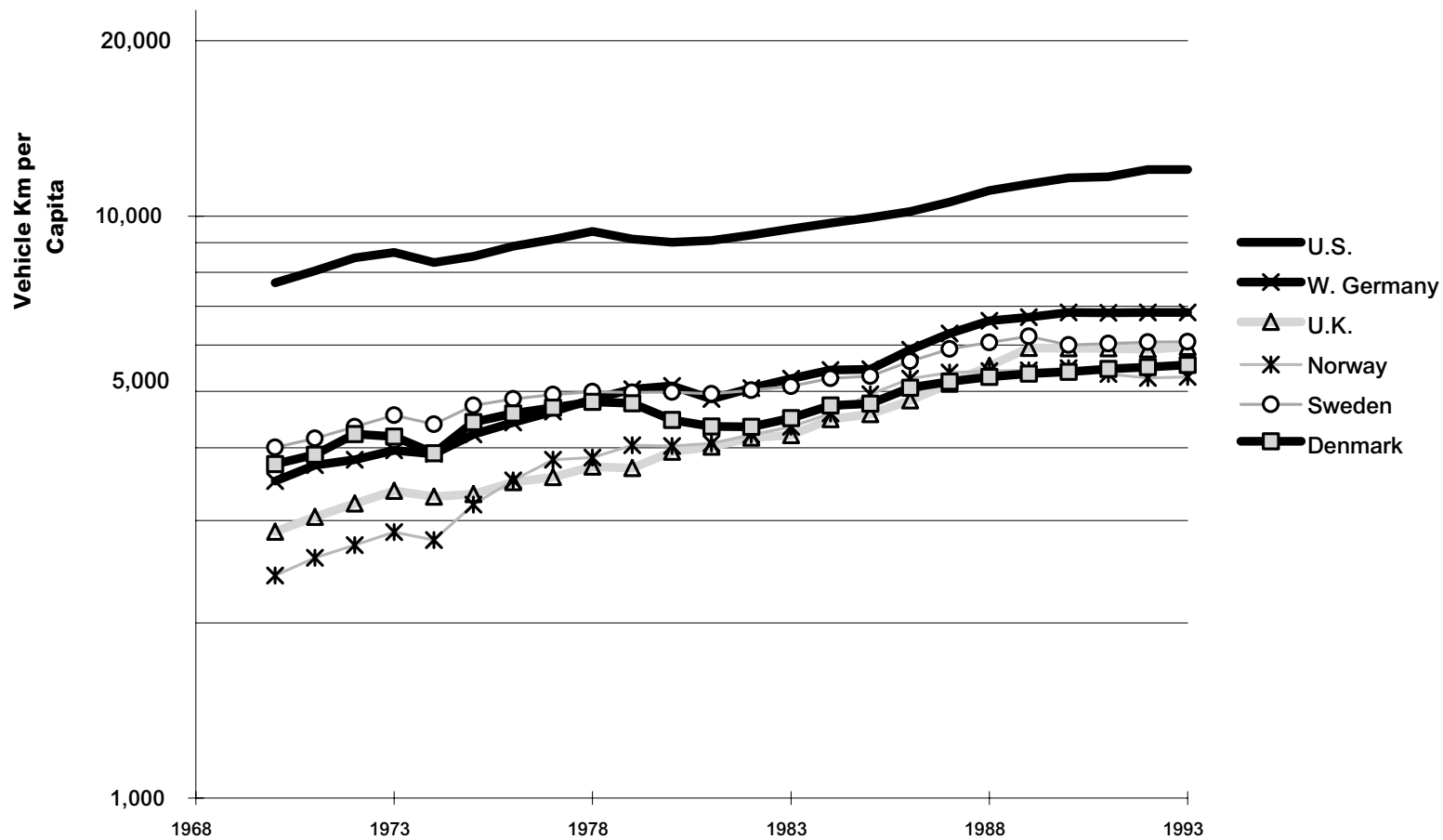
Despite these marked increases in car ownership and use, Western Europeans have continued to accept fuel taxes that have raised the retail price of motor fuel to three to four times the levels in the United States. The highly publicized negative public response to recent escalations in fuel prices, however, suggests that this acceptance may be eroding as Western Europeans use automobiles for a growing share of their daily trips. Faced with stiff public resistance, the British government, for instance, abandoned its plan to raise fuel taxes at an annual rate of 6 percent above the rate of inflation. Additional changes in tax policy are expected to ease the burden of sharply higher fuel prices.

Nevertheless, Western European motorists continue to pay fuel taxes that are several times higher than those in the United States, and they pay much higher excise taxes for vehicle acquisition and fees for registration. These levies also have origins that can be traced back many decades—in some cases originating as import duties to protect local automobile makers (Nivola and Crandall 1995). Like fuel taxes, motor vehicle fees have become a source of general government revenue. During the past two decades, however, public concern about traffic noise and congestion, air pollution, greenhouse gas emissions, and other side effects of automobiles have prompted some Western European countries (e.g., Norway and Denmark) to raise these taxes even further.<sup>3</sup> For a large and growing number of Western Europeans today, the car is no longer treated as a luxury but as an everyday necessity. Still, few Western European motorists can recall a time when taxes on motor vehicles were low, and most appear to have become accustomed to these impositions.

As discussed next, the older and more compact Western European cities are simply not as well suited to the automobile as the newer, more dispersed American cities. Thus, whether by adopting higher vehicle taxes, promoting public transit, or restricting cars in center cities, Western Europeans have many compelling reasons to take steps that discourage automobile use.

### **Historic, Preautomobile Cities**

The mass introduction of the automobile occurred early in the United States and at a time when many American cities were growing rapidly. Cars



Note: Vertical axis is logarithmic. Travel by vehicles registered as light trucks is included in the U.S. data. Data not available for Canada.

FIGURE 4-4 Trends in passenger car travel per capita in the United States and Western European countries (TRB 1997, 63; original data derived from Schipper 1995).

were mass introduced a generation or more later in Western European cities and at a much more advanced stage in their growth cycle.

The escalating use of automobiles in older Western European cities during the 1960s presented urban planners, transit operators, and traffic engineers with challenges seldom faced in the United States. The combination of physical constraints and a desire to preserve historic cities meant that Western Europeans could not build the kinds of extensive freeway systems found within American cities. Even by the mid-1960s—when automobile usage was just beginning to surge—many Western European cities already were suffering from serious traffic congestion in their downtown areas. By this time, recurrent congestion also was becoming a problem in small towns and villages.

In response to these problems, many Western European cities have taken steps to restrain the automobile and to promote other transportation options (Vuchic 1999, 128–130). Some of their actions are described in the preceding chapter. For instance, large, medium, and small cities alike—from Leeds, England, to Freiburg, Germany—have banned automobiles in portions of their historic centers and on some of their busiest downtown streets, converting the streets to pedestrian malls and transitways (Hass-Klau 1993). In some cases, the automobile-free zones cover several square kilometers and encompass entire commercial districts. In the largest cities, such as Paris and London, such areas are limited to small enclaves; however, more extensive pedestrian zones have been established in some German, Austrian, and Dutch cities, aided by postwar “ring” roads and bypasses that direct traffic away from the historic downtowns.

That Western Europeans are willing to accept such limits on city automobile use is often regarded as the manifestation of a strong urbanist mindset—one that leads them to preserve their historic cities and move closer to the city center as they become more affluent (Fishman 1990). Conversely, Americans are often portrayed as lacking such preferences and being more experimental and consumer-oriented, quick to adopt new technologies even if doing so leads to frequent relocating or refashioning of their surroundings (Rybczynski 1996, 235; Goldberg and Mercer 1986, 12–32). The contrast in the way American cities eagerly introduced electric streetcars at the end of the 19th century while Western European cities remained cautious (see Chapter 2) is sometimes cited as an example of these underlying cultural differences (McShane 1988; McKay 1988).

The notion that Europeans have a longer history or stronger culture of living in cities is not well supported by the data. Table 4-1 shows that even by 1900, a higher percentage of Americans lived in center cities than did all Western Europeans except the British, Danes, Dutch, and Belgians. France remained agrarian with a mostly rural population well into the 20th century. Only 15 percent of Germans lived in cities with more than 50,000 people in 1900, compared with 21 percent in the United States. In 1930, about 28 percent of Americans lived in center cities with more than 100,000 people, which was about the same as the percentage in Canada, the Netherlands, and Germany, and much higher than the percentage in France. Although definitions of "city" and "urbanized area" vary among countries, it is reasonable to assume that all areas so defined in 1900 (and even 1930) were compact and "city"-like because of the need to travel locally by foot, horse, and transit. Hence if a European preference for living in cities does indeed exist today, it would appear to be a relatively recent phenomenon.

Of course, the countries of Western Europe have many more historic cities than does the United States. Certainly the older, medieval Western European cities provide settings that are well suited to urban preservation policies such as restricting city centers to pedestrian traffic. Not only are the meandering streets and small buildings naturally amenable to strolling, but the historic character of many Western European downtowns attracts many pedestrians. Although such pedestrian conversions have been tried in the United States, many have failed because of a decline in downtown shopping and sometimes because a city's wide streets and long buildings have been poorly suited to travel by foot.

It is noteworthy that after the destruction resulting from World War II, many Western European cities were rebuilt on their original foundations, suggesting the importance Western Europeans place on preserving urban history. Such decisions reveal how public policies are influenced not only by historical factors, but also by public attitudes.

## **PUBLIC ATTITUDES AND INSTITUTIONS**

### **Public Concern About Land Use**

In seeking to explain why Western European governments are more inclined than those in the United States to intervene in urban land use decisions, Downs (1999, 16–17), Heidenheimer et al. (1990, 270–278), and

Table 4-1 Historical Comparison of Central City Populations in the United States, Canada, and Western Europe (Bureau of the Census 1999, Tables 1414 and 1415; Showers 1989, Tables 1b and 2F)

Country	1900			1930		
	Central Cities with More Than 50,000 Population	Total Population in These Central Cities	Central City Share of National Population (percent)	Central Cities with More Than 100,000 Population	Total Population in These Central Cities	Central City Share of National Population (percent)
Belgium	10	2,500,000	37	10	3,000,000	36
Canada	6	700,000	12	10	2,800,000	27
Denmark	3	910,000	37	2	1,400,000	39
France	35	6,700,000	17	17	6,370,000	15
Germany	40	8,600,000	15	43	17,800,000	27
Great Britain	53	13,700,000	37	44	16,100,000	35
Netherlands	8	1,400,000	27	6	2,200,000	28
Norway	2	300,000	13	3	770,000	27
Sweden	3	490,000	10	3	900,000	14
Switzerland	3	365,000	11	4	630,000	15
United States	77	16,800,000	21	88	35,000,000	28

Note: Definitions of "city" vary from country to country. Through annexation and boundary expansion, many cities today are suburban in character, especially in the United States. However, in the preautomobile periods considered in this table, most areas defined as cities were compact and urban in form.



Narrow streets in historic European cities are poorly suited to automobile use. (© UITP. Reprinted with permission from *Public Transport International*, No. 5, 1998, C. Hass-Klau, P. Goodwin, and S. Cairns, *Better Use of Road Capacity: What Happens to the Traffic*, p. 31.)

others<sup>4</sup> have observed that Western Europeans and Americans have different attitudes about the appropriate intensity of land use. More prevalent in Western Europe is the notion that open land is a scarce national resource and that if development is to occur, it must be sufficiently dense to lessen the need for further loss of open land. As a corollary, open land that remains free from development must be preserved for ecological, agricultural, or recreational purposes. As Downs (1999) and others have pointed out, one impact of the physical vastness of the United States and its low average population density is a willingness to entrust individual landowners with considerable authority to use the land as they see fit.

Demographic data lend support to these explanations. The contiguous 48 U.S. states have a population density of slightly less than 35 persons per square kilometer. The five most densely populated states (New Jersey, Rhode Island, Massachusetts, Connecticut, and Maryland) average between 200 and 400 persons per square kilometer; however, these states contain less than 9 percent of the country's population. California, the state with the highest proportion (nearly 97 percent) of its population residing in metropolitan areas, averages fewer than 80 persons per square kilometer. Half the U.S. population resides in states averaging fewer than 70 persons per square kilometer. Thus for most Americans, the availability of ample land to live on, work on, and enjoy for recreation is expected to continue for some time to come, even as the nation's population is projected to grow by more than 20 percent during the next 25 years (Bureau of the Census 1997, 25).

Low average population densities—viewed at the state or national level—mask the variation in densities across regions and the extent to which land scarcity is a concern in specific regions, states, and localities. Spreading urban development is a prominent public concern in many places in the United States, such as coastal California, northern Oregon, southern Florida, and the Chesapeake Bay Basin. However, there is considerable regional and local variability in this concern. During the past half century, most urban growth in the United States occurred in the South and West, where there were few economic or regulatory constraints on the supply of land for development on the urban periphery. Metropolitan Atlanta, Charlotte, Dallas, Houston, and Las Vegas—among the fastest-growing urban areas in the United States—have expanded outward at a rapid pace but remain surrounded by semirural counties containing thousands of square kilometers of agricultural and undeveloped land. Although public concern over urban land



use has increased in many of these areas during the past 20 years, this is a relatively recent phenomenon by Western European standards. The availability and use of land has become a more prominent public issue in some states (e.g., Maryland, Florida, New Jersey, Oregon), but it has yet to emerge as a national concern, as it has been for many decades in Western Europe.

Western European countries—many physically smaller than a single medium-sized U.S. state—have had high population densities for centuries. Today the Netherlands and Belgium together average more than 350 persons per square kilometer, Germany averages 230, and Great Britain averages about 245 (Bureau of the Census 1998, Table 1343). But even as early as 1850, Belgium and the Netherlands averaged more than 100 persons per square kilometer, and both Germany and Great Britain exceeded 90 (Showers 1989, Table 1b). By comparison, only 13 American states had population densities of more than 60 persons per square kilometer as late as 1960 (Bureau of the Census 1971, Table 12). Except in a few very large cities, crowding has not been a chronic problem in the United States.

Given the historically high population densities in the countries of Western Europe, their citizens' long-standing preference for a strong and centralized government role in land use planning and decision making might be expected. Most of the central governments of Western Europe have taken steps to influence local land use (see Chapter 3). In the Netherlands and Great Britain, all land use policies are guided, and largely determined, at the national level. The federal government of Germany establishes land use guidelines and requires individual states and local governments to adopt land use plans that conform to these guidelines. Indeed, the German constitution mandates such a national role (Konukiewitz and Wollman 1982).

Land is not viewed as especially scarce in the United States, and so undeveloped land on the periphery of urban areas is often treated similarly to most other private property, with relatively few government restrictions on its use by owners. In such areas, local governments responsible for regulating land use are more inclined to accept and seek development as a source of employment and tax revenue. Conversely, in established communities, additional development that threatens to increase employment and population densities is often resisted by local governments and residents concerned about incompatible uses and property values. Together these two interests can make regional coordination of land use difficult, especially if the goal is to concentrate new development in existing communities.

Whereas interests and attitudes can change, the decentralized political framework in the United States is likely to continue to impede the planning of land use at the national or regional level in a manner similar to that of Western Europe and Canada. Political decentralization, coupled with wide variability in population densities within the vast United States, makes national and state land use planning more difficult to implement than in the smaller and more uniformly dense nations of Western Europe, such as the Netherlands.<sup>5</sup> For regional planning to work, the public must agree on a common set of planning approaches and goals. Even at the local level in the United States, commonly accepted visions of how land should be regulated are unusual. Although a few states, such as Florida and Oregon,<sup>6</sup> are involved in local land use planning, their influence is minimal by Western European standards.

### **Collectivist Attitudes and Hierarchical Political Systems**

Berry (1973, 180) observes that Western Europe's "hierarchical social and political systems—where the governing class is accustomed to govern, where other classes are accustomed to acquiesce, and where private interests have relatively less power—can more readily evolve urban and regional growth policies at the national level than systems under the sway of the market, local political jurisdictions, or egalitarian political processes." Goldberg and Mercer (1986, 17) make similar observations about the "collectivist" outlook of Canadians, in contrast with the "more private entrepreneurial and individualistic tenor of social and economic life in the United States."

Such differences in social and political attitudes, if real, are relevant for understanding how Western European and Canadian governments have succeeded in adopting and retaining certain policies that have been supportive of public transit. For instance, they help explain how Canada and many Western European countries have been able to control local land use at the national and regional levels, repeatedly raise national taxes on motor fuel, and take other actions to deter the use of private automobiles—policies widely viewed as politically infeasible in the United States.

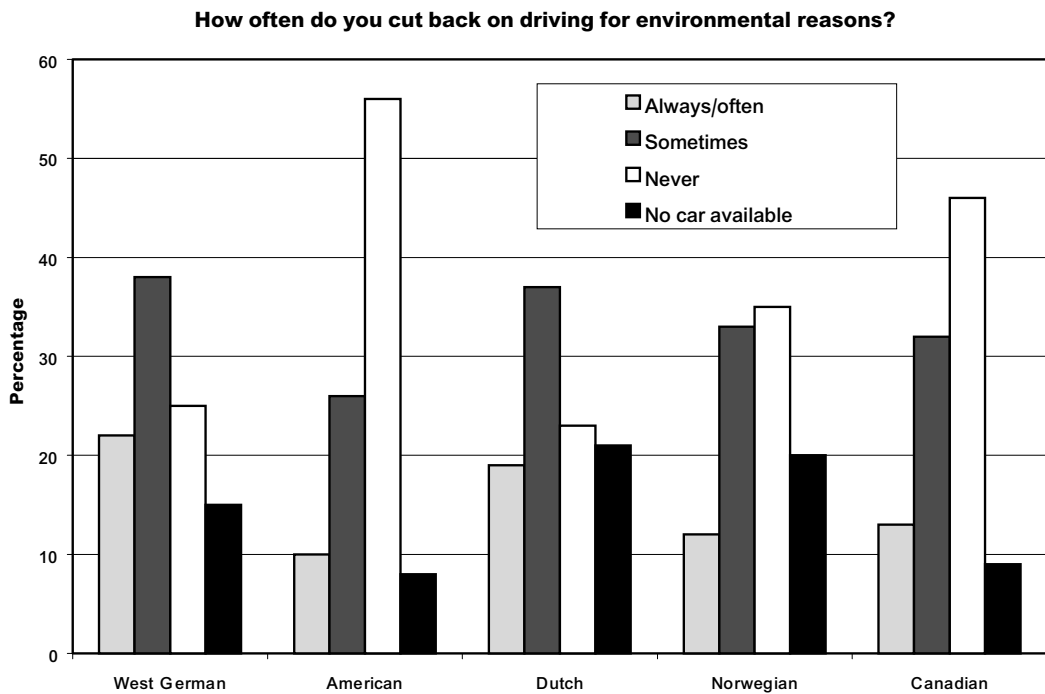
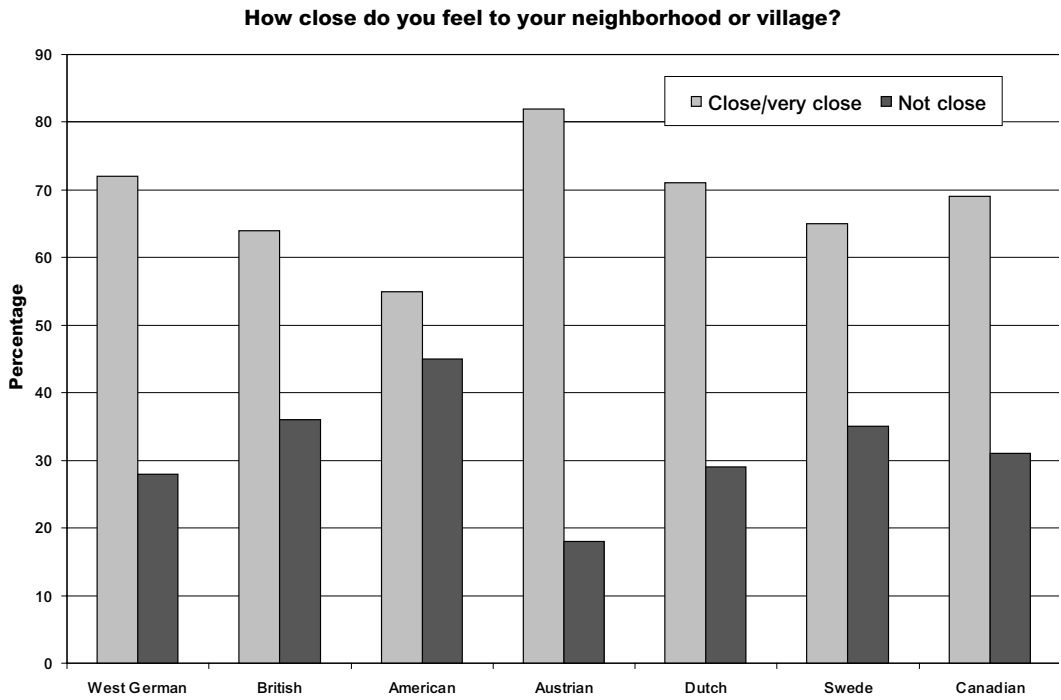
A common perception is that Western Europeans are more willing than Americans to accept government intervention in the marketplace and to favor policies that promote the public welfare, even if they impose significant limits on private activity. Having more homogeneous populations, feudal histories, and hierarchical political traditions, Western Europeans are commonly

viewed as being more accepting of public planning and top-down administrative or bureaucratic decision making. Likewise, the high percentage of Canada's immigrants originating from Great Britain and France is seen as reinforcing these Western European attitudes (Goldberg and Mercer 1986).

In comparing urban planning traditions in the United States and Western Europe, Heidenheimer et al. (1990, 270) observe that "the use of public power to regulate urban growth was common in Western Europe much earlier than in the United States, and so the scope of public intervention in land use, transportation, and housing is today considerably wider in Western European cities." Furthermore, the authors (1990, 217) note that in Western Europe, "land is considered a resource which is subject to strong government regulation, a view that can be traced all the way to feudal times, when all land tenure was enmeshed in a hierarchy of rights and obligations descending from the sovereign to the peasants. This tradition bred a degree of public acceptance of government intervention in and regulation of land use that is far greater in Western Europe than the United States."

Whereas Western Europeans are often portrayed as having stronger communal or collectivist attitudes, Americans are popularly characterized as being more inclined to favor policies that promote private welfare and interests. Local governance, seen as most democratic, is generally preferred, and the majority of local officials, from school board members to county judges, are popularly elected. In his historical study of Philadelphia's growth, Warner (1968, 214) points to "privatism," defined as individual interests and private institutions, as the single quality that best characterizes American cities, shaping their public institutions, productivity, and growth.

The importance and verity of such characterizations are debatable, and whether they are rooted in fundamentally different public attitudes is unclear. Sociologists have long noted differences in how Western Europeans and Americans respond to surveys of public opinion about the environment and community. For instance, in polls conducted as part of the International Social Survey Program (1985–1993), 65 to 82 percent of surveyed Germans, Britons, Austrians, Dutch, Swedes, and Canadians responded that they felt "close" or "very close" to their neighborhood or village, as compared with 55 percent of surveyed Americans (see Figure 4-5). Similarly, when respondents were asked how often they cut back on driving for environmental reasons, 36 percent of Americans replied "sometimes" or "always/often," compared with 45 to 60 percent of Germans, Dutch, Norwegians, and Canadians.



**FIGURE 4-5** Results from 1995 National Identity Opinion Survey, International Social Survey Program.

Although such surveys can be revealing, it is also important to observe how people behave to gauge true attitudes and preferences. The fact that Western Europeans have been driving more and moving to suburbs as they have become more affluent is viewed by many analysts as evidence of a growing similarity with Americans that is not well reflected in opinion polls (Lave 1992). Likewise, the American public's earlier acceptance of unleaded gasoline and catalytic converters—required many years before similar steps were taken in Western Europe—is portrayed as inconsistent with the weaker environmental values expressed by Americans in opinion surveys (Nivola and Crandall 1995, 57–58).

Differing political structures also may explain why Western European and Canadian governments have gone further in adopting policies that favor public transit. As discussed in the preceding chapter, Canada and many Western European countries are governed in ways that enable national and regional bodies to exercise more direct influence over land use plans and the provision of many local services, such as schools, parks, and policing. In some countries, such as Great Britain, Sweden, and the Netherlands, local governments are largely administrative agents tasked with supplying the prescribed services, which are paid for by the larger national or provincial governments (Mackensen 1999; Heidenheimer et al. 1983, 274–310). Even in federalist Germany, where local governments have considerable legal autonomy, their policy-making ability is limited by their dependence on funding from state and national governments—aid that is often accompanied by regulatory requirements (Mackensen 1999, 299–301).

National actions that are unimaginable in the politically fragmented United States are commonplace in Western Europe. For instance, during the 1970s, Sweden cut the number of local governments by 90 percent; likewise, the British Parliament has created and terminated local governments on a number of occasions since World War II (Heidenheimer et al. 1983, 274–310). In Western Europe, there is variability in the sovereignty of local governments; however, in general such top-down restructuring of local governance has been accompanied by relatively little public protest—far less than would be expected in the United States.

Government policies reflect this hierarchical political structure. For instance, the British government has introduced a "sequential test" that requires developers proposing new commercial or residential projects to determine whether other existing and underused development in the city could provide suitable alternatives. Only if the developer demonstrates a

lack of such alternatives can the new development proceed. Similar policies have been adopted in the Netherlands, where the national Ministries of Land Use and Transportation have identified areas of the country that are served well by public transit. When new developments are proposed, preference is given to those planned in such areas (Hamerslag et al. 1995). In the United States, there is certainly no precedent for the national government preempting private-sector and local government planning in this manner; likewise, few states do so, and then only on rare occasions.

## **URBAN HOUSING AND HIGHWAY PROGRAMS**

### **Postwar Housing Policies**

The destruction and dislocation of World War II and the ensuing acute shortages in housing, food, and building materials had lasting effects on the shape of Western European cities (Downs 1999, 20–21). Much of the housing stock in Germany, the Netherlands, Great Britain, Belgium, and France was destroyed, and the overcrowded units that remained were incapable of meeting the need. Rebuilding and alleviating the acute housing shortages became a main priority of local as well as national governments, which planned and financed most of the needed new housing and infrastructure (Rothblatt and Garr 1986, 55–57).

In many respects, this need to rebuild represented a rare opportunity—unknown in the United States—for national governments to exercise a powerful and direct role in urban planning and policy making, siting new housing and subsidizing its construction and occupancy (Downs 1999, 20–21). By the time rationing and other emergency conditions created by the wartime damage subsided during the 1950s, Western Europeans had become accustomed to their governments' assumption of a prominent role in the planning of residential and commercial development. In some cases, this role encompassed the wholesale creation of new communities. The Swedish national government and the city of Stockholm, for instance, purchased large tracts of land and created more than two dozen fully planned towns outside the city boundaries—towns that had not existed before World War II (Heidenheimer et al. 1990, 270–278). These new towns were located along urban rail lines designed to serve Stockholm commuters. Other new towns were created in France, Great Britain, and several other Western European countries.

Coupled with prolonged rent control rules that discouraged private investment in rental housing, public housing construction programs effectively displaced market forces as the main determinant of Western European housing access and location. As an example, after providing virtually no public housing before World War II, the British government built more than 100,000 new public housing units per year from 1946 to 1976 (Heidenheimer et al. 1983, 88–121). By the mid-1970s, more than a quarter of the British public was living in council homes built and owned by the government. In Scotland, more than half of households were in publicly subsidized housing (Maclennan 1999, 519). In the Netherlands, 80 percent of the housing units built between 1954 and 1979 were either financed or heavily subsidized by the government (Rothblatt and Garr 1986, 68–69). By 1970, a quarter of the housing units in France and West Germany were publicly owned or subsidized (Heidenheimer et al. 1983; Downs 1999, 20). These figures compare with 5 percent in the United States. Moreover, in contrast with the situation in the United States, public housing served a fairly broad spectrum of households in Western Europe—from the destitute to the middle-class (Downs 1999, 21).

The combined effect of these postwar policies in fostering denser cities and transit demand in Western Europe is difficult to gauge. That private market forces alone would have produced similar outcomes appears unlikely, however. From the Swedish new towns to the war-damaged German and British cities that were rebuilt in place, Western European planners were presented with a scale and range of opportunities for directly shaping urban form that did not exist in the United States.

Although the United States avoided significant wartime damage and prolonged shortages of consumer goods, it was faced with millions of returning military personnel who were reentering the private workforce and setting up households. There was an evident preference for single-family homes, and the federal government responded with a number of housing finance and tax incentive programs intended to make home ownership more affordable and to spur new construction. While these market-oriented policies may not have had the same direct effect on urban development patterns as the massive public housing programs of Western Europe, they are often cited as influencing American settlement patterns—mainly by fostering more dispersed, rather than compact, suburban development.

Among the many policies thus cited are federal and state income-tax deductions on mortgage interest and property-tax payments, as well as exemp-

tions on capital gains earned from the sale of a home when used to purchase another. These policies are intended to make home ownership more affordable; for instance, the interest payment deduction reduces the effective after-tax mortgage interest rate. A frequently claimed side effect, however, is that these allowances subtly prompt home owners to buy larger homes, often on larger lots, which they are more likely to obtain on the outskirts of cities (Katz and Bradley 1999). Local property-tax deductions (coupled with tax exemptions for investors in municipal bonds) are seen as reinforcing this outcome by making it easier for new suburban communities to raise local property taxes (which are also deductible) to pay for attractive new amenities, infrastructure, and services, such as public water, parks, and schools (Nivola 1999, 24–26; General Accounting Office 1999, 3).

Several other government-initiated programs designed to make mortgage financing easier and less expensive for home buyers are often cited as contributing to low-density development (Nivola 1999, 22). These include federal home mortgage insurance (e.g., administered by the Federal Housing Administration and the Veterans Administration)<sup>7</sup> and federally chartered loan purchasing programs (i.e., Fannie Mae, Freddie Mac).<sup>8</sup> Because these programs increase home affordability, they are presumed to boost demand for larger, single-family homes in suburban neighborhoods. These programs have also been criticized for having buyer and property qualification rules—including strict construction standards and reluctance to insure rehabilitation work—that have tended to favor lending in new, single-family subdivisions.

Gyourko and Voith (1997, 1998) found a correlation between some of these incentive programs and higher rates of urban decentralization, but mainly when combined with exclusionary zoning practices (e.g., setback standards, minimum acreage, architectural controls) that preclude multi-family housing and other high-density development. Less well known is the extent to which these tax programs truly make home ownership more affordable since the tax savings can lead to higher demand, causing housing prices to rise when supply is tight (Gyourko and Voith 1997; Gyourko and Voith 1998). Also, it is unclear whether single-family homes are favored disproportionately by these incentive programs, since affordability is presumably increased for all home types, including clustered suburban townhomes, city row houses, and downtown condominiums.

Despite the limited empirical evidence, some observers have ventured that these federal and state policies, taken together, have had an important role in prompting the low-density urban environment found throughout



much of the United States. Katz and Bradley (1999, 27) maintain that it is the cumulative effect of these policies that has “boosted the allure of suburbs and put cities at a relentless disadvantage.” Cervero (1986) and Schimek (1996) maintain that the refusal of Canadian provinces to pursue similar policies—for instance, by not providing tax subsidies for new public water systems on the outskirts of cities—has fostered a lower rate of detached, single-family home construction (usually about 50 percent of new housing starts in Canada each year as compared with about 70 percent in the United States) and more compact urban development patterns generally.

In addition to the direct provision of housing units, most Western European governments have many other programs and policies affecting housing demand and supply. Sweden and Great Britain, for instance, have at one time or another allowed home owners to deduct mortgage interest, as has been the policy of the United States for several decades (Heidenheimer et al. 1990, 123). Likewise, Denmark has provided taxpayers with credits for home purchases. Although in recent years these policies have been revised and in some cases scaled back, they were instituted to promote new home ownership. The plethora of government policies and programs that influence housing demand, supply, and location throughout Western Europe and North America makes it difficult to assess their relative roles in shaping urban development and related trends in public transit.

## **Urban Highway Programs**

Some analysts believe the means by which public highways are funded and administered in the United States has led to a disproportionate amount of highway building (Pucher and Lefevre 1996, 190–200). Some even suggest that the government’s emphasis on highway construction has exceeded what the public truly desires and demands (Mowbray 1969). They contend that state and federal fuel tax revenues that are dedicated almost exclusively to highways, coupled with the local political benefits derived from highway construction projects, favor highway programs to the detriment of funding for public transit. Others point out, however, that highways are paid for largely from taxes generated by users (motorists), whose continued willingness to pay these taxes suggests a strong preference for automobile travel (Altshuler et al. 1979; Meyer et al. 1965).

Federal involvement in road building can be traced back to the 1916 Rural Post Roads Act, which authorized federal grants to help defray the

cost of building rural roads for mail delivery (Small et al. 1989, 3–5). For the most part, however, road building remained the responsibility of state and local governments. Roads were initially funded almost entirely from general government revenues, although by the 1930s many states had created trust funds in which revenues from gasoline taxes were reserved for highway construction and maintenance (Rose 1979). After World War II, the federal government boosted its role through the creation of the National Highway Trust Fund and Interstate Highway Program. Federal and state fuel tax revenues remain the chief means by which highways are funded today.

The gradual expansion of the federal role in road building did not become controversial until the construction of urban highways in the 1960s. The Interstate Highway Program was originally conceived as a means of connecting populated areas across the country—not as a means of improving intraurban travel. Many city mayors at the time, however, believed that new high-capacity freeways would relieve city traffic congestion and revitalize downtown commercial districts and neighborhoods. The federal government soon expanded the program to include urban freeways (Rose 1979, 59; Rybczynski 1996; Tarr 1984).

Federal aid covers as much as 90 percent of the cost of building urban freeways and other major arterials. This financing formula has been especially controversial. Critics claim it skews investment in favor of freeway building, since few local entities are likely to pass on the opportunity for significant federal aid when so little local funding is required (Rose 1979, 96).<sup>9</sup> Another concern is that the central role of federal and state government in paying for and building urban highways has spurred urban highway construction without proper consideration for local impacts, including changes in urban form and public transit demand. This imbalance led to federal grants for public transportation, funded in part by the Highway Trust Fund, beginning in the 1960s.

Canada has a different process for providing urban transportation infrastructure, one that is frequently cited as more neutral with respect to transit and highways. In Canada, where the powers of the national government are limited, the provinces and municipalities share responsibility for funding most urban transportation infrastructure. Cervero (1986) believes Canadian cities have built fewer urban freeways as a result, largely because the process compels local governments to weigh the benefits and costs of such investments along with their other funding demands. Pucher and Lefevre (1996, 171) maintain that the absence of a nationally funded urban highway pro-

gram in Canada has led to more local discretion in transportation spending and more integrated transportation planning of highways and public transit.

## **TRANSIT POLICY-MAKING AND FUNDING ENVIRONMENT**

### **Management Autonomy**

The decision-making authority of public transit managers in the United States is often highly circumscribed and subject to regulatory and political influences that impede innovation, add to management and labor inefficiencies, and otherwise complicate efforts to respond to the demands of customers. The American preference for electing officials to direct nearly all local government activities—from school boards to public safety commissions—is evident in the structure of most transit agencies, which are usually governed by a large and active board of politically appointed or elected officials. By and large these oversight boards concern themselves with transit policy matters, such as fare levels and route structure, but they can, and often do, become involved in the most routine personnel management, operations, and planning functions of the agency. Transit boards often reflect the differing views of many constituencies, making it difficult to reach a consensus concerning a consistent and well-defined set of goals. Because these boards are frequently composed of representatives from jurisdictions that contribute funding (as opposed to at-large members), transit agencies must often provide services on an equitable basis to all jurisdictions, not necessarily according to where the concentrations of riders reside. This situation can lead to a too-thin distribution of services, which are often underused, to remote and low-density areas within the transit funding district.

The multitude of public funding sources can further reduce management autonomy. Most transit agencies receive financial aid from federal, state, and local governments. Each funding source carries with it various legislative and regulatory stipulations that compel transit managers to balance an assortment of goals, requirements, and interests, some of which are mismatched or conflicting. For instance, as public agencies, transit operators may be directed to reduce the cost and increase the speed of their services while also being obligated to extend service out to lightly traveled areas that have a politically active constituency, to maintain rigid labor

agreements, to reduce noise and air emissions by upgrading equipment, and to accommodate the special needs of elderly and disabled riders.

A common observation of U.S. transit professionals returning from study tours abroad is that Western European and Canadian transit managers are given more freedom and time to implement the long-term policy goals of elected officials. This situation may reflect differing political processes and public values. Western Europeans and Canadians are frequently characterized as more trusting of, or even deferential to, public bureaucracies for the provision of a wide range of services (Goldberg and Mercer 1986, 13–32; Heidenheimer et al. 1983, 274–310). German municipalities, for instance, have a long tradition of operating museums, theaters, warehouses, markets, utilities, and even slaughterhouses (Heidenheimer et al. 1983, 274–310). The public administrators of these enterprises are given wide latitude to manage as they choose.

## **Methods of Financing**

With few exceptions,<sup>10</sup> both transit capital and operating expenses are paid for in large measure with government subsidies. Most American transit systems have been subsidized for more than 30 years, since the introduction of federal aid in the mid-1960s. As discussed in Chapter 2, private ownership was the norm in the United States for most of the century (Lave 1991).<sup>11</sup> In Western Europe and Canada, public ownership and subsidization occurred much earlier in the century. Today, nearly all public transit agencies in industrialized countries—Great Britain being a notable exception—rely on public subsidies for 25 to 75 percent of their operating revenues and 100 percent of their capital funds (Pucher and Lefevre 1996).

Both the size and the source of public subsidies are often associated with declining transit productivity and performance (Bly and Oldfield 1986; Pucher 1982; Jones 1985). Since the U.S. federal government began providing capital support for transit in the 1960s, this effect has been the subject of much academic study. One observation is that the federal emphasis on capital, to the exclusion of operating costs, has led to overcapitalization, as evidenced by the proliferation of urban rail projects (Wachs 1989; Richmond 1998).

Cross-national differences in funding methods warrant consideration as a possible cause of disparities in transit use across countries. Pucher

(1988), for instance, has found that government subsidies whose use is not constrained by highly prescriptive spending requirements can lead to more local decision making about how funds are to be used to meet local needs. The approach taken by Germany is to provide state and local governments with block grants for spending on transit, highways, or other modes of transportation. State and local officials can thus decide on the appropriate allocation of the funds, for instance, between capital and operating expenses. Likewise, local governments in Denmark, Norway, and Sweden bear the main responsibility for allocating subsidies to meet transit capital and operating needs (see Table 4-2).

As mentioned, there is virtually no federal involvement in transit funding or planning in Canada. The provinces and municipalities share responsibility for determining and implementing urban transport policy and are thus responsible for allocating subsidy funds. Some believe this arrangement instills greater spending discipline, reduces bureaucratic delays, and gives local governments the flexibility to meet their own particular transportation needs (Soberman 1983; Pucher 1994; Cervero 1986).

## **WHAT DIFFERENTIATES CANADA?**

The many factors that help explain why public transit has enjoyed much success and favorable public policies abroad are most salient when contrasting the United States with Western Europe. Many of these same factors, however, do not offer a satisfactory explanation for the marked differences in transit use observed between the United States and Canada.

Like Americans, Canadians enjoyed early economic prosperity, the mass introduction of the automobile before World War II, ample land on which to spread out, and dynamic population growth for many decades. And unlike the countries of Western Europe, Canada does not have a long tradition of high motor fuel and automobile taxes; its housing policies have been largely market driven; and its cities are relatively young, most having been formed during the 20th century. Still, Canadians average about twice as many transit rides per capita as Americans, and they have a record of transit-supportive government policies.

There are, however, some notable differences. Some observers suggest that political values and other cultural factors differentiate Canadians from Americans (Goldberg and Mercer 1986, 11–31). Canadians, like Western Europeans, are portrayed as having a strong collectivist spirit

Table 4-2 Sources of Transit Operating and Capital Subsidies in Selected Countries

Country	Source of Government Operating Subsidy			Source of Government Capital Subsidy			Dedicated Sources of Financing	
	National	Regional (State, Province)	Local (County, Municipality)	National	Regional (State, Province)	Local (County, Municipality)	Operating	Capital
United States	<sup>a</sup>	xx	xx	xx	x	x	<sup>d</sup>	<sup>d</sup>
Canada		xx	xx		xx	x		
Norway		xx	xx		x	xx		
Sweden			xx	x		xx		
Denmark			xx	x		xx		
Germany		xx	xx	xx	x	x	<sup>e</sup>	
Netherlands	xx			xx				
Austria		xx	xx	xx	x	x	<sup>e</sup>	
France	<sup>b</sup>	xx	xx	xx	x	x		<sup>f</sup>
United Kingdom	<sup>c</sup>		xx	<sup>c</sup>				

Note: Commuter rail systems in most European countries are owned by the national government, and their operations are subsidized by the national government. xx = primary role, x = secondary role.

<sup>a</sup> National operating subsidies in the United States are more significant for small transit systems but usually account for less than 10 percent of operating subsidies.

<sup>b</sup> The national government provides large operating subsidies in the Paris capital region only.

<sup>c</sup> The national government does not subsidize bus services, except in greater London and on some other routes designated as socially necessary. Subsidies are provided for light and rapid rail systems.

<sup>d</sup> Availability of dedicated revenue sources varies by state and local jurisdiction.

<sup>e</sup> Revenues earned from profitable city-owned public utilities may be used to cover transit operating deficits.

<sup>f</sup> Revenues generated from an employer "transportation payments tax" are used for capital funding.

and thus being more willing than Americans to accept regional or national restrictions on the use of private land if they are deemed to be in the interest of the public as a whole. Americans are viewed as being wary of national or regional governments curtailing local government autonomy over land use regulation, education, and various other public functions and services.

It is also true, however, that political institutions in Canada are more centralized than those in the United States. Although the national government of Canada has little influence on urban planning and transportation, the 10 provinces exert considerable control. Most have established metropolitanwide governments that have been able to integrate tax, land use, transit, and highway programs across regions. In contrast with the United States, where most state governments have ceded land use controls to local government, the provinces have retained this authority, along with controls over transportation decision making.

The ability to raise tax revenues, guide land use, and plan transportation at the regional level has proven to be a powerful tool in Canada; however, having the institutional capability for such regional governance does not ensure that this capability will be used to promote compact urban areas favorable to public transit. In a democratic society, the public must desire such an outcome. Canadians have evidently accepted, and presumably demanded, regional planning that fosters more compact cities, fewer urban expressways, areawide parking policies, and a transit-first approach to traffic management.

In short, the Canadian experience suggests that public policies complementary to transit can be implemented and prove effective in the absence of a wide array of transit-supportive historic, demographic, and economic factors. That experience also suggests, however, the importance of political institutions and the fundamental values and attitudes of the public.

## NOTES

1. See Mills and Lubuele (1997) and Mieszkowski and Mills (1993) for a thorough consideration of these reasons.
2. For countries with per capita incomes half that of the United States, these price differences from nearly 40 years ago are even more significant.
3. Though not as resistant to fuel and vehicle taxation as Americans, Western Europeans are becoming more reluctant to accept further increases. For instance, the

British Parliament recently repealed a 6 percent annual fuel tax escalator (above inflation) in response to widespread and adverse public reaction to the duty.

4. See, for instance, Rothblatt and Garr (1986).
5. Although the U.S. federal government itself owns a substantial amount of mostly rural land (much of it in the western United States) and regulates some aspects of private land use (such as limits on the use of wetlands), it has little direct influence on most urban land use planning and regulation.
6. According to the General Accounting Office (1999), 11 states have passed state-level growth management policies of one kind or another.
7. The Federal Housing Administration and Veterans Administration offer home buyers mortgage insurance at reduced rates. Because the reduced-rate mortgage insurance allows for lower down payments, home buyers can afford more expensive homes (Rothblatt and Garr 1986, 32–33).
8. Freddie Mac and Fannie Mae, privately held companies chartered by Congress, purchase mortgages from lenders and package them into securities that are sold to investors. By doing so, they seek to provide home owners and renters with lower-cost housing through more efficient and effective mortgage financing markets. These programs also developed the market for long-term (20- to 30-year) mortgage loans. The longer amortization periods and smaller monthly payments allow home buyers to carry larger mortgages (Rothblatt and Garr 1986, 32–36).
9. Some of the same concerns about the distortion of federal aid have been raised with regard to transit funding, particularly the incentives to use federal aid to build expensive light rail lines (Wachs 1989).
10. The most notable exceptions are the private bus services in Great Britain (outside greater London).
11. According to Lave (1991, 117), 82 percent of transit agencies with \$1 million or more in annual passenger revenue were privately owned in 1964. That year, federal legislation providing financial assistance to state and local governments for the acquisition of transit companies was passed.

## REFERENCES

### ABBREVIATIONS

AAMA	American Automobile Manufacturers Association
API	American Petroleum Institute
IEA	International Energy Administration
MVMA	Motor Vehicle Manufacturers Association
TRB	Transportation Research Board

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# 5



## Insights and Opportunities

This report was prepared for policy makers seeking to increase public transit ridership in the United States and wishing to know what can be learned from experiences in Canada and Western Europe. The preceding chapters describe many of the important government policies and institutional, social, and economic circumstances that have increased transit ridership abroad, as well as some specific practices and innovations that have enhanced service performance and quality. In this chapter these factors are summarized, and Western European and Canadian experiences are contrasted with those of the United States. Some opportunities, derived from the committee's review, for boosting U.S. transit ridership in the near and long terms are then examined.

### **MAJOR FACTORS DIFFERENTIATING THE UNITED STATES, CANADA, AND WESTERN EUROPE**

A number of factors together have contributed to the high use of public transit in Western European and Canadian cities. Some of these factors can be traced back many decades; others can be attributed to existing differences in practice and policies.

#### **Historical Factors**

The United States was once a world leader in the use of new public transportation technologies. The expanding and enterprising American cities of the late 19th and early 20th centuries provided the quintessential environment for the introduction of faster and more efficient forms of urban transit. Almost overnight, the electric railway revolutionized urban employment and settlement patterns, allowing cities to expand both upward and outward

and to accommodate the thousands of new workers and residents being added each year without overcrowding. The electric streetcar and rapid rail lines that radiated out from city centers became popular corridors for residential development. They transported workers to and from busy downtowns and even out to the countryside for excursions to amusement parks and beaches.

Yet for most American cities, the boom in electric railways—especially streetcars—lasted little more than a generation. The widespread introduction of automobiles during the 1920s had a much more profound and lasting effect on urban size and form. Almost as quickly as Americans had embraced transit at the turn of the century, they abandoned it in favor of the increasingly affordable private automobile. Widespread automobile use progressively altered the contours of America's urban areas. It allowed growth to disperse outward at lower densities and without the kind of residential and commercial clustering found along transit corridors.

By comparison, Western European cities were more cautious in introducing electric streetcar lines in the years before World War I. The populations and workforces of the older Western European cities were growing more slowly than those of still incipient American cities—many of which emerged from small towns in a matter of years. With their urban infrastructure and development patterns long established, Western Europeans were more concerned about the potential cost and disruptions associated with introducing successive new forms of transport. Many Western European cities opted to build and operate the new electric transit systems themselves rather than entrust this responsibility to private entrepreneurs as in the United States.

The mass introduction of the automobile took even longer to occur in Western Europe. Decades passed before Western European cities witnessed the kind of widespread automobile usage that took hold in American cities between the two world wars. The automobile did not emerge as a primary mode of urban transport in Western Europe until the 1960s. By then, most Western European urban areas consisted of compactly settled "walking" cities surrounded by a close-in ring of suburbs clustered around rail and bus corridors.

Automobiles have since multiplied in Western Europe, and urban populations and businesses have been moving farther from the traditional central cities. Compared with urbanized areas in the United States, however, Western European cities remain compact and well suited to travel by tran-

sit. Even smaller Western European cities have ridership levels comparable with those in much larger American cities. Transit is used for about 10 percent of urban trips in Western Europe, compared with about 2 percent in the United States, although there is considerable variation across Western Europe, just as in the United States.

Despite increasing competition from automobiles during the past 40 years, Western European transit systems have not experienced the precipitous declines in patronage that befell American transit during the middle decades of the 20th century. As cars proliferated, the mostly private American transit systems saw patronage fall to a point where few could generate the revenue needed to maintain their networks. However, the dwindling fortunes of public transport after World War II received little national attention. By 1960, the public takeover of transit had hardly begun.

Even after the automobile was mass introduced in Western Europe during the 1960s, few transit operators failed. Most were publicly owned, and government investment in them continued. Automobiles, once considered luxuries, continued to be heavily taxed. High car ownership and fuel taxes were first imposed before cars were widely used; as automobile use grew, however, these taxes became important sources of government revenue. The funds were increasingly used for many government social programs, including transit service. In addition to boosting transit demand, the high automobile taxes made it incumbent upon Western European governments to continue to provide good transit service. Meanwhile, taxes on motor vehicles and fuel remained much lower in the United States, where the revenues were used largely to fund highway programs.

Long-standing limits on suburban development, coupled with the high cost of operating cars, kept urban areas more compact and transit oriented in Western Europe. Many Western European cities owned or otherwise controlled the land on their periphery and actively sought to curb its development to preserve the traditional function of their historic city centers. At the same time, strong national and regional governments, concerned about the loss of open space around cities, took steps to limit urban expansion. In contrast, ample land was available for burgeoning American urban areas to expand outward. Highly localized control of land use planning precluded any significant regional or national coordination of new development and transportation investments.

Many American urban areas were subject to economic and demographic growth pressures not experienced widely in Western Europe. After

World War II, the population of the United States—especially in urban areas—grew several times faster than that of Western Europe. Most population growth in the United States was in metropolitan areas and accommodated by new low-density development outside the central city. By comparison, fewer Western Europeans could afford private homes and automobiles after the war. In those cities heavily damaged during the war and desperately in need of more public housing, Western European governments located much of this residential development near public transit.

These historical differences are helpful in understanding why trends in transit use diverged in the United States and Western Europe. They offer little explanation, however, for the differences between the United States and Canada. Many of the trends that occurred in the United States—from rapid urbanization to the widespread introduction of the automobile early in the century—also occurred in Canada at about the same time. Yet Canadian urban areas have managed to retain high levels of transit use, in part because their center cities experienced less decline and their provincial governments intervened much earlier in providing financial aid to ailing transit systems. They also took a more active role in guiding and integrating land use planning and transportation system investments at the regional level. Because many of these policies and practices were adopted during the past 30 years, they suggest that transit-supportive policies and practices can have a significant influence on transit ridership.

## **Current Differences in Transit Practice and Policy**

Americans using public transit in Western Europe and Canada today immediately notice how fast, convenient, and reliable the service is. They also note its popularity. Transit operators themselves deserve much of the credit for the large number of riders they attract through innovative operating practices, customer-mindedness, and investments in new technology.

A frequent observation of those participating in American study tours of transit operations is that Western European and Canadian transit managers enjoy considerable discretion in determining methods of fare collection, adjusting routes, choosing equipment, and taking other steps to enhance service quality and performance. They pay close attention to customer needs, starting with the simplest and most obvious, such as providing clean, comfortable vehicles and pleasant, knowledgeable drivers. Moreover, most transit operators are committed to improving performance

through innovation and experimentation with new services, amenities, and technologies. As an example, many Western European and Canadian transit operators have equipped bus stops and train stations with vehicle locator systems that give waiting patrons up-to-date information on the status of pending service. Ticket purchasing is made convenient and fast through nearly ubiquitous selling points and off-board, automated fare collection. Service speed and regularity are often achieved by scheduling mainline bus routes with fewer time-consuming stops and by widening vehicle doors and encouraging prepayment of fares to expedite passenger boarding and alighting. In seeking to retain existing riders and attract new ones, many transit operators have demonstrated creativity—for instance, by offering commuters discounts on weekend car rentals and by incorporating transit rides into the price of admission to popular entertainment and sporting events.

Western European and Canadian transit riders also benefit from the priority given to transit vehicles by urban traffic management actions. Many Western European cities, both large and small, deploy advanced traffic control systems that allow buses to selectively preempt traffic signals or increase the green time on mainline routes, thus reducing queuing and delays at congested intersections. Many cities restrict on-street parking to discourage automobile use, and some have even closed large portions of their commercial districts to motor vehicles, excepting buses and other transit vehicles.

Such approaches to transit operations and traffic management have helped transit operators attract and retain riders. Many of these approaches may be applicable in the United States. It is important to recognize, however, that most Western European countries provide significant financial support for their transit systems, and they do so in part with revenues received from high taxes levied on automobiles and motor fuel. These taxes, in turn, encourage more transit use.

These policies are also consistent with what appears to be a strong and commonly shared public goal of preserving the traditional form and function of Western Europe's historic cities. The integration of transportation and land use policies is viewed as central to achieving this goal. In Western Europe and Canada, urban land use and transportation decisions are highly coordinated at the regional and often national levels. As examples, the governments of Great Britain and the Netherlands retain most authority for making local transportation and land use decisions, and in federalist Germany the national government, as a practical matter, shares this authority with local and regional governments. In parts of Canada, land use



and transportation plans are integrated at the metropolitan level by regional urban governments that have jurisdiction over transit, highways, and land use.

By comparison, decision making on urban land use in the United States is almost entirely a local government prerogative, whereas the planning and provision of major transportation infrastructure are usually regional and state responsibilities with federal funding assistance. In an environment characterized by highly diffused control over urban land use—with local government actions tending to favor low-density development—it is difficult for government planners to coordinate their actions in ways that might boost public transit use.

## **OPPORTUNITIES AND CHALLENGES**

The findings presented in this report suggest that a combination of factors working together and over time have led to differing levels of transit use in American, Western European, and Canadian cities. Urban areas in the United States and Western Europe clearly differ in many important respects that have affected transit demand and supply and continue to do so. The latter countries have stronger regional governments, long-standing controls on urban land use, tight constraints on city parking, and much higher costs for car ownership and operations. They have also experienced comparatively limited urban growth pressures, and most have continued to invest heavily in public transit since World War II. Because so few Western Europeans could afford to own cars until relatively recently, the public provision of transit was, and remains, a critical government concern.

Most urban environments in the United States today are suburban in character and poorly suited to public transit service. An abundance of inexpensive and accessible land open to development outside most cities, fast-growing urban populations and economies, and inner-city social and economic troubles have combined with the automobile to create increasingly decentralized and dispersed metropolitan areas that are difficult, and sometimes impossible, to serve with public transit. Moreover, a long time and significant changes in government institutions, land use controls, and public attitudes and preferences would be required to reshape this environment in ways that would substantially favor transit use.

In light of these marked differences, one must be cautious in drawing lessons from Western Europe, and even Canada, on how to increase transit

use in the United States. Still, there is opportunity for transit to play a more prominent role in the U.S. urban transportation system, and the experiences of these countries offer many important ideas for making public transit work better and gain in popularity. Although it is unreasonable to expect U.S. transit use to rise to Western European levels, there are many places in the United States that are now well suited to transit where its use could be increased. New York, Chicago, San Francisco, Washington, Boston, and several other American cities have retained high levels of central city employment, population densities, and public transit mode shares. Many of the policies and practices of Western European and Canadian cities—from their emphasis on channeling new development into areas that are well served by public transportation to their creative transit marketing and fare policies—are especially relevant for these American cities. Yet experiences abroad also offer insight into how transit can be improved in those American cities where it has a smaller role. Even in the most automobile-oriented cities of the United States, public transportation affords a service that is vital to a portion of the population and provides essential transport capacity in heavily traveled corridors, and therefore it is important to draw lessons for these cities as well. In particular, Western European and Canadian transit systems distinguish themselves in providing dependable, good-quality service, which is relevant to all American transit systems interested in satisfying the needs of existing riders and attracting new ones.

Table 5-1 lists several approaches examined in this report that have contributed to high levels of transit use in Western Europe and Canada. Also presented is an assessment of when each approach is likely to be most feasible to implement and to be effective in increasing transit use in the United States. Some of these approaches have the potential to be applied relatively quickly, whereas others present longer-term challenges.

### **Early Opportunities**

The experiences of Western Europe and Canada offer insights for improving service quality and operating performance in ways that can both benefit existing riders and attract new riders. In these countries, serious attention is given to service speed, comfort, and reliability. Operating practices ranging from the routing of buses and spacing of bus stops to methods of fare collection are designed not only to enhance convenience for passengers, but also to increase service speed and reduce delays. Riding is made con-

venient through ubiquitous ticket purchasing points and coordination of schedules and fares among multiple transit operators. Transit is marketed to attract new riders and meet the needs of existing users through various forms of discounted passes and inclusion of transit fares in the price of admission to concerts, sporting events, and other large public gatherings.

This emphasis on service quality has been instrumental in retaining and attracting new riders and in generating public support for other policies that further promote transit performance and use. These policies include local zoning and land use controls that permit new development contingent upon transit access and limited parking availability. A transit-first approach to city traffic management pervades Western Europe and Canada. Transit vehicles, whether buses or light rail, are given priority in mixed traffic; they can selectively preempt traffic signals at busy intersections, operate on dedicated travel lanes, and jump ahead of other vehicles waiting in queues.

To be sure, many of these policies and practices—summarized in Box 5-1—have been successful in Western Europe and Canada because they have augmented already high levels of service provided to a relatively large ridership. They have also been adopted in urban areas characterized by strong central cities, compact urban land use, and strong efforts to direct development into areas well served by transit. To the extent that U.S. central cities can be revitalized and urban development conditioned on transit access, transit ridership gains may follow.

Many of the specific policies and practices described above have been tried on a limited and often temporary basis in American cities. In the current urban environment, few such measures can be expected to generate large increases in passenger demand by themselves. However, it is through a series of such policies and practices, consistently and incrementally applied, that Canada and Western Europe have enhanced transit's performance and broadened its constituency and support.

## **Challenges**

Dependable, safe, and convenient service is an essential condition for the success of all policies aimed at making transit a more widely available, attractive, and well-used means of travel. The Western European and Canadian experience indicates that the provision of good transit service is an imperative regardless of market size. It also indicates that much more must be done if the goal is to raise transit demand substantially. Although many

Table 5-1 Possible Approaches for Increasing U.S. Transit Use

Possible Approach	Preconditions That Foster Successful Implementation	Examples of Conditions That Will Increase Effectiveness in Boosting Transit Use
Transit operational and quality-of-service enhancements	Flexible transit workforce; management autonomy, including latitude and incentives to innovate; regional coordination of transit fares and services; public expectations of dependable and convenient service	Existing significant ridership base; complementary traffic regulations that favor transit operations
Transit priority in traffic	Integration of highway and transit management and policy making; limited street space and suitable street geometry; latitude and incentives for transit operators to innovate	Large ridership on buses; chronic urban traffic congestion; commitment to enforcing priority measures; priority given to transit over a large area
Transit-oriented site design in land use zoning	Tradition of strong government regulation of development and land use; commonly accepted standards and guidelines for site design	Well-performing and ubiquitous transit network; safe and sufficient pedestrian access ways; large commercial complexes with significant ridership potential

<p>Parking restrictions</p>	<p>Regional governance that allows for parking coordination across a metropolitan area</p>	<p>Adequate transit availability, especially rapid transit that provides an attractive alternative to driving for access to major activity centers</p>
<p>Increase in cost of automobile use</p>	<p>Acceptance/tradition of high taxes on vehicles and fuel; public concern over pollution, noise, traffic, and other adverse side effects of driving; good alternatives to driving, including walking, biking, and transit</p>	<p>Persistent high costs, prompting fundamental changes in settlement and commuting patterns</p>
<p>Regional coordination of land use and transportation planning</p>	<p>Regional governance, including revenue sharing; government land ownership; tradition of strong regional governance; public concerns about environment and land scarcity</p>	<p>Attractive city centers; high residential and employment density; complementary policies that discourage driving, including tax policies</p>

## Box 5-1

## Examples of Key Practices and Public Policies Favorable to Transit Use in Western Europe and Canada

### Reliability and Frequency of Transit Service

- Wide spacing between bus stops to increase operating speeds
- Passenger loading platforms to ease bus reentry into traffic streams
- Prepaid tickets and boarding passes to expedite passenger boarding
- Low-floor buses with wide doorways to speed boarding and alighting
- Transit priority in mixed traffic (e.g., bus lanes and special signalization)
- Vehicle locator systems

### Comfort, Safety, and Convenience of Service

- Amenities at transit stops and stations
- Clean vehicles and knowledgeable drivers
- Convenient ticket purchasing places
- Sidewalks leading to stations and secure, lighted waiting areas
- Uniform and simplified fare structures across area transit modes
- Discounted transit passes tailored to individual rider needs
- Widespread publication of schedules and color-coded matching of buses and lines
- Special taxi service options to extend and complete the transit network

### Means of Making Transit Competitive with Private Automobiles

- High automobile taxes
- High motor fuel taxes
- Parking limits in city centers and uniform policies on an area-wide basis

- Restrictions on driving in certain areas, such as popular downtown retail districts
- Discounted automobile rentals and car cooperatives sponsored by transit agencies

#### **Compatible Urban Land Use Policies**

- Land use decision making shared among local, regional, and national governments
- Regional integration of transportation and land use plans
- Common rules and guidance on street and site development designs favorable to transit

of the means by which Western Europeans and Canadians have generated lasting demand for public transportation—from high taxes on motor vehicle use and ownership to regional control over parking, transportation, and land use—are widely viewed as having little potential for implementation in the United States, these prospects can change over time.

In particular, raising the cost of operating motor vehicles is widely viewed as an impractical option for the United States. Americans have come to depend on their cars and are reluctant to accept increases in motor fuel taxes or other constraints on motor vehicle ownership and use. Western Europeans have also become increasingly dependent on the automobile for much of their travel. Despite very high taxes on motor fuel and vehicles, Western European car ownership and use have increased rapidly during the past half century as incomes have risen. Regional controls on parking, and especially limits on parking supply in city centers, have proven to be important means of fostering the use of public transit.

Parking is already scarce in the downtowns of many large urban areas of the United States. Policies that limit the supply of new parking space could further increase demand for transit, provided the service is convenient, fast, and reliable. However, many people believe parking limits would encourage new development outside the center city, exacerbating the outward migration of retail and work places. Because most urban areas in the United States comprise scores of local jurisdictions—each competing for tax-generating businesses—the incentive has been to ensure ample parking rather than risk relocation of businesses and loss of revenue.

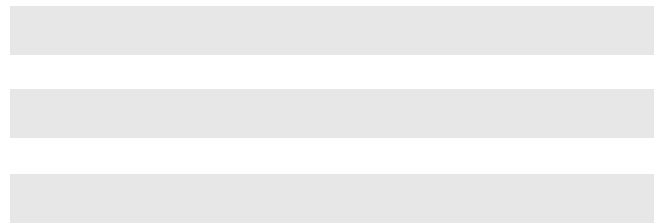
Canadians share with Western Europeans many of the same attitudes about the desirability of planning at the regional, rather than local, level and about the importance of coordinating parking controls and transportation investments on an areawide basis. Not only do Canadians limit downtown parking and require transit-accessible designs in new developments, but they direct development to existing or planned transit corridors. A similar attitude about the importance of planning land use at the regional level and coordinating land use with transportation does not prevail in the United States. Nor do most locales currently have the institutional or political frameworks needed to develop and implement such plans.

Many transit agencies in the United States operate and are administered on an urbanwide basis. Only rarely, however, have metropolitan-level governments been formed and granted authority to make integrated decisions about land use, taxation, and transportation that affect the entire region. Environmental and traffic congestion concerns in major metropolitan areas have prompted some states to gradually place limits on local control of land use, particularly on major land use decisions. Pressures to address wide-ranging issues such as these may prompt further coordination of land use and transportation at the regional level. The experience in Canada suggests that the advent of such regional land use planning, however difficult to achieve in the United States, is a critical complement to regional transit service.

## **CONCLUDING OBSERVATIONS**

What becomes clear from the committee's international comparison is that no single factor can explain why transit tends to be more popular abroad than in the United States. A number of policies, practices, and conditions have combined to elevate public transit's role in both the cities and suburbs of Western Europe and Canada. By no means do these experiences offer a panacea for transforming the role of public transit in the more automobile-oriented urban areas of the United States. They do, however, offer insights into ways of making transit a more effective and attractive alternative for urban travel in the future.





## APPENDIX

# Local Bus Transit Service Design and Quality in Western Europe\*

*Jack M. Reilly*

Comparisons of Western European and North American transit invariably focus on the high-quality rail systems found in the former. This focus, however, tends to diminish the important role that buses play in Western European transit systems. American transit agencies can learn much from Western European bus operating practices, service innovations, and technology applications.

### **BUS OPERATING PRACTICES IN WESTERN EUROPE**

As in the United States, Western European bus operations consist largely of the routine task of boarding and alighting customers at stops along prescribed routes at regular time intervals. However, there are considerable differences between the United States and Western Europe in the details of service execution.

#### **Interstop Distances**

Distances between bus stops are generally much longer in Western Europe than in the United States. In Hanover, Germany, for example, the average interstop distance is about 450 m. American transit systems generally set

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\* This appendix is an abridged version of a paper prepared by the author for the German Marshall Fund of the United States.

stops at about half this spacing. The longer intervals between bus stops in Western Europe, however, provide benefits to transport operators and their customers. Although walking distances are made longer, customers gain from the faster travel speeds resulting from less bus deceleration, acceleration, and dwell time. Service reliability is also enhanced, since a major source of time variation between trips is the number of customer stops en route.

Of course, increasing the distance between stops can be done only if the environment permits convenient pedestrian travel. Western European cities frequently have pedestrian-only zones and traffic signal engineering and intersection geometry that are well suited to travel by foot.

Reducing the number of bus stops also has advantages for providing customer information and traveler amenities. With fewer stops, more attention can be paid to each stop and the level of customer amenity. In Western Europe, it is typical for bus stops to have shelters that include posted schedules, ticket machines, and public telephones. Furthermore, fewer stops make it easier to display information on printed timetables. When stop densities are increased, as in the United States, it is difficult to show each bus stop on a printed map.

### **Timed Transfers and Other Scheduling Practices**

Practiced sporadically in the United States, timed-transfer systems are common in Western European cities. These systems enable convenient transfers between vehicles at major transfer centers because schedules are pulsed at easy-to-remember intervals that are based on clockface headways (i.e., 10, 20, 30 minutes after the hour). They are particularly helpful at train stations, which tend to be the major bus transfer hubs of Western European cities.

In some Western European bus networks, several routes branch from a common trunk. Service on these routes is typically phased to provide a regular interval between buses along the major trunk. As a result, two routes with a 20-minute frequency can combine to a single route with 10-minute frequency.

In larger cities in Western Europe, buses are permanently assigned to particular routes, which has many positive implications for customer information. Major stops can be displayed on the bus exterior and route maps can be posted inside the bus, much as they are in underground railway sys-

tems. On the down side, this practice precludes interlining and may increase operating costs because of vehicle dedication.

Many Western European systems operate nightbus, or "nachtbus," networks. In such a network several daytime routes are combined into a single night route. In Paris, night routes are designated by letter (rather than by number). Frequently, the routes are pulsed at major boarding points, which facilitates transfers between buses. Transit operators also publish separate night service route maps, and in some cities, such as Osnabrück, Germany, vehicles are specially marked for this service.

## **Fare Collection and Structure**

Bus fare collection in Western Europe is almost always handled off the bus. The idea is to increase boarding speeds at each stop. Off-board fare collection reduces dwell time at stops and enables customers to board at all doors in the bus.

Several systems use a simple technology in which fare media are purchased off-board but validated on-board. Most transit users buy discounted weekly, monthly, or annual fare passes. Inspectors randomly check to determine whether passengers have a valid ticket or pass for their journey.

Like American transit systems, Western European operators have been exploring "smart" cards for transit fare collection in which a chip with a stored value is used as a substitute for cash payment, particularly for small purchases. In Western Europe, most public telephone systems already use a similar card. Some cities are experimenting with a single card for a variety of public purposes such as downtown parking and transit use.

As fare collection technologies advance rapidly, the integration of fares among transit operators in a region is becoming more important. In many Western European urban areas with multiple operators, transit fares are set on the basis of origin and destination, not on the basis of mode of travel or the individual operator. For example, in Zurich, there is a regional fare structure for all surface transport modes including tram, bus, ferry, and rail systems. In several markets, customers have a choice of transit modes but fares are the same for each. In Germany, there are federations of operators that manage a common fare system. These federations, or verbunds, are described elsewhere in this report.

The Netherlands has implemented a national fare structure. The country is partitioned into several zones, and fares are computed on the basis of the number of zone boundaries that the customer crosses. Transport customers can purchase a 10-ticket *strippenkaart* that is valid on all local transport in the Netherlands. Fare reimbursement to transport operators is based on passenger kilometers computed by a sample survey of customer boardings and alightings. There is considerable interest in maintaining this unique fare system and the introduction of a stored value debit card that would have the advantage of more accurately rebating revenue to operators.

## **SERVICE INNOVATIONS**

Western European urban transportation systems are often more "seamless" than American systems. This is perhaps best demonstrated by the integration of taxi service and transit operations in many Western European cities. In the United States, taxis are usually viewed as competitors with transit. In many Western European cities, however, taxis are viewed as a complement to regularly scheduled transit service, especially in areas or time periods of relatively low transit demand.

A common use of taxi service in urban areas is the "sammel," or group, taxi, which is used widely in Germany as a hybrid between bus and taxi service. During late evening hours, a bus-stop to bus-stop service is operated in place of regularly scheduled transit service. Taxis are dispatched from a common center either hourly or half hourly. Customers can board taxis at the common center and be transported to the closest desired bus stop for a fare roughly twice the regular transit fare. Customers may also call for a taxi pickup at bus stops for trips that do not originate at the common center. Taxi trips may not be exclusive, and customers may share rides with other customers. The stop-to-stop nature of the service differentiates it from a pure, exclusive-use taxi service.

In some cities, particularly during the evening, transit customers may request the bus driver to call for a taxi to meet the customer at a prearranged stop and time along the route. In Hanover, Germany, for example, this service is available at all times to disabled customers, but after 8:00 p.m., all customers may use this service. This is operated as a customer service, and there is no fare integration between the bus and taxi.

## TECHNOLOGY

Western European transit operators are keen to explore new technologies. Although many of the technologies are also available in the United States, a key difference is the range and ubiquity of technologies in Western Europe. Sophisticated transit technologies can be found even in many small Western European cities.

### Traffic-Signal Priority and Automatic Vehicle Location

Traffic-signal priority schemes, which give approaching transit vehicles preference over other vehicles in traffic, are slowly being introduced in the United States, even as they have become commonplace in Western Europe.

Among the oldest and most extensive is the traffic priority scheme in Zurich, Switzerland. Transit use in Zurich is among the heaviest in Western Europe, even though Zurich does not have an underground rail system, and thus all transit is on surface streets with very restrictive geometry. To facilitate this surface transit, Zurich has sought to create "green waves" for transit vehicles. About 90 percent of transit vehicles (buses and trams) that enter signalized intersections are met by a green signal. The city has placed four traffic detectors on each vehicle approach to an intersection. The first is located about 20 s before the intersection. Activation of this detector readies a green traffic signal in 20 s. About 6 s from the intersection, a second detector verifies that the transit vehicle is still approaching at the expected speed. A third detector at the intersection acknowledges that the vehicle has approached the intersection, and a fourth indicates that the vehicle has cleared the intersection and that the signal system should revert to its normal operating mode. At some intersections, the overall traffic cycle time (for all phases) is maintained but green phases are extended where necessary to give priority to buses and trams.

Ancillary to the traffic system, the Zurich transit federation maintains a vehicle location system that determines the location of vehicles to an accuracy of 10 m. When compared with published timetables, the punctuality of the vehicle can be determined and transmitted to the vehicle operator. This monitoring, coupled with the availability of spare buses and trams that can be inserted into routes with delays, greatly improves the reliability of the service.

Automatic vehicle location systems are used throughout Western Europe, even by many smaller bus transit systems. As in the United States,

a dramatic shift is being undertaken between signpost systems and geographic positioning systems (GPS). Signpost systems determine location on a route as the distance along the route path from the last time a bus passed a signpost. GPS systems use a satellite system to determine location.

From a vehicle location system, it can be determined whether a vehicle is operating according to schedule or whether there are systematic delays in the transit operation. These systems advise not only the dispatcher but also the driver of the current state of on-time operation. Some systems have introduced sufficient intelligence to advise drivers of late buses which connections at transfer points may be jeopardized.

### **Customer Information Technologies**

A number of systems are available that improve the quality of customer information. Systems that are seldom used in the United States are used widely in Western Europe. Among these are real-time electronic timetables at major bus stops showing the expected (rather than scheduled) arrival time of the next bus on a particular route.

The Netherlands Transport Ministry maintains a national transit information service at public bus terminals, which is accessed by a telephone chip card. Fees are charged for each transaction.

### **Bus Equipment**

Many Western European transit operators use low-floor buses, a technology that is also being introduced in the United States. In addition to providing greater accessibility for elderly and disabled riders, a motivation for use of low-floor equipment in Western Europe has been to reduce bus dwell times by hastening passenger entry and exiting. The prevalence of off-board fare collection allows boarding and alighting through all doors; therefore, the low floors, coupled with wider doors, enable the rapid interchange of passengers at stops.



## Study Committee Biographical Information

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