COMPACTNESS OR SPRAWL: AMERICA'S FUTURE vs. THE PRESENT

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INTRODUCTION

This is the first time in U.S. history that an urban planning problem has featured, if peripherally, as a Presidential campaign issue.[1] Never before have academic urban planners been in so much demand for T.V. news programs, radio talk shows, and newspaper op-ed pieces. Why? Because of a raging debate about U.S. residential lifestyles. The long-held American dream of a suburban detached home with a garden and a two-car garage (now often four!) has become a cardinal sin, if not a crime: indulging in and contributing to "sprawl."[2] This addiction has a touted antidote: densification and public transit. Its defect is a widespread distaste for the medicine. Revealed preferences strongly favor the single-family home (and surveys among apartment dwellers show that this is their dream too) and driving. The New Urbanists who live on multi-acre lots and the transit agency bosses who choose among a Mercedes, a Lexus or a limousine rather than between bus and rail are more than anecdotal. But perhaps the world is changing. In 1998, three-quarters of the 250-plus local ballot initiatives in favor of growth management and development controls passed. Many developers have been "converted" to promote Smart Growth projects, such as infill townhome developments close to transit lines that pass a "sustainability" test. Billions of Federal and State dollars continue to be poured into transit (especially rail) with the perverse result that transit ridership continues to fall (primarily as a result of the diversion of resources from bus to rail). Suburban living is blamed for high school shootings, obesity and dysfunctional families. But, even if these diagnoses were correct and even if there has been a change of heart, would it make a difference?

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[1] The Planner's Web submitted questions about sprawl to both candidates. It was puzzling that neither addressed the key sprawl issues in their reply. Bush emphasized cleaning up brownfields, while Gore talked about investment in livable communities, but appeared to be focusing on central cities. Gore -s earlier remark of using a gallon of gas to buy a gallon of milk has received wider currency.

[2] The definition of "sprawl" is an open question. Despite some attempts at technical definitions, and an occasional association with ribbon development of commercial strips along arterial roads, the most acceptable if approximate description is that of low-density suburban development relying on automobiles as the overwhelmingly dominant transportation mode. Brueckner's (Brueckner, 2000) defrinition is "excessive spatial growth of cities," but how do we define "excessive."

SETTLEMENT, EMPLOYMENT AND TRANSIT TRENDS

Any understanding of the potential for changing the American metropolitan landscape needs to be based on an analysis of recent trends in the spatial distribution of population and employment. Tables 1-8 sum up what has happened in the United States over the past 30 years. We will not discuss these statistics in detail, but rather use the tables to draw the following generalizations:

i. Population densities continued to decline between 1950 and 1990 in the urbanized areas of most large U.S. CMSAs (Consolidated Metropolitan Statistical Areas) and MSAs, with a very few exceptions (e.g. Los Angeles, Miami) where international immigration has resulted in increasing densities (Table 1). However, since the 1980s population densities have begun to increase in the urbanized components of many metropolitan areas.

ii. Suburbanization (and more recently, exurbanization) has accelerated since the late 1960s (Table 2). The literature refers to a "rural renaissance" in the 1970s, a "new urban revival" in the 1980s, and a "rural rebound" in the 1990s. But these terms are misleading. The "rural renaissance" was not rural but primarily growth close to metropolitan areas or in small cities. In the "new urban revival" (Frey, 1993), the suburbs continued to grow faster than the central cities. The 1990s have been a replay of the 1970s.

iii. The decentralization of (especially private sector) employment has also been rapid, out of central counties into peripheral counties and down the urban hierarchy from large to smaller metropolitan areas and into the nonmetropolitan areas; the gaps have widened in the 1990s (Table 3). The employment growth rate differentials are even more striking in the case of manufacturing employment, with the core counties of large metropolitan areas experiencing significant negative growth for most of the period (Table 4).

iv. The CBD employment share in most of the large metropolitan areas remains small and continues to shrink in many of them (Table 5).

v. Average travel times vary modestly among large U.S. metropolitan areas (Table 6), and have remained stable over time.

vi. In most cities the share of public transit has declined significantly (Table 7). Reversing this trend would be very difficult. If that is the case, the transportation-land use nexus suggests that more compactness is unlikely.

vii. Table 8 suggests that the distinction between impoverished central cities and wealthy suburbs can be exaggerated. There are poor households in the suburbs, and rich households in the central cities. Certainly, there is some skewness in these distributions but the argument that suburbanization and sprawl have been the major factor in spatial income segregation can be overdone.

REVIVING THE CENTRAL CITIES: THE PROSPECTS FOR INFILL

Increasing the compactness of American cities requires a revival of the central cities, most of which have been losing population for decades. The only signs of central city recovery are found in selective cities at the neighborhood level (e.g. the Gaslight neighborhood in San Diego or Pioneer Square in Seattle, driven by historic preservation and small-scale commercial redevelopment) or in small tourist-oriented towns (e.g. Durango, Colorado, or Fredericksburg, Texas). Moreover, many of the inner suburbs have begun to exhibit some of the same blight characteristics that eroded the original vitality of the central cities.

The most superficially obvious strategy for central city recovery and densification is infill development. But this approach faces many obstacles. There are few empty infill sites available, and developing them might deprive the central cities of precious open space; most, if given the choice, would choose a park over a new residential development. NIMBY opposition to infill projects, particularly because of newly generated traffic, is intense. It is for this reason that New Urbanist architects have had much more success in bringing their projects to fruition on greenfield rather than on infill sites. Another possible option is redevelopment, but even here the constraints are imposing. There have been several redevelopment public housing projects scattered over the country, but almost invariably the number of new units is smaller than the original stock, and hence densities decline. There is a growing number of abandoned industrial sites ("brownfields") as manufacturing firms either close down or move out, but they are often poorly located, rezoning may be cumbersome, and environmental clean-up costs may be prohibitive.

IS POPULATION GROWTH TO BLAME?

In recent years, the Sierra Club has been ambivalent whether to blame population growth or low-density new development for the proliferation of sprawl. The source of their discomfort is that international immigration has been a major factor in population growth, especially in California, Texas and Florida. As a result, those who identify population growth as the villain, by extension end up being anti-immigration, a very difficult position for the liberal Sierra Club. Thus, the Club's Executive Committee banned the idea of taking a position on the issue, and essentially prohibited (but without success) its discussion. The question is of serious intellectual interest. Let us offer a few observations. First, even in areas with low population growth (e.g. the Midwest), land absorption for urban development has been at a higher rate than in some other parts of the country because the preference for lower densities has not been constrained by high land prices. Second, immigration has fueled land prices in several key regions, and higher land prices imply higher densities for new developments. Third, densities have risen considerably in those central cities that have experienced high

immigration rates (James, Romine and Zwanzig, 1998) so that blaming immigration for causing sprawl is absurd. Fourth, immigrants (especially from Latin America, and to a lesser extent Asia) have a much larger household size, so immigration has inevitably resulted in higher population densities; however, because higher population densities do not necessarily imply higher dwelling unit densities, this raises the question of how to measure sprawl (or compactness). Fifth, often within a decade, many immigrant families move on and out from the central cities, so the issue is: where they move and into what type of development (especially in terms of densities).

FARMLAND PRESERVATION

A major argument in the sprawl debate has been the impact of urban development on the supply of prime agricultural land (Nelson, 1992). A typical anti-sprawl position is that urban development is devouring agricultural land at the rate of 50 acres per hour! Such numbers are meaningless because we cannot interpret what they mean. The facts are clear. Urban development accounts for less than five percent of total urban land uses in the United States (excluding Alaska). The amount of land in agricultural use peaked in 1930, but agricultural output has soared since then because of huge productivity gains. Several jurisdictions have adopted farmland preservation ordinances to inhibit rural-urban land use conversion, and there have been several examples of the purchase of rural land by local governments or NGOs to preserve it from urbanization. However, Europeans would be perplexed about the discussions of agricultural land shortages in the United States if they compared the land area of the United States with that of the typical European country.

SUBURBAN ANOMIE AND ALIENATION

No indictment of suburban lifestyles has been more virulent than the reaction to the Columbine High School shootings at Littleton, Colorado. To blame this on sprawl would be laughable, if respected academics had not taken it seriously. The facts are unambiguous: central city serious crime rates are ten times the suburban rates. American youth are exposed to all kinds of cultural influences, some of them negative, regardless of where they live (central cities, suburbs and rural areas). To imply that living in the suburbs creates a propensity for violence is silly. Almost as bad is the argument that driving by commercial strip development creates anxiety and depression . Not much better was the argument suggested in a Federal document published by the Center for Disease Control that the reason why Georgia has the most obese population (on average) in the United States is because of Atlanta's sprawl that discourages walking (The Wall Street Journal, October 29, 1999).

Compact urban development is promoted not only for transportation objectives but also a means of fostering close-knit communities and civic involvement (this "spatial determinism" (David Harvey) underpins much of the rationale for New Urbanism. But do we know what makes for a good community or a bad community, especially via naïve spatial fixes? However, there is some evidence to test whether suburbanites are "stranded" in their low-density neighborhoods. Do suburban residents take fewer social trips (e.g. family and personal; civic, educational and religious; social and recreational) than central city residents? Do they take longer trips? NPTS data show that within metropolitan areas households both inside and outside central cities have very similar trip distributions (by trip type) and trip mileages (Gordon and Richardson, 2000, Table 3).

NEW URBANISM

For the past decade or so, leading architects in the United States have been arguing for a new type of development, labeled New Urbanism (Katz, 1994). The key ideas were laid out in a charter published under the rubric of the Congress of New Urbanism (CNU). The basic idea was higher densities, but there were also notions of using design elements (such as front porches, garages in back alleys, "granny flats" [in the U.S. terminology, "accessory apartments"], and traffic-calming measures) to promote communitarian behavior. These projects have been much more successful at new greenfield sites (e.g. Celebration and Seaside, Florida; Kentlands, Maryland; Laguna West, near Sacramento, California) than at closer-in infill sites where NIMBY opposition is rampant.

An interesting issue with respect to New Urbanism is the potential contradiction between the "democratic" ideas of CNU and the elitism of the New Urbanist communities (more than $600,000 for a modest unit at Seaside). Eppli and Tu (1999) found a 4-25 percent price premium for houses in New Urbanist communities compared with similar houses outside. How we interpret this? New Urbanism offers a preferred lifestyle, and people are willing to pay for it. Or, New Urbanism shuts out those with modest incomes and rules out significant income and racial diversity (apart from the ubiquitous and perfunctory response to the need for senior housing).

URBAN GROWTH BOUNDARIES (UGBs)

Proponents of UGB controls have multiple goals: limiting urban sprawl, saving agricultural land, promoting higher density settlements, improving air quality, reducing traffic congestion, etc. (Ding, Knaap and Hopkins, 1999). It is highly dubious that imposing UGBs can attain these goals. However, UGBs have several negative characteristics that are difficult to challenge.

First, any restrictions on the supply of potential urban land are certain to restrict housing supply, especially that of affordable housing, and raise house prices within the boundary. Outside the boundary, land values will probably decline. These distortions of land and housing markets have negative welfare impacts, for example, imputed income losses for housing consumers within the boundary and for landowners outside. It is doubtful that these losses will be offset by windfall gains for within-boundary landowners and higher profits for within-boundary developers.

Second, UGBs have distorting effects on the evolution of regional settlement hierarchies, probably resulting in higher commuting and other travel costs for many residents. The UGB typically involves a band of land surrounding the urban area, but development is allowed beyond the outer band, unless UGBs are Statewide. Thus, developers seek out sites beyond the no-build boundary. Such leap-frogging results in non-optimal patterns of development.

Third, the UGB is a very crude device because it does not differentiate between the quality and potential of sites at the micro-level. For instance, not all agricultural land is prime, and many sites outside the UGB may have few alternative uses except for housing.

Fourth, the increased competition for scarce land within the boundary can have many undesirable side-effects. A primary risk is that open and recreational space is threatened as the pressures for new housing build up. Furthermore, the scarcity of in-fill sites may result in either rapidly escalating house prices or costly redevelopment of both nonresidential and residential sites.

Fifth, the UGB may create conflicts among local jurisdictions, some being pro-development, others anti-development. Communities that happen to be located within the UGB may face severe revenue problems that are unlikely to be offset by State subsidies. In some cases, it is a question of the usurpation of State over local rights. In others, the exercise of local rights by one jurisdiction may interfere with the rights of another. It is difficult to devise procedures that lead to acceptable solutions to these inter-jurisdictional conflicts.

UGB protagonists may accept that some of these problems exist, but argue that they are outweighed by the many social benefits flowing from the imposition of UGBs.

No discussion of the land use-transportation nexus in the United States should pass without a mention of Portland, Oregon, with its Urban Growth Boundary (UGB) in place since 1979 combined with an associated instrument mix of light-rail investments, zoning code relaxations and priority to non-single family housing. The results remain controversial and mixed. On the one hand, population growth

has slowed down, the housing stock is becoming more heterogeneous, lots are shrinking, and there have been significant core city investments. On the other hand, the transit ridership share has not budged, the "Great Wall" has cracked as extensions to the UGB have been granted, Portland's densities remain less than one-half of those of Los Angeles (a testimony to the glacier-like changes in settlement patterns), and Portland has the distinction of experiencing the highest rate of increase in new house prices (103 percent), 1990-98, out of 128 monitored metropolitan areas (National Association of House Builders data). Needless to say, the gains in air quality improvement in Portland have been no better than those experienced elsewhere, and much less than in California's metropolitan areas. Nevertheless, the Portland story remains complicated, and we shall continue to hear more about it.

INFRASTRUCTURE AND THE COSTS OF SPRAWL

Despite the widespread argument that suburban development infrastructure is much more costly, older and more compact urban forms are costly in many ways. These include the extra costs of building vertically, enduring crowded roads and facilities and living in small spaces. Bearing these costs made sense once upon a time when the friction of distance was much greater than now. But the newer and flatter cities benefit from newer infrastructure that may be less costly to install and to maintain (Rybczynski and Linneman, 1999).

The famous RERC 1974 *Costs of Sprawl* report used questionable simulations to make the case for infrastructure savings associated with high residential densities. Although the report's methods were quickly shown to be questionable (Windsor, 1979), the conclusions have been widely cited and more recent studies to revive a similar approach (Parsons, Brinckerhoff, Quade and Douglas, Inc. – ECONorthwest, 1998; Burchell, et al., 1997) have not been fully convincing. The problem is often comparing two types of development, very low and low-medium rather than the full spectrum of density alternatives. A careful analysis by Ladd (1992) reveals a U-shaped cost-density function, showing that high-density urban areas have the higher infrastructure costs and that the lowest per capita infrastructure costs are in the range of 250-1250 people per square mile. Not surprisingly, all of the ten fastest growing cities in the 1990s and all five of the fastest growing one-million plus cities (Phoenix, San Antonio, San Diego, Houston and Dallas) have population densities in this range. Another problem is the total reliance on cost comparisons, ignoring the benefits of suburban lifestyles. Anti-sprawl protagonists often deny the existence of any such benefits, and certainly they are difficult to quantify. But satisfying residential preferences, the principle of consumer sovereignty, access to good schools, relative safety from crime, access to countryside and recreational amenities, and a high degree of mobility, and many other benefits have significant imputed values.

THE CONSTRAINTS ON INCREASING COMPACTNESS

Many cities in America, most notably in California, are becoming more dense under the pressure of rising land prices. To everyone's surprise, the Los Angeles urbanized area, the epitome of sprawl, is in fact the densest metropolitan area in the United States, again the product of high land prices. Yet the rates of change are snail-like, and the prospects for a transition to compact urbanization in the United States are close to zero. There are at least two main reasons for this.

i. So much of the urban capital stock is already built, and is highly durable. Even though significant population growth (and hence housing development) will occur over the next fifty years, we are still talking about marginal, incremental change. For example, consider the case of Portland, Oregon, widely regarded as having the most ambitious and radical densification plan among the U.S. large cities. Even if the goals of the Metro 2040 Plan were to be achieved, Portland would still have only two-thirds of Los Angeles' residential densities by 2040.
ii. There are major obstacles to attempts to increasing density. One is the strong preference for more living space (the average dwelling size has increased by a third in the last quarter century) and for lower densities. Another is the limitations imposed by existing zoning ordinances and community opposition to higher densities.

CENTRAL CITY DECAY, SPRAWL AND GOVERNMENT POLICIES

Critics of sprawl point to many U.S. policies (favorable federal tax treatments of mortgtage interest and property taxes, zoning codes that favor low densities, comparatively low gasoline taxes, highways built "at the expense of transit," large-lot residential zoning, local tax inducements to industrial locators, and many others; see Nivola, 1999) favoring U.S. dispersed settlement patterns. But there also many policies promoting central cities such as downtown redevelopment subsidies, subsidized stadia placed in central cities, convention centers, and heavily subsidized downtown-focused rail transit systems. The fact is that U.S. policies influence land development patterns in many contradictory directions. A recent GAO (U.S. General Accounting Office) report reaches similar conclusions (GAO, 1999).

Critics of sprawl also refer to central cities "losing" jobs, people and capital. This expresses a strong preference for the old "place-prosperity" argument over the alternative that emphasizes the welfare of people rather than places, "people-prosperity." This is similar to a standard protectionist argument stressing job losses over the highest and best use of human capital. In the fast-paced "new" and global economies, the key economic success lies in flexible markets where

participants are able to exploit new opportunities quickly. Regulations (including growth controls) are more costly than ever. A recent example is the $1,000 per employee annual exaction to be levied by a suburban Portland county on the well-know hi-tech company, Intel, if they hire beyond a negotiated employment ceiling.

Linking the suburbanization of population to the problems of central cities is a stretch[3] in the sense of a belief that there was somehow an alternative path of development that could have avoided what happened. People moved to the suburbs because they did not like what was happening in central city schools, they were concerned about central city crime rates, and yes, many of them wanted to live in white rather than integrated neighborhoods. But this was an expression of revealed preferences, not the direct consequence of misguided policies. Policies may have had an impact, but they were not the deciding factor.

SPRAWL AND TRANSPORTATION

In the United State, anti-sprawl advocates have identified the issue of "automobile dependence" as the inevitable by-product of low-density suburban lifestyles (Newman and Kenworthy [1990,1999] are widely quoted. Automobile dependence is regarded as an evil that can be alleviated by promoting more compactness. This proposition needs an evaluation.

Certainly, Americans do rely heavily on the private car, even in the largest cities (that we might expect to be able to achieve the economies of scale in public transit) and even for work. Almost 90 percent of metropolitan commuting trips are by car, and 85 percent of these trips consist of solo driving. Auto's share of worktrips ranges from 66 percent in New York to 95 percent in detroit and Dallas-Fort Worth. Public transit accounts for 27 percent of worktrips in New York, 14 percent in Chicago and Washington, D.C., but only 2.5 percent in Detroit and Dallas-Fort Worth. Other modes (mainly walking and bicycling) average 5 percent of worktrips, and range from 3 to 7 percent.

There are three sets of questions that are somewhat interrelated. What are the consequences of automobile dependence, and are these consequences undesirable? Can automobile dependence be reduced in the United States? Among the battery of policies proposed, how effective are attempts to change land use patterns (more compactness, the promotion of mixed uses, more infill development, smart growth, etc) relative to other policy alternatives.

Has automobile dependence resulted in more traffic congestion? In a systemic sense, no. The decentralization of jobs has continued, with a subsequent, continuous rise in suburb-to-suburb commuting (44 percent of the total in 1990, and now higher). Average highway speeds have increased, offsetting a modest

[3] Downs (1999) was surprised to find no correlation between sprawl measures and indicators of central city decline.

increase in trip lengths. The Nationwide Personal Transportation Study (NPTS) reports a modest decline in average commuting times from 22.0 minutes in 1969 to 20.7 minutes in 1995.[4] Of course, traffic densities have increased on some individual routes.[5] The answer to this "commuting paradox" (Gordon, Richardson and Jun, 1991) is that there are enough "rational relocators" who move house or change job location to keep the *average* commuting time constant. This result is all the more remarkable given that the massive growth in VKT (vehicle-kilometers-traveled) was 2.5 times faster than the increase in urban lane-kilometers (Hartgen and Curley, 1999). In California, the statistics are even worse; between 1988 and 1998, the population grew by 18 percent and VKT expanded by 30 percent, but freeway capacity increased by only 1 percent (data compiled in a report by the Legislative Analyst of the State of California that was made public on May 12, 2000). This point undermines another argument: that automobile dependence has led to a binge of highway construction.

Of course, the changes in the behavior of households and firms add up to a change in urban spatial structure. If growth occurred without the spatial adjustments, of course congestion would increase. But the dynamics of metropolitan change avoids this. In the 1980s, the Los Angeles region added three million people (a 25 percent increase), yet remained No. 5 in the top ten metropolitan areas in terms of commuting times and speeds. The moral is that it is continued metropolitan decentralization not transit investments (especially rail transit) that keeps congestion under control. This explains why metropolitan area size is a very poor predictor of work trip travel times, speeds or distances (Hafeez, 2000).

Urban economic theory to the contrary, most households do not choose locations by minimizing the journey to work. Instead, most consider trade-offs among a wide variety of possible destinations and other locational considerations. Most notably, families with children rank access to good schools at the top. Urban economists have, unfortunately, concluded that these households indulge in "excess commuting". This conclusion is contradicted by Pisarski's calculation (based on 1990 data) that if 70 percent of all workers live in multi-worker households then it is unclear that they could relocate and substantially reduce aggregate household commuting distances. The rise of home-based businesses, now one-half of all U.S. small businesses, also complicates this picture.

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[4] The literature frequently refers to anecdotal evidence of commutes in excess of two hours (one-way). Yet in 1990, only 12.5 percent of commutes were more than 45 minutes and less than 6 percent were longer than 60 minutes (the longer trips included disproportionately greater numbers of transit users). By way of contrast, almost one-half of Greater Tokyo commuters travel more than 60 minutes one-way (Sato and Spinks, 1996).

[5] Different results are obtained depending on how congestion is defined. For example, the Texas Transportation Institute repeatedly refers to Los Angeles as the most congested metropolitan area in the United States and the Southern California Association of Governments continues to give the region a 'D' grade for mobility, referring to "increases" in congestion. But this reflects the measurement of congestion in physical terms (bottlenecks, gridlock, and route congestion) rather than in economic terms, e.g. systemic travel times. By the latter measure, Los Angeles is no more congested than it was thirty years ago.

Furthermore, in the absence of efficient pricing, some congestion exists. It is the default roadway capacity rationing device. The real news is how little highway congestion there is. Dynamic market adjustments, e.g. the suburbanization of jobs, is the prime explanation, the "solution" not the problem. Not only are there many fast suburb-to-suburb commutes but there is also a "safety valve" effect, i.e. the reduction of trips to downtown. This means that even central city residents get some traffic congestion relief.

Long-term historical commuting data are rare, but the few examples available show long-term stability. A 1967 Los Angeles Regional Transportation Study survey found that average commuting times were 24 minutes each way (Gordon and Richardson, 1993), whereas the 1995 NPTS entry for Los Angeles (Table 7) is also 24 minutes. Long period comparisons of entire travel time distributions are even harder to find. Yet one author (Lowry, 1988) found travel time distributions for Pittsburgh that go back to 1934. The shape of the entire distribution did not change at all over fifty years. Again, beneficial land us adjustments are the only plausible explanation. Sprawl makes it all possible.

The data from self-reported travel time surveys are not only more reliable and more plausible than modeled travel time results (such as those from the TTI [Texas Transportation Institute] and the FHWA [Federal Highway Administration]) but also tell the opposite story. Area-wide averages of vehicle-miles per lane-mile mask the critical spatial redistributions that minimize congestion. The "commuting paradox" (mentioned above) explains how and why flexible land markets allow people to adjust to road and highway bottlenecks. A long-term spatial and transportation equilibrium is maintained as revealed by invariances across the various NPTS surveys; survey year does not predict any of the main parameters, including work trip travel time, distance or speed (Hafeez, 2000).

All the doomsday forecasts made over the years have been wrong (Maurice and Smithson (1984), cited in Eklund and Tollison, 2000), and the standard prediction of traffic gridlock is equally wrong, primarily because it is based on a static model that does not allow for spatial adjustments.

However, there would be less spatial decentralization if road and highway pricing were efficient. Efforts to reduce external costs and charge travelers the full marginal costs of each trip are the economist's favorite urban transportation policy prescription. In fact, most peak-hour traffic in U.S. cities is for non-work purposes, and appropriate disincentives could divert many of these trips to off-peak periods. DeLucchi (1996) suggests that full-cost pricing would add between 17 and 26 percent to the annual costs of auto use.

Public choice analysts have raised the question of whether public officials can be expected to mimic profit-maximizing private corporations and work hard to get the

prices right. If this is not the case, road privatization may be the best way to achieve efficiency. Not that extensive highway privatization in the U.S. is likely. The states would have to take the lead, but they are unlikely to give up their access to the sizeable and politically popular highway trust funds (Roth, 1995).

Taking advantage of new fare collection technologies, the support of environmentalists, and the fiscal benefits for public officials, there are now several congestion pricing experiments underway. A few, such as Southern California's SR-91, with time-of-day tolls ranging from $0.50 to $3.25 for a ten-mile stretch (Richardson and Bae, 1998), have been privately financed and built. Lessons are being learned, such as the pitfalls for private owner-operators managing very small pieces of a state-run network. On the other hand, commuters are appreciating the opportunity to exchange cash for time at will.

Nevertheless, there is the widespread impression that road pricing is "inequitable" (Richardson and Bae, 1998). The lengths to which transportation planners and others will go to avoid the pricing option is illustrated by the willingness to build or try almost anything instead to avoid "gridlock". In fact, there is no gridlock although there are inevitable pockets of congestion in the absence of pricing. New Urbanists now propose "traffic calming", the addition of impediments to traffic flow, such as roadway narrowing, "neckdowns and chokers", closures, traffic circles, forced turns, speed humps, cutting down four lanes to two, etc. These are capacity reductions designed to "change the behavior of motorists" (Dittmar and Poticha, 1999, p 5) to make auto use less appealing so that people will walk, bike, or use transit instead. It is true that moving to any pricing scheme will create both winners and losers. But that is not the problem. The problem is that most people enjoy the personal mobility provided by the auto-highway system and the suburban lifestyles that it makes possible, but continue to grumble about congestion and resist the antidote of peak-load pricing. Continuous free access continues to be regarded as an entitlement. Many second-best "solutions" are offered, such as strict, usually counterproductive, land use controls and very expensive transit investments. The standard favorite is a high-capacity rail transit system, with the eternal hope that large numbers of *other* people will use it. A San Francisco Bay Area Council opinion survey showed that 40 percent of respondents ranked transportation as the most important problem facing the Bay Area (education was ranked second at 14 percent); the same poll found that expanding public transit was the first choice (82 percent agreed) as the most effective remedy (Wall Street Journal, Dec. 9, 1998).

Many politicians, planners, environmentalists and smart growth advocates continue to stress the importance of expanding public transit, especially expensive rail transit, despite the fact that conventional transit is a declining industry. After more than $360 billion of public subsidies since the mid-1960s, transit use per capita is at a historic low.[6] Falling ridership in the face of rising subsidies have become the industry norm. There are now almost as many transit users in Shanghai as in the whole of the United States. Only 1.8 percent of all person-trips (2.1 percent of all person-miles) are via transit. This is substantially less than walking (5.4 percent of person-trips) and only slightly more than school bus use (1.7 percent of person-trips; Figure 15, U.S. Department of Transportation, 1997). In terms of worktrips, transit accounts for 3.5 percent of both person-trips and person-miles (Figure 21, U.S. Department of Transportation, 1997). Yet public transit has received more than 15 percent of all public expenditures on transportation between 1977 and 1995 (U.S. Department of Transportation, 1997).

Per capita transit use in almost all of the nation's largest metro areas fell by double-digit rates in recent years (1980-97; Table 7 is in terms of boardings or unlinked trips, avoiding the transit lobby's occasional misleading mixing of trips involving transfers with those that do not). Houston[7] and Phoenix started from a low ridership base and grew in the 1980s, but suffered reversals between 1900 and 1997. Only four of the 30 largest metro areas show sustained 17-year growth in per capita use. Yet all four (Denver, Orlando, San Diego and Sacramento) also started the period with very low levels of ridership and still have relatively modest transit use. Kain and Liu (1995) demonstrate that most of the ridership increase enjoyed by San Diego and Houston in the 1980s can be attributable to "aggressive service expansion", e.g. adding more bus-miles of service, not because of rail-related actions (hitherto, of course, there is no rail service in Houston).

Increasingly dispersed origins and destinations, rising auto affordability, and the widespread appeal of personal transportation have been widely cited as the explanations for transit's decline. One important dimension of the overwhelming convenience and flexibility of auto travel is the increasing propensity to make incidental stops along the way to and from work. The 1995 NPTS data show that 20 percent of all trips to work between 6 and 9 a.m. involve at least one stop along the way. In the afternoons, between 4 and 7 p.m., 30 percent of commuters do not go directly home but make an intermediate stop at a school, a store, the health club, a friend's house, or some other destination. Contemporary lifestyles cannot easily

[6] There has been a recent very modest upward tick in rail ridership. In California, for example, ridership on the four rail systems (BART {San Francisco], Sacramento, the MTA [Los Angeles], and the San Diego) increased by an average of 8 percent in the year, 1998-99 (Wall Street Journal, April 26, 2000). But this is not the whole story. The price paid for boosting rail ridership is the cannibalization of bus services, with the inevitable result that total transit ridership has declined.

[7] Houston's system consists of radial busways.

be accommodated via conventional transit or carpools. This also explains why extensive systems of HOV lanes and even more expensive exclusive freeway-to-freeway carpool lane ramps have had negligible impacts, and why they will never pay for their high costs. Further increases in the female labor force participation rate will expand the demand for trip-chaining and magnify observed mode choice trends.

Nevertheless, massive dollar amounts have been spent on the wrong projects (mostly rail transit) administered by unresponsive, politicized and unionized monopolies. The contrasts between promise and performance for a number of federally assisted rail systems were first documented in great detail by Pickrell (1990) Examining eight new rail transit systems, he found: i. four new heavy-rail systems experienced ridership shortfalls averaging 35 percent; ii. four new light-rail systems experienced patronage shortfalls averaging 65 percent; iii. full costs per boarding were $8.66 (average) for the subways and $7.99 (average) for the light rail systems; and iv) three of the eight cities experienced lower systemwide patronage after rail opened. Each new transit trip (i.e diversion from other modes, typically the car) cost almost $20. Pickrell's findings are notable because the transit industry rarely elaborates full costs, focusing on operating costs and ignoring capital costs.

Updating the Pickrell findings, the 1985-95 systemwide performance in these eight cities reveals net transit ridership losses in four of the eight. Taken as a group, their ridership grew by just 3 percent over the ten-year period. Roughly speaking, it cost society $15 billion in capital costs plus operating expenses to effect this change. Assuming that capital costs per year are annualized at 10 percent and using Pickrell's average operating cost for rail service, the 25 million *net new* transit trips cost $1.85 billion per year. That is almost $75 per *new* boarding! Costs like this are not even competitive with limousines. Approximately seventy-five percent of net transit costs are subsidized by taxpayers, primarily from the highway trust fund and other fees paid by motorists. In contrast, FHWA's most recent cost-allocation study estimates that net auto subsidies fall within the range of 10 to 30 percent (the range largely explained by variations in State fees and taxes). Yet transit advocates argue in favor of more "balance". A preferred option is to phase out any auto subsidies (perhaps via an "optimum" fuel tax, as suggested by Mills, 1999) and simultaneously end the new-rail programs. While there is considerable "pork" in highway as well as in transit spending, most of the former promotes mobility while most of the latter are jobs and lobbyist support programs.

In the face of the negative outcomes, rail boosters have retreated to an emphasis light-rail. Unfortunately, these systems tend to be even less cost-effective (Rubin, et al, 1999). The ten U.S. cities that added light rail in the years 1980-95 experienced a collective system-wide ridership *loss* of 2 percent. Even the few systems that showed modest gains are not close to being cost-effective (Richmond,

1998, Table 2-15). Fifteen light-rail systems that opened their books to the U.S. Federal Transit Administration (FTA) show an average taxpayer subsidy of 87 percent; Portland (Anti-Sprawl Mecca) was the most subsidized (97 percent). In return, these systems account for 0.27 percent of their metropolitan areas' VKT. Rail transit cannot pay its way because no one values its service enough to pay for its extremely expensive costs. This explains the emphasis on other transit "benefits," e.g. saving energy, cleaning the air, decongesting the roads, promoting more "rational" land use patterns. But remember that none of these benefits can be reaped as long as transit ridership gains remain very modest, if not negative.

Even though the failures of rail transit have been widely documented, expensive proposals for new rail projects are put still forth regularly, still sold as a way to "get people out of their cars". The transit industry's trade magazine recently noted, "At first glance, the largesse of the Transportation Equity Act for the 21st Century (TEA-21) seems to have turned the U.S. rail projects pipeline into a gusher. Indeed, the law enacted last summer, the nation's largest public transport bill in history, authorized funding for more than 200 specifically identified projects over the six-year life of the law" (Henke, 1999, p 32).

TRANSIT-ORIENTED DEVELOPMENTS (TODs)

Responding to the poor record of recently installed rail transit facilities, advocates now promote Transit Oriented Developments (TODs), sometimes called Transit Villages, a key element of smart growth, as a way to create development densities around train stations to assure adequate patronage. Homes, stores and social services would be clustered around transit stations. Residential densities would need to be in the range of 12-15 dwelling units per acre (or 28-35 per hectare; Bernick and Cervero, 1997, pp. 74-85). Some studies have found slightly more transit use by people living near stations (Cervero, 1993). From this, it is inferred that forcing higher densities will generate greater transit use. Of course, even if there are people willing to trade off density for transit access, it does not follow that others compelled to live at higher densities would choose the same trade-off (Brindle, 1995). TODs may also be most attractive to current transit users. Crane (1998) concluded that "there is no convincing evidence that these designs influence travel behavior at the margin'"

The powerful preference for personal mobility cannot be ignored. A recent study commissioned by *American Demographics* found that the automobile is regarded as the most important personal space. Gerondeau cites a French survey that showed that 88 percent of French car owners look on their car as an index of personal freedom (Gerondeau, 1997, p. 229). In 1995 in the United States, there were 1.78 vehicles but only 0.68 children per household. The release from fixed routes and schedules gives people much empowerment; this explains why carpooling in the U.S. is negligible, declining by 19 percent in the 1980s. Average

commuting vehicle occupancy in metro areas in 1990 was only 1.09. Even these statistics do not purge the data of the spontaneous intra-household carpooling so the data overstate true ridesharing. Dunn (1996, p. 2) adds that " the auto provides a sort of individualist equality that is particularly well suited to American values."

All of this only fuels the fire. For many, the private auto is simply "too democratic" while public transit is properly collective. The leaders of the former east-bloc nations understood quite well that "a mobile population is a population essentially out of control of centralized government" (Yates, quoted by Smith, 1990). The fact that auto use is complementary with private and individual single-family housing incites the critics' ire.

Compact development and growth management advocates do not admit that while there are only negligible differences in auto trips per capita in TOD-type areas (Cervero, 1993), there are many more people, with the net effect that traffic conditions worsen. It is not surprising that correlations across the largest U.S. urbanized areas indicate a *positive*, if moderate, association between population density and commuting trip times. The 1995 NPTS data for the thirty largest metropolitan areas can be disaggregated by trip purpose and travel mode (Table 6). At this level, sample sizes are sufficient for four major trip types (to work, to shop, family and personal, social and recreational) for trips by autos and by all privately operated vehicles (POVs; autos, vans, trucks, SUVs, etc.). Inspection of the table shows modest variations in all trip times across urbanized areas. Population density data are available for urbanized for Census years since 1950. The correlation between auto commute times and 1990 densities is 0.55; between all POV commute times and 1990 densities, it is 0.32. Correlations between the other three trip types and urbanized area population density are close to zero.

In addition, Pickrell and Schmieck (1999) demonstrate that, after controlling for income and other household characteristics, the elasticity of household VMT with respect to residential density is approximately -0.1; a doubling of densities would decrease VMT per household by 10 percent, but with twice as many households, there would be many more trips. Other cross-sectional studies corroborate the intuitively obvious thought that densities are associated with high levels of congestion (Hartgen and Curley, 1999). Orski (1999) reports that "(t)he Ballston rail transit station in Northern Virginia, often cited as a national model of a compact transit-oriented 'village' that is supposed to encourage walking and reduce car use, is a case in point. With density five times higher than their neighboring spread-out Fairfax City/Oakton area, Ballston creates more than four times as many daily vehicle trips than its low-density neighbor." Even when and where everything is within walking distance and everyone rides bicycles, people continue to drive. As Crane (1998), consumers may buy more when the price drops; trip frequencies (including those of auto trips) may increase. The Clean Air

Act, TEA-21 and other mandates work hard to promote compact land use arrangements, but they may have negligible effects on auto use and air pollution.

The problem is that there are no plausible policies to "get people out of their cars" in significant numbers at reasonable cost. The steepest transit ridership losses in recent years were in transit's strongest markets where conditions are most favorable, the ten U.S. cities with considerable rail transit capacity and relatively strong and high density employment centers, including New York, Chicago, Boston, Philadelphia, Washington, D.C. and Baltimore (Taylor and McCullough, 1998). The 1990 Census data (excluding those who work at home) showed that commuting mode shares across the U.S. were 91.4 percent private auto, 5.5 percent public transit and 3.1 percent for other modes. Assume that an ambitious transit program succeeds in increasing transit's share by, say, 25 percent (of course, it has never happened, even after $360 billion in subsidies); assume also that *all* new transit riders come from automobiles (extremely unlikely); auto use would merely decline to slightly more than 90 percent of all commuting.

A variant of the TOD argument holds that sprawl can be avoided and land use can be "shaped" by the introduction of predictable (rail) transit service. Low and declining preferences for transit and powerful suburbanization trends are the Achilles Heels of this argument. A recent study examining twenty years of development trends around stations of the oldest of the post-WW II subways, San Francisco's BART, found that "population has grown faster away from BART than near it" (Landis and Cervero, 1999, p.4). The authors reported similar trends for employment growth in the Bay Area. A system that in 1999 had not yet reached its 1975 ridership forecasts, even with the aid of 30 percent population growth, cannot be expected to have any significant secondary impacts. This is the real problem, more so than regulatory barriers to land use change cited in an accompanying article (Levine, 1999). Similarly, Portland is learning the hard way that lightly used light-rail does not spur downtown development; developers of the Round at Beaverton Central, a strongly promoted project close to the tracks of the Westside transit route, are near bankruptcy.

COST-EFFECTIVE TRANSPORT POLICIES

Unconventional transit (including private transit) and a host of commonsense transportation management approaches, including deregulation and efficient pricing, have received only moderate attention in U.S. cities. Being low-cost and occasionally without subsidies, they lack the built-in pork barrel constituencies attached to rail projects. Transit systems configured in ways to take advantage of drivers' preferences, such as express buses running on separate rights-of-way (busways or transitways), could achieve high operating speeds but are not political favorites. Because they can be their own feeders, they can avoid the necessity of many transfers and would cater to more demand than rail but at a cost per passenger trip that is 80-90 percent cheaper than light-rail (Kain, 199x). Light-rail

is often not grade separated, and in this case is slower than buses on grade-separated busways

The preference for personal transportation is so powerful that transit will always be a marginal alternative in the U.S. Yet, it should be very easy to do better than the recent performance cited here. The trouble is that the politics of pork make sure that common sense transportation programs receive limited attention. Common sense recommendations include four complementary policies that would be cost-effective if jointly implemented. They are: i. getting the prices right (already discussed for the case of congestion pricing), possibly involving highway privatization; ii. deregulation to ease entry, allowing more private transit provision while bringing the various "informal" and "gypsy" providers out of the shadows and providing service beyond fixed-routes; iii. user-side subsidies to replace (and scale down) the much abused supplier-side subsidies; and iv. busways to accommodate transit and HOV vehicles. Removing the federal role in urban transportation would go a long way to achieving several of these objectives (Lang, 1999).

The specifics of these strategies might vary from place to place. For example, user-side subsidies have received some attention in the form of "eco-pass" experiments, whereby employers buy inexpensive bulk access rights much the way that they secure group health insurance. They then award passes to employees or sell them at low rates. Local governments could partner with such employers, using available transit funds to make the passes even more attractive. Shoup (1999) reports that the Santa Clara Valley (California) Transportation Authority charges from $10 to $80 per employee per year, depending on the employer's location and how many passes are purchased. The price is much lower than for conventional transit passes because the likelihood that each employee uses them is much lower than that of a conventional transit pass user. Transit vouchers could be redeemed for either conventional or private transit. To expand the latter would require deregulation. After passing standard safety and insurance requirements, any provider could be permitted. Share-ride taxis and vans, reminiscent of jitney systems in developing countries, might find a market. The fact that there are clandestine jitney-type services operating in the immigrant and low-income communities of New York, Miami, Los Angeles, Detroit, and elsewhere suggests that the established transit and taxi monopolies serve the poor badly. Because the most reasonable legalization would probably impose significant costs on these operators, it may require user-side subsidies to make legal operation an attractive option for the many providers that are presently operating "underground". New entrants might even be attracted into the market. Conventional public transit would be forced to become more competitive.

As already discussed, systems of busways are much more cost-effective in U.S. cities than rail transit. Where possible, busways should be open to new forms of

private transit, making the busways and the eco-passes more cost-effective while making private transit provision more attractive.

Although there are currently two HOT (high-occupancy-toll) lanes in operation (a converted segment of a HOV lane on California's I-15 and the privately operated median of the SR-91), HOT-lane proposals may be one the most promising way to reintroduce market mechanisms to the auto-highway system (Fielding and Klein, 1993). Existing high-occupancy lanes could be made accessible to solo-drivers if they paid tolls that varied by time-of-day demand conditions; new electronic toll collection, scanning and feedback technologies make this approach quite feasible. Poole (2000) adds that this should interest officials who are starting to realize that increasing fuel efficiencies (and alternate fuel technologies) will force governments to move away from their reliance on the gasoline taxes.

Systems of HOT-lanes in large metropolitan areas would be open to the usual ride-sharers, who alone are often too few to justify the expenditures on HOV-lanes,[8] plus solo-drivers paying peak-hour tolls, plus many types of transit (Poole and Orski, 1999). Finally, tolls would be a new source of highway funding. For the case of private roads, this is of course a given.

[8] Most HOV lanes are severely underutilized because the small changes of in-vehicle travel time seldom make up for the inconvenience of carpooling

ENVIRONMENTAL IMPLICATIONS OF TRANSPORTATION

If expanding public transit will not get large numbers of people out of their cars, what are the environmental consequences of auto-dominated sprawl? There are many different positions. Some emphasize the well-known problems associated with common properties. Others have problems with resource use (Myers, 1997; UNDP, 1998), stressing resource "finiteness," "sustainability" and "ecological footprints" (Chilton, 1999). Often ignored are the substantial stewardship inherent in asset ownership, accelerating rates of technological change, and the long-term downward trends in falling commodity prices (Moore, 1992; Simpson, 1999; *The Economist*, April 17, 1999; Krautkraemer,1998). "What we observe is the net result of diminishing returns, as the industry moves from larger to smaller deposits and from better to poorer quality, versus increasing knowledge of science and technology generally, and of local government structures. So far, knowledge has won" (Adelman, 1995, p. 292).

Let us restrict ourselves to five brief observations on autos and air pollution.

i. We have already shown that the traffic consequences of suburbanization are benign; higher speeds denote fewer stops (stop and go driving is much more polluting.

ii. Newer automobiles operating on new fuel mixes burn cleaner than ever; "although total vehicle mileage more than doubled between 1970 and 1995, emissions of all auto-related pollutants declined" (Chilton, 1999c, p. 223); two gasoline-electric "hybrids" (the Toyota Prius and the Honda Insight) are available; the Nissan Sentra CA is the first automobile designated a SULEV (Super-Ultra-Low-Emission Vehicle) by the California Air Resources Board and a version of the Honda Accord is expected to receive the same status; fuel cell powered autos are in development by the major auto makers (in fact, prototypes already exist). Of course, it will some time for the new technologies to diffuse as auto fleets turn over, but from a technological perspective the mobile source pollution problem is almost solved. Already, the EPA's recent analysis of air pollution trends in 92 metropolitan areas show that 87 of them had fewer days with PSI values above 100 in 1997 than in 1988 (Table 4-45, U.S. EPA, 1999).

iii. There remains no clear-cut consensus among scientists on whether there is unusual global warming (much depends on the time periods chosen for analysis) or, if it exists, how much of it is the result of "greenhouse effects", or even about what the risks might be (Moore, 1998; Singer, 1999). It is interesting that the Europeans give more favorable tax treatment to diesel engines because of there more benign "global warming" effects, yet we now

know that diesel fuel is very dangerous because of its particulate matter emissions.

iv. We live in a world of trade-offs; the most efficient choices emerge from extending markets; common (mainly nuisance) law works better than central government statutory law(Meiners and Yandle, 1999); assigning property rights and expanding wealth work are cost-effective; implementing flexible market-based emissions rights trading arrangements, already in use in the case of SO2, is a promising way to improve the environment at relatively low cost (Burtraw, 1996; Burtraw and Mansur, 1999).

v. Vehicle-miles traveled have more than doubled in the past decade, yet there has been substantial progress in cleaning up the air; of the six main pollutants, five are down substantially; only one (NOx) is up (by 11 percent). Portney (1999, p. 2) reports that "[s]ince 1970, air quality has improved markedly in almost all the nation's cities, and many of the most polluted rivers are substantially improved as well." He cites the success of incentive-based policies and predicts that more of these will soon be implemented, leading to even more improvement. Goklany (2000, p 48) concludes a survey of ambient air quality data with " the nation's air is far cleaner today than it has been in several decades, despite the fact that population, consumption and economic output – according to many environmentalists, the culprits fundamentally responsible for environmental degradation – have never been higher."

ANTI-SPRAWL POLICY MEASURES

A major question is what policy measures might increase compactness in the United States, and how effective would they be. A recent analysis (Brueckner, 2000) sheds some interesting light on this issue. He argues that any negative aspects of urban sprawl are the result of market failure and can be remedied by pricing measures. He identifies three examples. First, the conversion of agricultural to urban land can be slowed by imposing a development tax equal to the implicit value of the land as open space over and above its agricultural land value. Second, a possible consequence of sprawl is excessive commuting (in our view, this is unclear in a world of increasing suburb-to-suburb commuting); his proposed remedy is road congestion pricing. Third, infrastructure subsidies often facilitate suburban development; the solution is full-cost development impact fees, implying that developers pay the total costs of the infrastructure associated with their projects. We agree with all these proposals; the problem is that their impacts on compactness are likely to be modest, much less than what the anti-sprawl advocates desire. There are other more extreme policies, such abolishing the tax deductibility of mortgage interest and property taxes, but this would be widely unpopular and unlikely to be implemented. Anti-sprawl groups prefer the Urban

Growth Boundary (UGB) approach, which Brueckner criticizes as a blunt instrument that may be excessive, but in any event will result, as suggested above, in escalating housing costs (restricting supply, without influencing demand) with negative impacts, especially on low income groups, entrants to the home ownership market, and new inmigrants.

CONCLUSIONS

Increasing the compactness of American cities may not even be desirable, but it is certainly infeasible. A few infill development projects, investment in some historic districts there, a sprinkle of New Urbanist communities on greenfield sites out there. The latter have attracted considerable attention, but have had minimal impact. There are too few of them, they have not resulted in significant land savings (in gross density terms), and travel behavior has barely budged. Their most noticeable characteristic is a trade-off of individual yard space for more public open space (this explains, for example, why outsiders drive[!] to Kentlands, Maryland for morning walks). In their favor, they have achieved a more varied housing mix (if not a heterogeneous population mix) than the traditional suburb.

Some areas of the United States, such as California, are going to increase their populations substantially in the next decades (unless the immigration tap is turned off), and if they were all accommodated at high densities, it might make a difference. But it is not going to happen. The American home ownership dream is too entrenched. And if you are going to buy, you prefer (if you can afford) your own little castle, not joint ownership of a condominium or townhome development, although you may see advantages in the security of your little castle within a private gated community. Americans when surveyed (and, more often than not, when voting) come out strongly in favor of higher densities, but not for them and not in their neighborhood.[9] There is nothing that brings residents out in droves to a City Council or Planning Commission meeting than a proposed high-density project nearby. NIMBY reigns!

And, why not? In a country where you can drive for a hundred miles without passing a gas station, the idea that urban development will lead to running out of land is absurd. Having two or three cars (this explains why new houses often have three-car garages, although the cars are usually parked outside, at least in the West) is not considered an indulgence, and is increasingly much less of an environmental threat as emission technologies improve. Having a nice big house, with individual bedrooms and a yard for the children, and where home offices are almost mandatory, is a universal goal. Of course, there are some social engineers and environmental activists who would like to tell us what to do and how to behave.

[9] The same experience happens with transit. When surveyed, a significant majority expresses support for public transit, but most of those surveyed would never consider using it.

But their actions fly in the face of the strong American traditions of individualism and freedom of choice.

This is not to suggest that there will be no change. The "smart growth" movement is gaining some momentum, and may eventually permeate the public consciousness. At that time, environmentalists and developers will make their pact with the devil, but for different reasons: satisfaction and higher profits. Also, higher land prices (e.g. in most of California) are forcing higher density development, still mostly single family homes but on ever shrinking lots.

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Table 1 Urbanized Area Population Densities, 1950 - 1990

	1998 Pop	1990	1950 - 90	1980 - 90
		UA Pop Dens	UA % Pop Dens Chge	UA % Pop Dens Chge
New York-Northern NJ-Long Island CMSA	20124	5408.5	-44.9	_2.6
Los Angeles-Riverside-Orange CMSA	15781	5800.8	26.4	11.8
Chicago-Gary-Kenosha CMSA	8809	4286.6	-38.2	_5.3
Washington-Baltimore CMSA	7285	3560.1	-50.8	3.9
San Francisco-Oakland-San Jose CMSA	6816	4152.3	-41	3.6
Philadelphia-Wilmington-Atlantic City CMSA	5988	3626.7	-61.3	_10.5
Boston-Worcester-Lawrence-Lowell-Brockton CMSA	5633	3114.1	-51.9	_0.4
Detroit-Ann Arbor-Flint CMSA	5458	3303	-49.2	_9.4
Dallas-Ft. Worth CMSA	4802	2216.3	-31.2	15.7
Houston-Galveston-Brazoria CMSA	4408	2464.8	-5	7.2
Atlanta MSA	3746	1898.4	-60.3	6.4
Miami-Ft. Lauderdale CMSA	3656	5429	38.3	14.7
Seattle-Tacoma-Bremerton CMSA	3424	2966.6	-41.3	3.3
Phoenix-Mesa MSA	2931	2707.2	-31.1	23.2
Cleveland-Akron CMSA	2912	2638	-42.8	_5.3
Minneapolis-St. Paul MSA	2831	1956.5	-54.2	7.2
San Diego MSA	2781	3402.7	4.5	22
St. Louis MSA	2563	2673.1	-56.5	_13.6
Denver-Boulder-Greeley CMSA	2365	3307	-30.4	7.4
Pittsburgh MSA	2346	2157.6	-64.3	_15
Tampa-St. Petersburg-Clearwater MSA	2257	2630	16	2.4
Portland-Salem CMSA	2149	3021	-32.9	2.7
Cincinnati-Hamilton CMSA	1948	2367	-57.5	_11.5
Kansas City MSA	1737	1673	-64.3	_10.2
Sacramento-Yolo CMSA	1686	3284	-34.9	14.7
Milwaukee-Racine CMSA	1646	2395	-70.5	_1.6
Norfolk-Va Beach-Newport News CMSA	1542	1992	-67.9	8.2
San Antonio MSA	1538	2578	-48.4	_3.4
Indianapolis MSA	1519			
Orlando MSA	1504			

Source: http://www.publicpurpose.com/new_ix.htm

Table 2 **Average Annual Population Growth Rate**
USDA Area Groups

	1969 - 97	1969 - 78	1978 - 89	1989 - 95	1995 - 97
Metro Counties					
1. Large - - counties in metro areas with 1 million or more pop					
Core Counties	0.65%	0.34%	0.89%	0.67%	0.63%
Non-core counties	1.30%	1.26%	1.33%	1.30%	1.32%
2. Small - - counties in metro areas with LT 1 million pop	1.21%	1.43%	1.08%	1.23%	0.93%
Non-metro Counties					
Adjacent to Large Metro Areas					
3. Contain all or part of a city with 10,000 or more pop	1.05%	1.23%	0.82%	1.22%	1.01%
4. Contain no part of a city that large					
Adjacent to Small Metro Areas					
5. Contain all or part of a city of 10,000 or more pop	0.79%	1.25%	0.47%	0.74%	0.60%
6. Contain no part of a city that large					
Not adjacent to Metro Areas					
7. Contain all or part of a city of 10,000 or more pop	0.82%	1.32%	0.48%	0.82%	0.46%
8. Contain all or part of a town of 2,500 or 9,999 pop	0.61%	1.21%	0.10%	0.67%	0.55%
9. Totally rural, contain no part of a town as large as 2,500 pop	0.27%	0.71%	-0.22%	0.42%	0.51%
US Total	1.02%	1.10%	0.96%	1.05%	0.94%

Source: Calculated from Regional Economic Information System 1969-1997, Bureau of Economic Analysis, U.S. Department of Commerce, May 1999.

Table 3 **Average Annual Manufacturing Employment Growth Rate**
USDA Area Groups

		1969 - 97	1969 - 78	1978 - 89	1989 - 95	1995 - 97
Metro Counties						
1.	Large - - counties in metro areas with 1 million or more pop					
	Core Counties	-1.22%	-0.82%	-1.36%	-2.30%	1.05%
	Non-core counties	-0.03%	0.24%	0.07%	-1.09%	1.46%
2.	Small - - counties in metro areas with LT 1 million pop	0.00%	0.61%	-0.39%	_0.22%	0.12%
Non-metro Counties						
Adjacent to Large Metro Areas						
3.	Contain all or part of a city with 10,000 or more pop	0.55%	1.21%	-0.18%	0.96%	0.38%
4.	Contain no part of a city that large					
	Adjacent to Small Metro Areas					
5.	Contain all or part of a city of 10,000 or more pop	0.43%	1.20%	-0.01%	0.20%	0.06%
6.	Contain no part of a city that large					
	Not adjacent to Metro Areas					
7.	Contain all or part of a city of 10,000 or more pop	0.85%	1.67%	-0.03%	1.26%	0.70%
8.	Contain all or part of a town of 2,500 or 9,999 pop	1.12%	2.48%	0.30%	1.26%	_0.96%
9.	Totally rural, contain no part of a town as large as 2,500 pop	1.44%	2.55%	1.53%	0.61%	_1.55%
US Total		-0.15%	0.33%	-0.39%	_0.66%	0.56%

Source: Calculated from Regional Economic Information System 1969-1997, Bureau of Economic Analysis, U.S. Department of Commerce, May 1999.

Table 4 **U.S. Private Employment Growth Rates**
USDA Area Groups

	1969 - 97	1969 - 78	1978 - 89	1989 - 95	1995 - 97
Metro Counties					

1.	Large - - counties in metro areas with 1 million or more pop					
	Core Counties	1.55%	1.35%	2.02%	0.58%	2.75%
	Non-core counties	2.81%	2.91%	3.31%	1.62%	3.17%
2.	Small - - counties in metro areas with LT 1 million pop	2.48%	2.84%	2.34%	2.14%	2.68%
Non-metro Counties						
Adjacent to Large Metro Areas						
3.	Contain all or part of a city with 10,000 or more pop	2.18%	2.49%	1.73%	2.48%	2.4%
4.	Contain no part of a city that large					
Adjacent to Small Metro Areas						
5.	Contain all or part of a city of 10,000 or more pop	1.91%	2.42%	1.48%	1.82%	2.22%
6.	Contain no part of a city that large					
Not adjacent to Metro Areas						
7.	Contain all or part of a city of 10,000 or more pop	2.32%	3.16%	1.52%	2.55%	2.19%
8.	Contain all or part of a town of 2,500 or 9,999 pop	2.08%	3.07%	1.14%	2.35%	1.91%
9.	Totally rural, contain no part of a town as large as 2,500 pop	2.00%	2.69%	1.11%	2.57%	2.04%
US Total		2.23%	2.39%	2.35%	1.61%	2.74%

Source: Calculated from Regional Economic Information System, U.S. Department of Commerce, Economics and Statistics Administration Bureau of Economic Analysis, Regional Economic Measurement Division.

Table 5 CBD Employment, 1994, 1996

	1998 pop	1994 Principal CBD Empl	1996 Principal CBD Empl	1996 94 - 96 CBD Job Growth	1996 CBD Empl Prop of Metro
New York-Northern NJ-Long Island CMSA	20124	1354.3	1388.8	0.025474	0.156168
Los Angeles-Riverside-Orange CMSA	15781	241.5	239.9	_0.006625	0.039762
Chicago-Gary-Kenosha CMSA	8809	173.5	182.6	0.052450	0.042270
Washington-Baltimore CMSA	7285	119.6	114.2	_0.045151	0.031930
San Francisco-Oakland-San Jose CMSA	6816	245.5	261.5	0.065173	0.082589
Philadelphia-Wilmington-Atlantic City CMSA	5988	82.5	82.8	0.003636	0.030241
Boston-Worcester-Lawrence-Lowell-Brockton CMSA	5633	24.5	24.9	0.016327	0.010691
Detroit-Ann Arbor-Flint CMSA	5458	42	37.6	_0.104762	0.015080
Dallas-Ft. Worth CMSA	4802	96	97.4	0.014583	0.041645
Houston-Galveston-Brazoria CMSA	4408	83.3	79.8	_0.042017	0.040590
Atlanta MSA	3746	50.1	64.3	0.283433	0.033743
Miami-Ft. Lauderdale CMSA	3656	12.6	10.9	_0.134921	0.007042
Seattle-Tacoma-Bremerton CMSA	3424	114.4	115.5	0.009615	0.071156
Phoenix-Mesa MSA	2931	48.2	51.6	0.070539	0.039404
Cleveland-Akron CMSA	2912	112.6	119.9	0.064831	0.083461
Minneapolis-St. Paul MSA	2831	99.2	105.3	0.061492	0.066684
San Diego MSA	2781	65.8	64.4	_0.021277	0.064464
St. Louis MSA	2563	84.1	85.7	0.019025	0.067560
Denver-Boulder-Greeley CMSA	2365	59.1	61.8	0.045685	0.050207
Pittsburgh MSA	2346				
Tampa-St. Petersburg-Clearwater MSA	2257				
Portland-Salem CMSA	2149	46.5	43.9	_0.055914	0.043591
Cincinnati-Hamilton CMSA	1948	78.7	77.9	_0.010165	0.083387
Kansas City MSA	1737	69.7	73.1	0.048780	0.083201
Sacramento-Yolo CMSA	1686				
Milwaukee-Racine CMSA	1646	101.7	101.4	_0.002950	0.113474
Norfolk-Va Beach-Newport News CMSA	1542				
San Antonio MSA	1538				
Indianapolis MSA	1519	39.9	41.5	0.040100	0.051102
Orlando MSA	1504				

Source: Zip Code Business Patterns 1996, U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, issued August 1999.

Table 6 **Average Trip Times, 1995**
(selected NPTS trip purposes, one-way, POVs)

	1998 pop	1995	1995	1995	1995
		(NPTS 1) To/From Work	(NPTS 3) Shopping	(NPTS 4) Fam Pers	(NPTS 10) Soc Rec
		All POV Mins	All POV Mins	All POV Mins	All POV Mins
New York-Northern NJ-Long Island CMSA	20124	25.4	12.2	14.1	19
Los Angeles-Riverside-Orange CMSA	15781	24.1	12.4	13.6	16.1
Chicago-Gary-Kenosha CMSA	8809	23.7	12	16.9	16
Washington-Baltimore CMSA	7285	25.1	14.8	17	18
San Francisco-Oakland-San Jose CMSA	6816	21.4	11.3	14.1	16.4
Philadelphia-Wilmington-Atlantic City CMSA	5988	20.6	11.8	13.3	19.1
Boston-Worcester-Lawrence-Lowell-Brockton CMSA	5633	22.2	12	13.1	17.2
Detroit-Ann Arbor-Flint CMSA	5458	20.6	11.9	11.7	14.3
Dallas-Ft. Worth CMSA	4802	21.2	13.3	13.1	18.7
Houston-Galveston-Brazoria CMSA	4408	21.2	12	14.2	17.6
Atlanta MSA	3746	23.1	11.5	14.9	15.3
Miami-Ft. Lauderdale CMSA	3656	21.7	11.4	14.1	16.4
Seattle-Tacoma-Bremerton CMSA	3424	27.1	12.5	14.9	19
Phoenix-Mesa MSA	2931	18.5	13.5	13.4	16
Cleveland-Akron CMSA	2912	18.9	13.5	19.4	15.6
Minneapolis-St. Paul MSA	2831	19.5	12.3	14.5	17.4
San Diego MSA	2781	11.8	5.8	8.1	11.4
St. Louis MSA	2563	21.2	14.8	12.8	15.2
Denver-Boulder-Greeley CMSA	2365	21.4	10.7	11.1	17.7
Pittsburgh MSA	2346	22.7	11.8	12.4	15.8
Tampa-St. Petersburg-Clearwater MSA	2257	18.9	11.3	16.2	20.2
Portland-Salem CMSA	2149	18.5	13.3	11.6	19.7
Cincinnati-Hamilton CMSA	1948	20.2	12.4	14.4	19.1
Kansas City MSA	1737	19.7	11.4	11.5	15.7
Sacramento-Yolo CMSA	1686	17	11	13.5	14.8
Milwaukee-Racine CMSA	1646	17.5	19	13	16.3
Norfolk-Va Beach-Newport News CMSA	1542	20.6	15.6	13.4	18.4
San Antonio MSA	1538	19	12.1	12.8	21.2
Indianapolis MSA	1519	17	11.1	15	14
Orlando MSA	1504	20.3	14.4	14.5	24.8
All CMSAs		23.6	12.4	14.4	17.8

Source: Nationwide Personal Transportation Survey, October 1997, Federal Highway Administration, United States Department of Transportation.

Table 7 **Per Capita Transit Use, 1980 - 1997 (unlinked trips)**

	1998 Pop	80 - 97	90 - 97
		Prop Chge Unlinked Transit	Prop Chge Unlinked Transit
		Trips / Cap	Trips / Cap
New York-Northern NJ-Long Island CMSA	20124	-15.4	-0.1
Los Angeles-Riverside-Orange CMSA	15781	-15.6	-2.6
Chicago-Gary-Kenosha CMSA	8809	-36.3	-25.1
Washington-Baltimore CMSA	7285	-19.8	-14.6
San Francisco-Oakland-San Jose CMSA	6816	-21.9	-5.4
Philadelphia-Wilmington-Atlantic City CMSA	5988	-22.8	-14.8
Boston-Worcester-Lawrence-Lowell-Brockton CMSA	5633	-11	-4.2
Detroit-Ann Arbor-Flint CMSA	5458	-51	-31.1
Dallas-Ft. Worth CMSA	4802	-10.6	0.2
Houston-Galveston-Brazoria CMSA	4408	34.2	-16.8
Atlanta MSA	3746	-15.3	-5.8
Miami-Ft. Lauderdale CMSA	3656	-8	3.2
Seattle-Tacoma-Bremerton CMSA	3424	-21.9	7.8
Phoenix-Mesa MSA	2931	28.9	-12
Cleveland-Akron CMSA	2912	-41.2	-10.9
Minneapolis-St. Paul MSA	2831	-54.8	-18.9
San Diego MSA	2781	27.5	12.6
St. Louis MSA	2563	-40.2	19
Denver-Boulder-Greeley CMSA	2365	5.8	9.1
Pittsburgh MSA	2346	-31.8	-15.6
Tampa-St. Petersburg-Clearwater MSA	2257	-38.8	-24.8
Portland-Salem CMSA	2149	-1.2	12.6
Cincinnati-Hamilton CMSA	1948	-41.2	-20.9
Kansas City MSA	1737	-53.3	-27.2
Sacramento-Yolo CMSA	1686	14.6	28.4
Milwaukee-Racine CMSA	1646	-21.1	4.7
Norfolk-Va Beach-Newport News CMSA	1542	-47.4	7.5
San Antonio MSA	1538	-27	-20.5
Indianapolis MSA	1519	-53.7	-28.7
Orlando MSA	1504	33.8	78

Source: http://www.publicpurpose.com/new_ix.htm

Table 8 **Household Income Distribution in U.S. Urbanized Areas Central Cities and Suburbs, 1989**

	Central Place	Urban Fringe
<$5,000	0.0808	0.0335
$5,000 - $9,000	0.1081	0.0594
$10,000 - $14,999	0.0954	0.0643
$15,000 - $24,999	0.1833	0.1458
$25,000 - $34,999	0.1562	0.1519
$35,000 - $49.,999	0.1645	0.1985
$50,000 - $74,999	0.1300	0.1995
$75,000 - $99,999	0.0431	0.0784
> $100,000	0.0385	0.0687

Source: 1990 Census of Population: Social and Economic Characteristics, Table 3: Summary of Occupation, Income, and Poverty Characteristics

Table 1 Urbanized Area Population Densities, 1950 - 1990

	1998 Pop	1990	1950 - 90	1980 - 90
		UA Pop Dens	UA % Pop Dens Chge	UA % Pop Dens Chge
New York-Northern NJ-Long Island CMSA	20124	5408.5	-44.9	-2.6
Los Angeles-Riverside-Orange CMSA	15781	5800.8	26.4	11.8
Chicago-Gary-Kenosha CMSA	8809	4286.6	-38.2	-5.3
Washington-Baltimore CMSA	7285	3560.1	-50.8	3.9
San Francisco-Oakland-San Jose CMSA	6816	4152.3	-41	3.6
Philadelphia-Wilmington-Atlantic City CMSA	5988	3626.7	-61.3	-10.5
Boston-Worcester-Lawrence-Lowell-Brockton CMSA	5633	3114.1	-51.9	-0.4
Detroit-Ann Arbor-Flint CMSA	5458	3303	-49.2	-9.4
Dallas-Ft. Worth CMSA	4802	2216.3	-31.2	15.7
Houston-Galveston-Brazoria CMSA	4408	2464.8	-5	7.2
Atlanta MSA	3746	1898.4	-60.3	6.4
Miami-Ft. Lauderdale CMSA	3656	5429	38.3	14.7
Seattle-Tacoma-Bremerton CMSA	3424	2966.6	-41.3	3.3
Phoenix-Mesa MSA	2931	2707.2	-31.1	23.2
Cleveland-Akron CMSA	2912	2638	-42.8	-5.3
Minneapolis-St. Paul MSA	2831	1956.5	-54.2	7.2
San Diego MSA	2781	3402.7	4.5	22
St. Louis MSA	2563	2673.1	-56.5	-13.6
Denver-Boulder-Greeley CMSA	2365	3307	-30.4	7.4
Pittsburgh MSA	2346	2157.6	-64.3	-15
Tampa-St. Petersburg-Clearwater MSA	2257	2630	16	2.4
Portland-Salem CMSA	2149	3021	-32.9	2.7
Cincinnati-Hamilton CMSA	1948	2367	-57.5	-11.5
Kansas City MSA	1737	1673	-64.3	-10.2
Sacramento-Yolo CMSA	1686	3284	-34.9	14.7
Milwaukee-Racine CMSA	1646	2395	-70.5	-1.6
Norfolk-Va Beach-Newport News CMSA	1542	1992	-67.9	8.2
San Antonio MSA	1538	2578	-48.4	-3.4
Indianapolis MSA	1519			
Orlando MSA	1504			

Source: http://www.publicpurpose.com/new-ix.htm

Table 2 **Average Annual Population Growth Rate**
USDA Area Groups

	1969 - 97	1969 - 78	1978 - 89	1989 - 95	1995 - 97
Metro Counties					
1. Large - - counties in metro areas with 1 million or more pop	0.65%	0.34%	0.89%	0.67%	0.63%
Core Counties	1.30%	1.26%	1.33%	1.30%	1.32%
Non-core counties					
2. Small - - counties in metro areas with LT 1 million pop	1.21%	1.43%	1.08%	1.23%	0.93%
Non-metro Counties					
Adjacent to Large Metro Areas					
3. Contain all or part of a city with 10,000 or more pop	1.05%	1.23%	0.82%	1.22%	1.01%
4. Contain no part of a city that large	1.20%	1.46%	0.85%	1.32%	1.56%
Adjacent to Small Metro Areas					
5. Contain all or part of a city of 10,000 or more pop	0.79%	1.25%	0.47%	0.74%	0.60%
6. Contain no part of a city that large	0.90%	1.28%	0.51%	0.98%	1.06%
Not adjacent to Metro Areas					
7. Contain all or part of a city of 10,000 or more pop	0.82%	1.32%	0.48%	0.82%	0.46%
8. Contain all or part of a town of 2,500 or 9,999 pop	0.61%	1.21%	0.10%	0.67%	0.55%
9. Totally rural, contain no part of a town as large as 2,500 pop	0.27%	0.71%	-0.22%	0.42%	0.51%
US Total	1.02%	1.10%	0.96%	1.05%	0.94%

Source: Calculated from Regional Economic Information System 1969-1997, Bureau of Economic Analysis, U.S. Department of Commerce, May 1999.

Table 3 Average Annual Manufacturing Employment Growth Rate

USDA Area Groups

	1969 - 97	1969 - 78	1978 - 89	1989 - 95	1995 - 97
Metro Counties					
1. Large - - counties in metro areas with 1 million or more pop	-1.22%	-0.82%	-1.36%	-2.30%	1.05%
Core Counties	-0.03%	0.24%	0.07%	-1.09%	1.46%
Non-core counties					
2. Small - - counties in metro areas with LT 1 million pop	0.00%	0.61%	-0.39%	-0.22%	0.12%
Non-metro Counties					
Adjacent to Large Metro Areas					
3. Contain all or part of a city with 10,000 or more pop	0.55%	1.21%	-0.18%	0.96%	0.38%
4. Contain no part of a city that large	0.95%	2.07%	0.34%	0.66%	0.17%
Adjacent to Small Metro Areas					
5. Contain all or part of a city of 10,000 or more pop	0.43%	1.20%	-0.01%	0.20%	0.06%
6. Contain no part of a city that large	1.02%	1.86%	0.69%	0.97%	-0.81%
Not adjacent to Metro Areas					
7. Contain all or part of a city of 10,000 or more pop	0.85%	1.67%	-0.03%	1.26%	0.70%
8. Contain all or part of a town of 2,500 or 9,999 pop	1.12%	2.48%	0.30%	1.26%	-0.96%
9. Totally rural, contain no part of a town as large as 2,500 pop	1.44%	2.55%	1.53%	0.61%	-1.55%
US Total	-0.15%	0.33%	-0.39%	-0.66%	0.56%

Source: Calculated from Regional Economic Information System 1969-1997, Bureau of Economic Analysis, U.S. Department of Commerce, May 1999.

Table 4 U.S. Private Employment Growth Rates
USDA Area Groups

	1969 - 97	1969 - 78	1978 - 89	1989 - 95	1995 - 97
Metro Counties					
1. Large - - counties in metro areas with 1 million or more pop	1.55%	1.35%	2.02%	0.58%	2.75%
Core Counties	2.81%	2.91%	3.31%	1.62%	3.17%
Non-core counties					
2. Small - - counties in metro areas with LT 1 million pop	2.48%	2.84%	2.34%	2.14%	2.68%
Non-metro Counties					
Adjacent to Large Metro Areas					
3. Contain all or part of a city with 10,000 or more pop	2.18%	2.49%	1.73%	2.48%	2.4%
4. Contain no part of a city that large	2.43%	2.73%	1.87%	2.86%	2.87%
Adjacent to Small Metro Areas					
5. Contain all or part of a city of 10,000 or more pop	1.91%	2.42%	1.48%	1.82%	2.22%
6. Contain no part of a city that large	2.11%	2.60%	1.61%	2.3%	2.02%
Not adjacent to Metro Areas					
7. Contain all or part of a city of 10,000 or more pop	2.32%	3.16%	1.52%	2.55%	2.19%
8. Contain all or part of a town of 2,500 or 9,999 pop	2.08%	3.07%	1.14%	2.35%	1.91%
9. Totally rural, contain no part of a town as large as 2,500 pop	2.00%	2.69%	1.11%	2.57%	2.04%
US Total	2.23%	2.39%	2.35%	1.61%	2.74%

Source: Calculated from Regional Economic Information System, U.S. Department of Commerce, Economics and Statistics Administration Bureau of Economic Analysis, Regional Economic Measurement Division.

Table 5 CBD Employment, 1994, 1997

	1998 pop	1994	1997	1997	1997
		Principal CBD Empl	Principal CBD Empl	94 - 97 CBD Job Growth	CBD Empl Prop of Metro
New York-Northern NJ-Long Island	20124	1354.3	1454.7	0.07409	0.17655
Los Angeles-Riverside-Orange CMSA	15781	241.5	239.6	-0.0081	0.04174
Chicago-Gary-Kenosha CMSA	8809	173.5	177.4	0.02215	0.04465
Washington-Baltimore CMSA	7285	119.6	126.8	0.06047	0.04208
San Francisco-Oakland-San Jose CMSA	6816	245.5	279.4	0.13815	0.09227
Philadelphia-Wilmington-Atlantic City	5988	82.5	77.3	-0.0623	0.03046
Boston-Worcester-Lawrence-Lowell-	5633	24.5	25.4	0.03711	0.00815
Detroit-Ann Arbor-Flint CMSA	5458	42	37.9	-0.0970	0.01681
Dallas-Ft. Worth CMSA	4802	96	88.6	-0.0772	0.03883
Houston-Galveston-Brazoria CMSA	4408	83.3	84.6	0.01615	0.04728
Atlanta MSA	3746	50.1	68.9	0.37568	0.03786
Miami-Ft. Lauderdale CMSA	3656	12.6	9.6	-0.2410	0.00695
Seattle-Tacoma-Bremerton CMSA	3424	114.4	118.6	0.03622	0.08414
Phoenix-Mesa MSA	2931	48.2	54.1	0.12177	0.04435
Cleveland-Akron CMSA	2912	112.6	123.0	0.09201	0.09416
Minneapolis-St. Paul MSA	2831	99.2	110.0	0.09439	0.07369
San Diego MSA	2781	65.8	67.8	0.03036	0.07479
St. Louis MSA	2563	84.1	86.5	0.02899	0.07250
Denver-Boulder-Greeley CMSA	2365	59.1	65.1	0.10109	0.05913
Pittsburgh MSA	2346				
Tampa-St. Petersburg-Clearwater MSA	2257				
Portland-Salem CMSA	2149	46.5	46.7	0.00508	0.05079
Cincinnati-Hamilton CMSA	1948	78.7	78.5	-0.0026	0.08926
Kansas City MSA	1737	69.7	77.3	0.10785	0.09618
Sacramento-Yolo CMSA	1686				
Milwaukee-Racine CMSA	1646	101.7	104.4	0.02730	0.12569
Norfolk-Va Beach-Newport News CMSA	1542				
San Antonio MSA	1538				
Indianapolis MSA	1519	39.9	45.5	0.13988	0.06191
Orlando MSA	1504				

Source: Zip Code Business Patterns 1997, U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, issued August 1999.

Table 6 Average Trip Times, 1995
(selected NPTS trip purposes, one-way, POVs)

	1998 pop	1995 (NPTS 1) To/From Work All POV Mins	1995 (NPTS 3) Shopping All POV Mins	1995 (NPTS 4) Fam Pers All POV Mins	1995 (NPTS 10) Soc Rec All POV Mins
New York-Northern NJ-Long Island	2012	25.4	12.2	14.1	19
Los Angeles-Riverside-Orange CMSA	1578	24.1	12.4	13.6	16.1
Chicago-Gary-Kenosha CMSA	8809	23.7	12	16.9	16
Washington-Baltimore CMSA	7285	25.1	14.8	17	18
San Francisco-Oakland-San Jose CMSA	6816	21.4	11.3	14.1	16.4
Philadelphia-Wilmington-Atlantic City	5988	20.6	11.8	13.3	19.1
Boston-Worcester-Lawrence-Lowell-	5633	22.2	12	13.1	17.2
Detroit-Ann Arbor-Flint CMSA	5458	20.6	11.9	11.7	14.3
Dallas-Ft. Worth CMSA	4802	21.2	13.3	13.1	18.7
Houston-Galveston-Brazoria CMSA	4408	21.2	12	14.2	17.6
Atlanta MSA	3746	23.1	11.5	14.9	15.3
Miami-Ft. Lauderdale CMSA	3656	21.7	11.4	14.1	16.4
Seattle-Tacoma-Bremerton CMSA	3424	27.1	12.5	14.9	19
Phoenix-Mesa MSA	2931	18.5	13.5	13.4	16
Cleveland-Akron CMSA	2912	18.9	13.5	19.4	15.6
Minneapolis-St. Paul MSA	2831	19.5	12.3	14.5	17.4
San Diego MSA	2781	11.8	5.8	8.1	11.4
St. Louis MSA	2563	21.2	14.8	12.8	15.2
Denver-Boulder-Greeley CMSA	2365	21.4	10.7	11.1	17.7
Pittsburgh MSA	2346	22.7	11.8	12.4	15.8
Tampa-St. Petersburg-Clearwater MSA	2257	18.9	11.3	16.2	20.2
Portland-Salem CMSA	2149	18.5	13.3	11.6	19.7
Cincinnati-Hamilton CMSA	1948	20.2	12.4	14.4	19.1
Kansas City MSA	1737	19.7	11.4	11.5	15.7
Sacramento-Yolo CMSA	1686	17	11	13.5	14.8
Milwaukee-Racine CMSA	1646	17.5	19	13	16.3
Norfolk-Va Beach-Newport News	1542	20.6	15.6	13.4	18.4
San Antonio MSA	1538	19	12.1	12.8	21.2
Indianapolis MSA	1519	17	11.1	15	14
Orlando MSA	1504	20.3	14.4	14.5	24.8
All		23.6	12.4	14.4	17.8

Source: Nationwide Personal Transportation Survey, October 1997, Federal Highway Administration, United States Department of Transportation.

Table 7A Per Capita Transit Use, 1980 - 1997 (unlinked trips)

	1998 Pop	80 - 97	90 - 97
		Prop Chge Unlinked Transit Trips / Cap	Prop Chge Unlinked Transit Trips / Cap
New York-Northern NJ-Long Island CMSA	20124	-15.4	-0.1
Los Angeles-Riverside-Orange CMSA	15781	-15.6	-2.6
Chicago-Gary-Kenosha CMSA	8809	-36.3	-25.1
Washington-Baltimore CMSA	7285	-19.8	-14.6
San Francisco-Oakland-San Jose CMSA	6816	-21.9	-5.4
Philadelphia-Wilmington-Atlantic City CMSA	5988	-22.8	-14.8
Boston-Worcester-Lawrence-Lowell-	5633	-11	-4.2
Detroit-Ann Arbor-Flint CMSA	5458	-51	-31.1
Dallas-Ft. Worth CMSA	4802	-10.6	0.2
Houston-Galveston-Brazoria CMSA	4408	34.2	-16.8
Atlanta MSA	3746	-15.3	-5.8
Miami-Ft. Lauderdale CMSA	3656	-8	3.2
Seattle-Tacoma-Bremerton CMSA	3424	-21.9	7.8
Phoenix-Mesa MSA	2931	28.9	-12
Cleveland-Akron CMSA	2912	-41.2	-10.9
Minneapolis-St. Paul MSA	2831	-54.8	-18.9
San Diego MSA	2781	27.5	12.6
St. Louis MSA	2563	-40.2	19
Denver-Boulder-Greeley CMSA	2365	5.8	9.1
Pittsburgh MSA	2346	-31.8	-15.6
Tampa-St. Petersburg-Clearwater MSA	2257	-38.8	-24.8
Portland-Salem CMSA	2149	-1.2	12.6
Cincinnati-Hamilton CMSA	1948	-41.2	-20.9
Kansas City MSA	1737	-53.3	-27.2
Sacramento-Yolo CMSA	1686	14.6	28.4
Milwaukee-Racine CMSA	1646	-21.1	4.7
Norfolk-Va Beach-Newport News CMSA	1542	-47.4	7.5
San Antonio MSA	1538	-27	-20.5
Indianapolis MSA	1519	-53.7	-28.7
Orlando MSA	1504	33.8	78

Source: http://www.publicpurpose.com/new-ix.htm

Table 7B Shares of Transit Use, 1998

	1998 Pop	Share of US Public Transport Total	Share of US Population	Ratio of Public Transport Share to Population Shar
New York-Northern NJ-Long Island	20124	36.858	7.445	4.95
Los Angeles-Riverside-Orange CMSA	15781	7.418	5.838	1.27
Chicago-Gary-Kenosha CMSA	8809	7.078	3.259	2.17
Washington-Baltimore CMSA	7285	6.025	2.695	2.23
San Francisco-Oakland-San Jose CMSA	6816	5.909	2.522	2.34
Philadelphia-Wilmington-Atlantic City	5988	3.673	2.215	1.65
Boston-Worcester-Lawrence-Lowell-	5633	4.487	2.084	2.15
Detroit-Ann Arbor-Flint CMSA	5458	0.939	2.019	0.46
Dallas-Ft. Worth CMSA	4802	0.830	1.777	0.46
Houston-Galveston-Brazoria CMSA	4408	1.209	1.631	0.74
Atlanta MSA	3746	2.035	1.386	1.46
Miami-Ft. Lauderdale CMSA	3656	1.317	1.353	0.97
Seattle-Tacoma-Bremerton CMSA	3424	1.524	1.267	1.20
Phoenix-Mesa MSA	2931	0.447	1.084	0.41
Cleveland-Akron CMSA	2912	0.934	1.077	0.86
Minneapolis-St. Paul MSA	2831	0.837	1.047	0.79
San Diego MSA	2781	1.180	1.029	1.14
St. Louis MSA	2563	0.705	0.949	0.74
Denver-Boulder-Greeley CMSA	2365	0.908	0.875	1.03
Pittsburgh MSA	2346	0.929	0.868	1.07
Tampa-St. Petersburg-Clearwater MSA	2257	0.228	0.835	0.27
Portland-Salem CMSA	2149	1.141	0.795	1.43
Cincinnati-Hamilton CMSA	1948	0.409	0.721	0.56
Kansas City MSA	1737	0.191	0.643	0.29
Sacramento-Yolo CMSA	1686	0.395	0.624	0.63
Milwaukee-Racine CMSA	1646	0.936	0.609	1.53
Norfolk-Va Beach-Newport News CMSA	1542	0.213	0.571	0.37
San Antonio MSA	1538	0.520	0.569	0.91
Indianapolis MSA	1519	0.131	0.562	0.23
Orlando MSA	1504	0.236	0.557	0.42

Source: http://www.publicpurpose.com/new-ix.htm

Table 8 Household Income Distribution in U.S. Urbanized Areas Central Cities and Suburbs, 1989

	Central Place	Urban Fringe
< $5,000	0.0808	0.0335
$5,000 - $9,000	0.1081	0.0594
$10,000 - $14,999	0.0954	0.0643
$15,000 - $24,999	0.1833	0.1458
$25,000 - $34,999	0.1562	0.1519
$35,000 - $49.,999	0.1645	0.1985
$50,000 - $74,999	0.1300	0.1995
$75,000 - $99,999	0.0431	0.0784
> $100,000	0.0385	0.0687

Source: 1990 Census of Population: Social and Economic Characteristics, Table 3: Summary of Occupation, Income, and Poverty Characteristics: 1990.