

IS SPRAWL INEVITABLE? LESSONS FROM ABROAD

by

Harry W. Richardson and Peter Gordon
School of Policy, Planning and Development

University of Southern California

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INTRODUCTION

Whenever we present the case for the view that the prevailing metropolitan settlement patterns in the United States, while not necessarily optimal, are acceptable and satisfy the residential preferences of most households, we are usually offered the alternative hypothesis that other countries (occasionally Canada or East Asia, more often Europe) have found a better (i.e. more compact) way. The argument is that these cities elsewhere, by building at higher densities, have created a more balanced distribution of travel modes (i.e. less automobile dependence) and preserved a higher level of environmental quality. This paper discusses this

issue. However, it is not a research paper but a prologue to research. It examines some of the existing evidence, and concludes that the settlement trends and associated travel behavior observed in the United States appear to be emerging abroad, albeit with a lag, and that such trends appear to be close to universal rather than sporadic. The research needed to settle the argument remains to be done, although its feasibility is often hampered by the scarcity of small area urban data in many countries.

Critics of suburban development in the United States have argued that it is the result of a special mix of U.S. policies, including the treatment of mortgage interest and property taxes in the federal income tax code, extensive highway subsidies (although these pale in comparison to transit subsidies on a per trip basis), low gasoline taxes and rigid suburban zoning codes. While some of these policies have an impact, the important question is: How much? This question is seldom raised, never mind answered (Voith [1999] is one of the few analysts that have addressed this important issue). Rather, compact development advocates seem to be trying to establish that: i. observed settlement patterns reflect a pattern of consumer demand that has been distorted by taxes, subsidies, and (in the absence of tighter density control policies) developer marketing techniques; and ii. simple policy changes can "solve the problem".

The trouble with this position is that suburbanization is almost universal. It occurs in places that have adopted many of the policies that U.S. Smart Growth supporters recommend. Mills and Lubuele (1997) report that "...the facts are clear. Suburbanization, defined as flattening density-distance functions, has pervaded U.S. MSAs for at least 50 years and has characterized every metropolitan area in the world for which density patterns and trends have been measured, during a half century of pervasively rising incomes and

transportation improvements." (p. 730). The motive force of consumer demand for spacious living is inescapable. Large segments of the expanding middle class everywhere are able to chose lifestyles once only available to the wealthy.

Widespread auto ownership with suburban land use patterns are evolving in countries such as those of Western Europe and Canada where policies are very different, most of them strongly favoring compact development and blatantly pro-transit. (Gerondeau, 1997; Giuliano, 1999; Morrill, 1992). AThroughout the developed world, people own more private vehicles, use them more frequently, drive more miles, and are more likely to drive alone than ever before@ (Giuliano, 1999, p. 1). Annual growth rates, 1970-93, of the vehicle fleet averaged 2.6 percent in the US, 4.5 percent in other OECD countries, and 6.5 percent elsewhere. Although low-income countries have the lowest car ownership levels, they are experiencing the highest growth rates. Car ownership increases with GDP, although there is some dispersion, e.g. US car ownership rates in the U.S. are almost double those in Denmark and Japan (yet both car ownership rates and VMT are growing in Japan 2-3 times faster than in the United States). VMT are also rising faster in Europe than in the United States, despite shorter commuting distances (e.g. 13.1 kilometers in the Netherlands; Rouwendal and Rietveld, 1994); as in the United states, much of the growth is in non-work travel. Although the automobile passenger modal share remains higher in the United States (87 percent in 1994) than in the European Union (79.7 percent) or Japan (51.5 percent), the trends are in the opposite direction; between 1980 and 1994, auto=s share in the United States fell 1.7 percent (the result of a 25 percent increase in the air travel share), but rose by 3.7 percent in the European Union and by 24.3 percent in Japan. Some European cities have an automobile share similar to that found in Japan, for example, 48

percent in London, 64 percent in Manchester, 68 percent in Norwegian city regions and 49 percent in German cities. Nevertheless, in most cases the auto share is rising, and the national average across eight European countries in terms of VMT is 85 percent. Similarly, the U.S. decline in the bus and rail share over the same period (8.0 percent and 23.4 percent respectively) was more than matched by the declines in the European Union (27.3 percent and 27.2 percent) and in Japan (38.9 percent and 14.9 percent; Cox, 1998). Undoubtedly, transit promotion has been pushed much harder abroad than in the United States. Nevertheless, people abroad seem to acquire cars in spite of policies designed to get them to behave differently. Moreover, although there is a widespread belief that automobile use is subsidized, Gerondeau (1997) pegs the 1992 European surplus of road system revenues over costs at 97 billion ECUs (certainly more than enough to cover unpriced social costs).

This paper summarizes some of our own recent research on recent U.S. suburbanization trends and compares these to similar phenomena observed in some other countries. Although small-area data are in short supply and unstandardized, making comparisons difficult, it is clear that similar suburbanization trends are occurring abroad. Observed differences are better explained by moderate time lags than by contrasting policies.

II. THE U.S. EXPERIENCE

In a recent paper, Beyers (1998) examined County Business Patterns data on U.S. job growth patterns and reported that most growth between 1985 and 1995 occurred in rural areas. Suburbanization had moved out into the exurban and rural areas. Our examination of the BEA's REIS data also found that most U.S. job growth took place in the outer suburbs or the exurban and rural areas. Competition between these three types of sub-area is now much more significant than the old central city-vs-suburbs rivalries that preoccupy textbook writers.

Dramatically declining communications and transportation costs have quickened urban decentralization trends, accelerating the outward expansion of most of the world's metropolitan regions. The increasing "footlooseness" of producers means that for "the first time, population distribution is being shaped noticeably by the independent effect of consumers' preferences rather than dictated by the locational decisions of firms" (Easterlin, 1994, p. 30). The location decisions of households are influenced less by workplace accessibility than the availability of amenities, recreational opportunities and public safety.

Many writers have commented on the 1970s apparent reversal of long-term urbanization in the U.S. (the metropolitan "turnaround", "counter-urbanization," "rural renaissance," "clean break," and similar terms; Wardwell, 1977; Vining and Strauss, 1977; Gordon, 1979). However, most of this literature became moot in the 1980s when the turnaround reversed, in what Frey called "the new urban revival in the United States" (1993). But now there appears to be yet another turnaround, with even faster rural growth in the 1990s?

Using the Bureau of Economics Analysis' REIS data over a twenty-six year time span, 1969-1994, we found that:

i. Frostbelt-to-Sunbelt regional employment shifts continued throughout this period.

ii. Most urban growth is suburban: even the 1980s "urban revival" was a period of strong suburban growth, with most core counties suffering a relative decline.

iii. The "rural renaissance" of the 1970s was primarily a shift to smaller and mid-sized MSAs rather than unadulterated non-metropolitan growth.

iv. Recent growth (i.e. in the 1990s) has been strongest in the nonmetropolitan areas, including the nonmetropolitan fringe of the Sunbelt MSAs.

v. Relative sector performance does not vary much across geographical space after controlling for regional and subregional effects.

III. CANADA

There is an ongoing debate about whether Canada is similar to or different from the U.S. (Bourne, 1989, 1997; Rothblatt, 1994). In Vancouver, for example, although the land value gradient is steeper than in, say, Los Angeles, subcentering at Burnaby and Surrey has been strong; moreover, employment growth has dispersed rapidly throughout Canada (Hamilton and Heikkila, 1997). Goldberg and Mercer (1986), on the other hand, have searched for contrasts between Canadian and U.S. settlement patterns, as reflected in the title their book, *The Myth of the North American City*. Yet, any differences they found were not very significant. As noted by Mieskowski and Mills (1993, p. xx): "Goldberg and Mercer set out to demonstrate that Canadian metropolitan areas are relatively compact and more centralized than in the U.S. However, the authors conclude that Canada and U.S. metropolitan areas were decentralizing at the same rate" (p. xx). Coffey and Shearmur (1998) show that employment growth in Canada was faster in the urban shadow of metropolitan areas, a factor reinforcing suburban and exurban development. Thus, during the 1980s, metropolitan land use patterns bore an increasingly similarity to those in the U.S. (Perl and Pucher, 1995, p. 266). Thus, Toronto's urban form is like Vienna surrounded by Phoenix. Car ownership rates rose a little faster in Canada than in the U.S., but with a 10-15 year lag. More than 50 percent of Canadian housing starts are SFHs, and 64 percent of all housing is owner-occupied, in spite of no tax deductibility for mortgage payments. No country has tax breaks for owner occupation as large as the United States (\$65 billion in total). A recent study by Voith (1999) estimates that mortgage interest tax deductibility in the United States might reduce residential densities by 15 percent (based on a

price elasticity of demand of B1.0). But the facts show that relocation to suburban lower density environments is occurring in countries without these tax benefits (such as Canada) or with much lower tax benefits (e.g. some European countries such as the United Kingdom).

Public transit trips per capita in Canada fell from 246 in 1950 to 100 in 1970, rose slightly to 104 in 1990 and then dropped to 83 in 1994 (transit subsidies were limited and the costs of driving fell, so that auto and transit costs to users diverged). In the U.S., the numbers fell from 147 in 1950 to 38 in 1990 and dropped again to 34 in 1994 (Perl and Pucher, 1995). Overall, Cox (1999) shows that transit use (per capita ridership) declined in thirteen out of fifteen major Canadian cities between 1984 and 1994 by an average of 22.1 percent. Even larger losses were experienced by Toronto's widely acclaimed system. Canadian big-city transit losses exceeded those experienced in the large U.S. metro areas. Perl and Pucher (1995, p. 261) report that A[s]ince 1990 urban transit has steadily lost riders while urban auto use continues to increase.@

Similarly, Bourne (1997, p. 70) describes Canada's suburban development as "typically North American.@ Between 1951 and 1996, the central city population share in Vancouver fell from 64 percent to 29 percent, in Montreal from 74 percent to 32 percent, in Ottawa from 74 percent to 31 percent, and in Toronto from 58 percent to 15 percent. This is clearly decentralization on the U.S. scale. Bourne notes that Canada's suburbs "are the product of the intersection of three basic systems: i. the socio-economic environment, notably the financial and tax systems in place for building construction and home purchase; ii. housing polices and programs; and iii. local systems of property taxation, land use regulation, service provision,

and development control" (Bourne, op.cit., p. 81).

He notes that "Canada does not have a single national housing policy" and that provincial and local variations result in "different forms from one region of the country to another" (Ibid., p. 82). In addition, he admits that policies in the 1940s and 1950s "assigned priority to market-driven solutions" which resulted in suburban development that was "chaotic, disorderly and weakly regulated" (Ibid., p. 83). Yet, it is difficult to gather from Bourne's analysis how policy distinctions across North America or across Canada have made a difference.

IV. EUROPE

Peter Hall's discussion of the 1952 General Plan for Stockholm tells a story: "It proposed establishing new suburban districts, each for 10,000 to 15,000 inhabitants, strung like beads along the lines of a new subway system. Within them, apartment blocks were to be built within 500 yards of subway stops; single-family houses, constituting no more than 10-15 percent of housing units in each district, were to be built within 1000 yards of the stops but no further ... the city's policy was that each station on the subway should generate enough traffic to make it self-supporting" (Hall, 1998, pp. 862, 863). Things did not work out as planned. He notes that "surveys in the late 1970s reaffirmed the fact that 90 percent of people preferred single-family homes" (Hall, op.cit., p. 876). Not surprisingly, a more recent Swedish development is described as follows: "a vast linear edge City of business parks and hotels and out-of-town shopping centers, stretching along the E4 highway, for twelve miles and more towards the Arlanda Airport. It is almost indistinguishable from its counterparts in California and Texas" (Ibid., p. 878).

Earlier analysis by Hall and Hay (1980) analyzed an extensive small-area data file to determine whether the 1970s U.S. non-metropolitan area growth surge had also occurred elsewhere. They found that it did not. However, they did find significant suburbanization of population and employment in the post-1960 years. The same cross-European data file was updated and studied further by Cheshire and Hay (1989). They too looked for signs of a 1970s U.S.-style metropolitan-to-nonmetropolitan shift. They reported that "suburbanization has given way to decentralization or ex-urbanization" in Europe since the 1960s (Cheshire and Hay, p. 3) but that "(i)t is reasonable to expect that most growth of output and employment over the next 10 to 20 years will be in

services and this therefore provides strong grounds for believing that an urban revival is likely" (Ibid., p. 6). This has not been an accurate prediction, of course, because the service sector has also decentralized.

Hall (1995, p. 68) writes that "since WW II, at varying speeds and from varying starting points, cities in all Western European countries have decentralized. ... The evidence is overwhelming that both population and, behind it, employment are decentralizing." Similar conclusions were reported from a recent survey of European city officials (OECD, 1995, p. 15): "Settlement patterns are becoming more complex and the continuing suburbanisation of population and jobs is one of the major features.@ Interestingly, all of the cited research includes discussions of policy differences across Europe. Yet, none of the studies attempts to link distinct spatial outcomes to specific policies.

In 6 out of 7 European cities (Antwerp, Copenhagen, Hamburg, Milan, Paris and Rotterdam; the exception is Liverpool), both population and employment grew faster in the suburbs than in the core city, even in the 1970s. In Liverpool, both population and employment declined in the 1970s, but by less in the core city (Jansen, 1993). More recent data show declines in central city population shares: Paris, 32-23 percent, 1968-90; Zurich, 38-29 percent, 1970-95; Amsterdam, 80-66 percent, 1970-94; less so in London, 41-38 percent, 1971-94. Similarly, Cox (1999) shows that population densities in Greater London fell by 14.6 percent between 1971 and 1995, with 26 of 33 boroughs experiencing declining densities. Cox has also assembled Paris population data for 1890-1990, showing that Paris's population density (like that of Manhattan) peaked in 1910. However, Central Paris densities have declined only modestly in this century, falling from 71,555 per sq. mile in 1910 to 53,328 in 1990. Although Rotterdam

is much more centralized, decentralization has still been considerable (a central city population share of 75 percent in 1950 fell to 53 percent in 1992). The Stockholm story is similar, 71 percent in 1961 and 44 percent in 1991.

Even Eastern Europe is not immune from these trends.

Preliminary analysis by Johannes Broucker and Dieter Lohse of the Dresden University of Technology of Dresden households suggest location behavior remarkably similar to that observed in U.S. data, in spite of marked differences in urban densities, the availability of automobiles, and historical planned vs. market conditions.

VI. JAPAN

Spatial delineations for Japan similar to U.S. MSAs were developed long ago by Glickman (1978). He found evidence of rapid suburbanization in the post-1970 years. Detailed analysis by Kawashima and Hiraoka (1993) for the years 1960-1999 demonstrates a pattern of suburbanization away from Tokyo although at fluctuating rates that also vary along the five major radial railway routes out of the city center. Cox (1999) points out that whereas 68 percent of Greater Tokyo's population resided in the central city in 1965, only 29 percent did so by 1996. Nevertheless, commuting times in Tokyo with a 46.4 minute average commute [1993]) are up to twice as long as in major U.S. cities (19-27 minutes in 1990), a reflection of the relatively high transit share, inadequate investment in roads, and the search for low land prices on the urban periphery.

VII. OTHER, ESPECIALLY DEVELOPING, COUNTRIES

In preliminary research, Bertaud and Malpezzi (1998) construct measures of compactness for 35 world cities. The ingenious measure they use is the average distance per person (by census tract or equivalent small area) to the CBD as a ratio of the average distance to the center of a circle represented by assuming that the city is a cylinder with a height corresponding to uniform density. The higher the ratio, the more dispersed the city. Apart from problems associated with the CBD possibly being off-center, the main difficulty is that it is a relative measure not an absolute measure. Thus, a low-density metropolitan area, Los Angeles (note: low by international standards, high in the U.S.), has a Dispersion Ratio < 1.0 , while the highest density city in the sample (Bombay) with 389 persons per hectare has the highest Dispersion Ratio of 3.08. This yields the paradox of a high-density sprawling

city. The truth of the matter is that the dispersion ratio is a better measure of the irregular shape of the city than of sprawl per se. Thus, Bombay's high Dispersion Ratio reflects its linear rather than circular shape. Hence, it is not surprising that plausible regressions attempting to explain the degree of compactness did not generate statistically significant results. Subject to these qualifications, 10 out of 14 developing country cities and 15 out of 21 developed country cities had Dispersion Ratios > 1.0. Yet 23 of the total sample of 35 cities had Dispersion ratios within the range 0.90 B 1.10.

More relevant here, Bertaud and Malpezzi also present some standard density gradient results. Although monocentricity is becoming a rare phenomenon, even in developing country cities, the simple 2-parameter monocentric density gradient still yields statistically significant results in all but one of the sample (the exception was Seoul; however, if the new towns are included, the density gradient in the Seoul metropolitan region works better). However, the Seoul case shows a positive density gradient; a possible explanation is that high land prices have induced higher densities at peripheral locations that were developed later. Apart from 2 Chinese cities (Guangzhou and Shanghai, but not Beijing and Tianjin), all the density gradients had a slope of less than -0.2, and 24 of the 35 cities had slopes well below 0.1. This suggests that even developing country cities tend to have substantial decentralization.

Although densities in the developing country cities tended to be higher, several cities outside the developed world have densities comparable to those found in developed country cities, e.g. Bangkok (58 persons per hectare), Capetown (32), Curitiba (54) and Johannesburg (53). In Bangkok in particular, there was significant decentralization in the 1980s,

with most housing being built in the 11-20 km. ring (Dowall, 1992).

Worldwide, there is a very strong historical relationship between the growth of per-capita income and the growth of vehicle ownership (Dargay and Gately, 1997; Ingram and Liu, 1999; Gomez-Ibanez, 1991; Gakenheimer, 1995). Motor vehicle ownership rates are more closely associated with GDP per capita than with densities (of course, Newman and Kenworthy [1989] are the most prominent exponents of the alternative view), although interpretation is complicated by the inverse correlation of income per capita and density. This has strong implications for future patterns of urban growth (e.g. in Asia), given the link between motorization and suburbanization.

Density gradients flatten, as expected, with rising incomes, population size and increasing automobile ownership rates. Cities with dispersed population can be efficient if jobs are also dispersed; however, surprisingly, the sample cities with the most dispersed populations in the Bertaud-Malpezzi study (Capetown, Moscow, Seoul) have the highest central city employment shares.

VIII. POLICY IMPLICATIONS

Although this is not primarily a policy paper, it is worth asking whether in the light of decentralization trends everywhere and ubiquitous rising automobile use, these trends could be reversed (leaving aside whether or not such a reversal would be desirable). For example, Perl and Pucher (1995) have suggested policy recommendations to limit urban sprawl in Canada: i. more transit subsidies targetted at potential new riders (e.g. transit passes); ii. full-cost pricing of automobiles; and iii. implementing Atransit supportive@ land use policies. There is doubt in the United Kingdom that the widely supported greenbelt policy instrument has been effective in controlling sprawl. On the contrary, it has forced people to commute across the greenbelt to work in the towns subject to constraints on their physical growth. ASuch a policy therefore increases the length of the average journey to work, and conflicts with the idea that physical planning should aim at reducing the length of this daily journey to achieve the objective of sustainability@ (Evans, 1998, p. 138).

In our view, there is no compelling evidence that sprawl reversal measures will work, for the following reasons:-

The elasticity of VMT with respect to increases in density is very low (-0.07).

Changes in neighborhood design have not been shown to reduce automobile use (possibly there will be more trips rather than modal shifts).

The continued erosion of core agglomeration economies mean that firm relocations back to the central city are implausible, and land use regulations are increasingly

ineffective because of the ability to relocate globally.

Although there may be a niche demand for high-density living, the overwhelming preference is for low-density suburban environments.

Although land use regulations in Europe appear to be tougher than in the U.S., they have not been effective in reversing the trends towards increased auto use.

- i. The modest results of Singapore's VQS (Vehicle Quota Scheme), a 63 percent increase in price reduced car ownership by 7-11 percent (Chin and Smith, 1997), show the mountain policymakers in the U.S. and Europe have to climb to use higher auto costs as a mechanism to restrict car ownership and use.

We continue to argue that the three most important measures to counteract sprawl in the United States would be the abolition of R-1 residential zoning, mortgage interest tax deductibility, and the deductibility of property taxes. Would the Smart Growth advocates go for it? Not a chance. Yet the case is compelling: higher-density development in R-1 zones; shifting demand in favor of (higher density) renting; reducing spatial income segregation; and more place-based tax revenues that would permit a substantial cut in income and capital gains taxes, with favorable effects on incentives to work and to save.

CONCLUSIONS

This paper has focused on simple measures for which scarce data can be obtained: population and employment densities, central city shares, and travel mode statistics. Using these criteria, other countries appear to be following the same

decentralization trends experienced in the United States, with lags of varying length. But an analysis of the degree of sprawl requires the availability of considerable micro-spatial data (regardless of how sprawl is defined; for a discussion see Malpezzi, 1999), and in most countries these data either do not exist or are not easily accessible. Also, in many parts of the world, what happens to spatial settlement patterns over the next two or three decades will help to answer the question posed in this paper.

Nivola (1999b, p. 11) sees the decentralization of U.S. cities as "path dependent: technological innovations helped chart an early course that has determined, and been amplified by, subsequent events.@ The trouble with this view of technology is that it leaves no room for people's preferences as a driver of technological change. The view that technological change is an exogenous juggernaut has been challenged by Romer (1996), among others. Nivola also calls attention to America's interstate highway program, begun in 1956. This is too large an investment to have had no impact. Yet there was significant suburbanization prior to 1956, and there is much of it in countries without infrastructure programs on this scale. The relative sparseness of highway networks in other countries helps to explain their high levels of traffic congestion, especially in cities or along major interurban corridors. Most troubling for Nivola's argument is that he says so little about the decentralizing pattern of urban development now taking place in Europe. Nor does he reflect on the central argument of this paper that spatial policies (either direct [e.g. land use] or indirect [e.g. transit subsidies]) that attempt to buck market trends and consumer preferences are likely to fail.

Affluence and technological change, especially in communications and transportation, continue to have their expected effects in almost all developed countries: they help to explain the increasing demand for and supply of urban space. Cities everywhere spread outward as a result. These effects are universal. Increasing footlooseness is simply another opportunity for greater adaptive efficiency. Perhaps we should not be surprised to find enough international urban development similarities to cast doubt on the importance of substantial policy differences.

Country music fans celebrating "My Mean Green Freedom Machine" know what they are singing about. Gerondeau (1997, p. 229) cites a French survey showing 88 percent of French car owners also look on their car as "an important part of their personal freedom. @ Even scholars have recognized the "empowerment" associated with the release from fixed routes and schedules. Carpooling in the U.S. is negligible for precisely these reasons. The statistics that demonstrate its unpopularity seldom purge the data of the natural carpooling that occasionally occurs between members of the same household. Dunn (1998, p. 2) adds that A the auto provides a sort of individualist equality that is particularly well suited to American values. @ Hogarty (1998, 1999a, 1999b) estimates the net social benefits of personal vehicle travel in the United States to be about \$2 trillion per year. The international allure of American popular culture suggests that traditional American freedoms appeal to people everywhere. A universal fondness for automobiles should surprise no one. It is not only American teenagers who see an operator=s license as their Declaration of Independence.

REFERENCES

Abdallah, Arbi Ben and Charles L. Leven (1989), "Shifting Size Distribution of Metro Areas," *Review of Urban and Regional Development Studies*, 2, pp. 77-87.

Bertaud, Alain and Stephen Malpezzi (1998), *The Spatial Distribution of Population in 35 World Cities: The Role of Markets, Planning and Topography.* @ Madison: University of Wisconsin, Center for Urban Land Economics Research.

Beyers, William B. (1998), *Trends in Producer Service Employment in the United States: The 1985-1995 Experience.* @ Santa Fe: 1998 North American Regional Science association Meeting.

Brog, W. and E. Erl (1996), *Germany,* @ in *Changing Daily Urban Mobility: Less or Differently? Report of the Hundred and Second Roundtable on Transport Economics.* Paris: European Conference of Ministers of Transport.

Bourne, Larry S. (1997) "Suburban Development in Canada: Evolving Forms and Styles of Regulation" presented at the International Workshop on Suburbanization and Housing Development, Korea Housing Institute, Seoul, Korea.

Bourne, Larry S. (1989), *Are New Urban Forms Emerging? Empirical Tests for Canadian Urban Areas,* @ *The Canadian Geographer*, 33(4), 312-328.

Champion, A.G. (1992) , "Urban and Regional Demographic Trends in the Developed World," *Urban Studies*, 29, 3/4 pp. 461-483.

Cheshire, P. (1991) Problems of Regional Transformation and Deindustrialization in the European Community. In: Rodwin, L., Sazanami, H. (ed.) Industrial Change and Regional Economic Transformation: The Experience of Western Europe, 237-267. London: Harper Collins.

Cheshire, P.C. (1993) Some Causes of Western European Patterns of Urban Change, 1971-88. In: Summers, A.A., Cheshire, P.C., Senn, L. (ed.) (1993) Urban Change in the United States and Western Europe: Comparative Analysis and Policy, 145-190. Washington, D.C.: The Urban Institute Press.

Cheshire, P.C. (1995) A New Phase of Urban Development in Western Europe? The Evidence for the 1980s. *Urban Studies*, 32, 1045-1063.

Cheshire, P.C., Hay, D.G. (1989) Urban Problems in Western Europe: An Economic Analysis. London: Unwin Hyman.

Cheshire, P., Camagni, R.P., Gaudemar, J.-P. de, Cuadrado Roura, J.R. (1991) 1957 to 1992: Moving toward a Europe of Regions and Regional Policy. In: Rodwin, L., Sazanami, H. (ed.) Industrial Change and Regional Economic Transformation: The Experience of Western Europe, 268-300. London: Harper Collins.

Chin, A. and P. Smith (1997), Automobile Ownership and Government Policy: The Economics of Singapore's Vehicle Quota Scheme, *Transportation Research A*, 31(2), 129-40.

Chinitz, Benjamin (1991) "A Framework for Speculating about Future Urban Growth Patterns in the U.S.," *Urban Studies*, 28(6), pp. 939-959.

Clark, David E. and Christopher A. Murphy (1996), "Countywide Employment and Population Growth: An

Analysis of the 1980s," Journal of Regional Science, 36: 2, pp. 235-256.

Coffey, William J. and Richard G. Shearmur (1998), AFactors and Correlates of Employment Growth in the Canadian Urban system, 1971-91,@ Growth and Change, 29 (Winter), 44-66.

Cox, Wendell (1998), AThe Predominance of Highways in U.S. (and European) Transport.@ The Public Purpose, Transport Fact Book.

Cox, Wendell (1999) Assorted tables and data at www.publicpurpose.com.

Dargay, Joyce and Dermot Gately (1997), AIncome=s Effect on Car and Vehicle Ownership, Worldwide: 1960-2015.@ New York: NYU, C.V. Starr Center for Applied Economics, RR #97-33.

Dowall, David E. (1992), AA Second Look at the Bangkok Land and Housing Market,@ Urban Studies, 29(1), pp. 25-37.

Dunn, James A., Jr. (1998), Driving Forces: The Automobile, Its Enemies and the Politics of Mobility. Washington, D.C.: The Brookings Institution.

Easterlin, Richard A. (1994), "Twentieth Century American Population Growth," in Stanley Engerman and Robert E. Gallman, eds., The Cambridge Economic History of the United States. Vol. III. The Twentieth Century. Cambridge University Press.

Ellison, Glenn and Edward L. Glaeser (1994), "Geographic Concentration in U.S. Manufacturing Industries: A Dartboard Approach." Discussion Paper #1691, Harvard Institute of Economic Research, Harvard University.

Evans, Alan W. (1998), ADr. Pangloss Finds His Profession: Sustainability, Transport, and Land Use Planning in Britain,@ Journal of Planning Education and Research, 18(2), 137-44.

Gakenheimer, Ralph (1995), Motorization in the Developing World. Washington, D.C.: World Bank.

Gerondeau, Christian (1997), Transport in Europe. Norwood, MA.: Artech House, Inc.

Giuliano, Genevieve (1999), "Land Use Policy and Transportation: Why We Won't Get There From Here" Transportation Research Board Circular (forthcoming).

Glickman, Norman J. (1978), The Growth and Management of the Japanese Urban System. New York: Academic Press.

Goldberg, Michael A. and John Mercer (1986), The Myth of the North American City. Vancouver: University of British Columbia Press.

Gomez-Ibanez, Jose Antonio (1991), AA Global View of Automobile Dependence,@ Journal of the American Planning Association, 57(3), pp. 376-9.

Gordon, Peter (1979), "Deconcentration without a 'Clean Break'" Environment and Planning A, 11, pp. 281-290.

Gordon, Peter and Harry W. Richardson (1998), "World Cities in North America: Structural Change and Future Challenges," in Fu-Chen Lo and Yu-man Yeung, eds., Globalization in a World of Large Cities. Tokyo: United Nations University Press.

Gordon, Peter and Harry W. Richardson and Gang Yu (1998), "Metropolitan and Non-metropolitan Employment Trends in the U.S.: Recent Evidence and Implications," Urban Studies, 35:7, 1037-1057.

Hall, Sir Peter (1998), *Cities in Civilization*. New York: Pantheon Books.

Hall, Peter and Dennis Hay (1980), *Growth Centres in the European Urban System*. Berkeley: University of California Press.

Hall, Peter (1988), *Urban Growth and Decline in Western Europe*, pp. 111-27, in Dogan, M. and Kasarda, J.D. (eds.), *The Metropolis Era. Vol. 1 A World of Giant Cities*. Beverly Hills and London: Sage.

Hall, Peter (1991), *Europe's Regional-Urban Futures: Conclusions, Inferences and Surmises*, with R. Camagni, P. Cheshire, J.-P. de Gaudemar, L. Rodwin and F. Snickars, pp. 310-18, in Rodwin, L., Sazanami, H. (eds.) *Industrial Change and Regional Economic Transformation: The Experience of Western Europe*. London: Harper Collins.

Hall, Peter (1993a), *Forces Shaping Urban Europe*, *Urban Studies*, 30, 883-898.

Hall, Peter (1993b), *Planning in the 1990s: An International Agenda*, *European Planning Studies*, 1, 3-12.

Hall, Peter (1993c), *Priorities in Urban and Economic Development*, pp. 55-85, in Summers, A.A., Cheshire, P.C., Senn, L. (eds), *Urban Change in the United States and Western Europe: Comparative Analysis and Policy*. Washington, D.C.: The Urban Institute Press.

Hall, Peter (1995a), *A European Perspective on the Spatial Links between Land Use, Development and Transport*, pp. 65-88, in Banister, David (ed.), *Transport and Urban Development*. London: E & F Spon.

Hall, Peter (1995b), AThe Future of Cities in Western Europe,@ European Review, 3, 161-169.

Hamilton, Stan W. and Eric J. Heikkila (1997), AResidential Land Prices and Urban Form in Vancouver,@ Western Regional Science Association Meeting, Hawaii.

Hervick, A., T. Tretvik and L. Ovstedal (1993), ANorway: Crossing Fjords and Mountains,@ in I. Salomon, P. Bovy, and J.-P. Orfeuil, eds., A Billion Trips a Day: Tradition and Transition in European Travel Patterns. Dordrecht: Kluwer Academic Publishers.

Hogarty, Thomas F. (1998), AThe Social Benefits of Personal Vehicle travel,@ Transportation quarterly, 52(2), pp. 5-9.

Hogarty, Thomas F. (1999a), ATaxing Away the Benefits of Personal Vehicle Travel,@ Transportation Quarterly, 53(3), pp. 5-8.

Hogarty, Thomas F. (1999b), AThe Untold Benefits of Roads and Travel,@ Consumers= Research, 82(7), pp. 10-14.

Ingram, Gregory K. and Zhi Liu (1999), ADeterminants of Motorization and Road Provision,@ in Jose Antonio Gomez-Ibanez, William B. Tye and Clifford Winston (eds.), Essays in Transportation Economics and Policy: A Handbook in Honor of John R. Meyer. Washington, D.C.: The Brookings Institution Press.

Jansen, G. (1993), ACommuting: Home Sprawl, Job Sprawl and Traffic Jams,@ in I. Salomon, P. Bovy, and J.-P. Orfeuil, eds., A Billion Trips a Day: Tradition and Transition in European Travel Patterns. Dordrecht: Kluwer Academic Publishers.

Johnson, Kenneth M. and Calvin L. Beale (1995), "The Rural Rebound," American Demographics, July, pp. 46-55.

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

Kawashima, Tatsuhiko and Noriyuki Hiraoka (1993), "Centralization and Suburbanization: ROXY Index Analysis for Five Railway-line Regions in Tokyo Metropolitan Area," Gakushuin Economic Papers, 30(1), pp. 203-28.

Keith, John E, and David L. Barkley (1991), "The Location of Nonmetropolitan High-Tech Industries: A Comparison of Regional Determinants," Review of Urban and Regional Development Studies, 3, pp. 60-77.

Linneman, Peter D. and Anita A. Summers (1991), "Patterns and Processes of Employment and Population Decentralization in the U.S., 1970-87." University of Pennsylvania, Wharton Real Estate Center WP #106.

Malpezzi, Steven (1999), "Estimates of the Measurement and Determinants of Urban Sprawl in U.S. Metropolitan Areas." Madison: Center for Urban Land Economics Research, University of Wisconsin.

Mieskowski, Peter and Edwin S. Mills (1993), "The Causes of Metropolitan Suburbanization" Journal of Economic Perspectives, 7, pp. 135-147.

Mills, Edwin S. (1992), "Sectoral Clustering and Metropolitan Development," in Edwin S. Mills and John F. McDonald (eds.) Sources of Metropolitan Growth. New Brunswick: Center for Urban Policy Research.

Mills, Edwin S. and Luan Sende Lubuele (1997),
"Inner Cities," *Journal of Economic Literature*, 35,
pp. 727-756.

Mills, Edwin S. and Jee Pee Tan (1980), "A Comparison of Urban Population Density Functions in Developed and Developing Countries," *Urban Studies*, 17(3), 313-21.

Morrill, Richard (1992), "Population Redistribution within Metropolitan Regions in the 1980s: Core, Satellite and Exurban Growth," *Growth and Change*, Summer, pp. 277-302.

Nelson, Arthur C., William J. Drummond and David S. Sawicki (1995), "Exurban Industrialization: Implications for Economic Development Policy," *Economic Development Quarterly*, 9(2).

Newman, Peter W.G. and Jeffrey R. Kenworthy (1989), *Cities and Automobile Dependence: An International Sourcebook*. Aldershot: Gower.

Nivola, Pietro S. (1999a), "Are Europe's Cities Better?" *The Public Interest*, No. 137 (Fall), pp. 73-84.

Nivola, Pietro S. (1999b), *Laws of the Landscape: How Policies Shape Cities in Europe and America*. Washington, D.C.: The Brookings Institution Press.

OECD (1995), *Travel and Sustainable Development*. Paris: OECD.

O'Hallachain, Brendan (1992), "Economic Structure and Growth of Metropolitan Areas," in Edwin S. Mills and John F. McDonald (eds.), *Sources of Metropolitan Growth*, New Brunswick, NJ: Center for Urban Policy Research.

Noyelle, T.J. and T.M. Stanback (1984), *The Economic Transformation of American Cities*. Totowa, N.J.: Rowman and Allanheld.

Palumbo, George and Patricia Hutton (1987), "On the Causality of Intraurban Location," *Journal of Urban Economics*, 22.

Perl, Anthony and John Pucher (1995), "Transit in Trouble? The Policy Challenge Posed by Canada's Changing Urban Mobility," *Canadian Public Policy*, 21:3, pp. 261-283.

Pucher, John and Christian Lefevre (1996), *The Urban Transport Crisis in Europe and North America*. Basingstoke: Macmillan Press.

Romer, Paul M. (1996), "Why, Indeed, in America? Theory, History, and the Origins of Modern Economic Growth," *American Economic Review*, 86(2), pp. 202-206.

Rothblatt, Donald N. (1994), "North American Metropolitan Planning: Canadian and U.S. Perspectives," *Journal of the American Planning Association*, 60(4), pp. 501-20.

Rouwndal, Jan and Piet Rietveld (1994), "Changes in Commuting Distances of Dutch Households," *Urban Studies*, 31(9), pp. 1545-1557.

Vickrey, William (1977), "The City as a Firm," in Martin Feldstein and Robert Inman (eds.), *Economics of Public Services*, pp. 334-343. New York: MacMillan.

U.S. Bureau of the Census, Population Division, Journey to Work and Migration Statistics Branch (1996), "Selected Journey to Work and Place of Work Characteristics."

U.S. Congress, Office of Technology Assessment (1995), *The Technological Reshaping of Metropolitan America*. OTA-ETI-643 (Washington, D.C.: U.S. Government Printing Office).

Vernon, Raymond (1957), "Production and Distribution in the Large Metropolis," *Annals of the American Academy of Political and Social Science*, 314, pp. 15-29.

Vining, Daniel R. and A. Strauss (1977), "A Demonstration that the Current Deconcentration of Population in the U.S. is a Clean Break with the Past," *Environment and Planning A*, 11, pp. 751-758.

Voith, Richard (1999), "Does the Federal Tax Treatment of Housing Affect the Pattern of Metropolitan Development," *Business Review of the Federal Reserve Bank of Philadelphia*, (March/April), pp 3-16.

Voith, Richard (1992), "Cities and Suburban Growth: Substitutes or Complements?" *Business Review of the Federal Reserve Bank of Philadelphia*, xx, pp. 21-33.

Wardwell, John M. (1977), "Equilibrium and Change in Nonmetropolitan Growth," *Rural Sociology*, 42(2), pp. 156-179.

Wardwell, John M. and D.L. Brown (1980), "Population Redistribution in the United States During the 1970s," pp. 1-35, in D. L. Brown and John M. Wardwell (eds.), *New Directions in Urban-Rural Migration*. New York: Academy Press.