

AN ECONOMIST'S PERSPECTIVE ON URBAN SPRAWL:

With an Application to Metropolitan Areas in the American West

By

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ABSTRACT

For more than sixty years, urban planners have used the catchall phrase “urban sprawl” to categorize much of what people dislike about life in metropolitan areas. In the early 1990s, the term urban sprawl grew to common usage by the public and is now a policy concern that is debated at national, state, and local levels. The purpose of this paper is to offer a better understanding of urban sprawl in general, and urban sprawl in the American West in particular. First, an economic way of thinking about urban sprawl is presented. Then the previous planning and popular literature is examined to derive a consensus on ways to quantify the degree of urban sprawl in a metropolitan area given the available data. Values for these measures are provided for urbanized and metropolitan regions throughout the western United States. Conclusions are drawn from this data and a policy course for dealing with sprawl is suggested.

In the next three or four years, Americans will have a chance to decide how decent a place this country will be to live in, and for generations to come. Already, huge patches of once green countryside have been turned into vast smog-filled deserts that are neither city, suburb, nor country and each day – at a rate of some 3,000 acres a day – more country is being bulldozed over... It is not merely that the countryside is receding; in the great expansion of the metropolitan areas, the subdivisions of one city are beginning to meet up with the subdivisions of another.

The above statement sounds like it comes from a recent commentary written in any newspaper or newsmagazine in the United States. Many would be surprised to learn that it appeared in the opening paragraph of an article by the sociologist William Whyte that he titled “Urban Sprawl” in the January 1958 (p. 103) edition of *Fortune* magazine. In fact, Thomas Black (1996) has traced the

pejorative use of the term “sprawl” back to a speech made in 1937 by Earle

Draper of the Tennessee Valley Authority to a national conference of planners:

Perhaps diffusion is too kind of word... In bursting its bounds, the city actually sprawled and made the countryside ugly... uneconomic [in terms] of services and doubtful social value.

For more than sixty years, urban planners have used the catchall phrase of “urban sprawl” to categorize much of what people dislike about suburban life in metropolitan areas. In the early 1990s, coinciding with Joel Garreau’s (1991) publication of *Edge City: Life on the New Frontier*, the term urban sprawl grew to common usage in the public’s lexicon and is now a policy concern that is debated at all levels of government. In his 1999 State of the Union Address, President Clinton devoted nearly 20 percent of his time to issues related to metropolitan development; he only spent more time on foreign policy. Vice President Al Gore, running for President, followed up with campaign speeches last year that attributed road rage, loss of fertile land, central city decay, and even a decline in family life to urban sprawl in the United States.

In California, where the U.S. Census Bureau anticipates that population will grow from 32.5 million in 2000 to 49.3 million in 2025, the question of how to accommodate a greater than 50 percent increase in population in 25 years is widely asked. How pleasant will it be to live and work in California’s metropolitan areas if a majority of this growth occurs at low density at the fringe of current metropolitan areas? Since many places in the western United States

face similar population pressures, the same question is widely debated within state and local governments throughout the American West.

Alternatively, conservative commentators like Thomas Sowell (1999) and George Will (1999), attribute this focus on urban sprawl and the necessity of government directed “smart growth,” as the most recent crisis contrived by Liberals to justify government interference in what they believe are location decisions better left to individuals and business. Even so, it is hard to find a policymaker who at least publicly, favors urban sprawl. At the same time, it is equally difficult to find someone who can concisely define what urban sprawl is and how to measure the degree to which it has occurred in a region. Though it is not hard to find a policymaker concerned over the negative outcomes that are widely attributed to urban sprawl: loss of open space and farmland, traffic congestion, air pollution, a greater percentage of the poor living in the inner-city, central city blight, etc.

To begin to think about and examine the causal connection between urban sprawl and these negative outcomes, ways are needed to assess the degree that urban sprawl has occurred in a metropolitan area. Ken Small (2000), an urban economist, offers a medical analogy concerning how the public and even policymakers usually think about the “disease” of sprawl. We all recognize the undesirable symptoms of the disease, policymakers have already come up with many cures for the disease (all under the label of smart growth); unfortunately,

most people – and even policymakers – lack a clear understanding of the underlying disease.

This purpose of this paper is to offer a better understanding of the disease of urban sprawl. First, an economic way of thinking about urban sprawl is presented. Then the previous planning and popular literature is examined to derive a consensus on ways to quantify the degree of sprawl in a metropolitan area given the available data. Values for these measures are provided for urbanized areas and metropolitan regions throughout the western United States. Conclusions are drawn from this data and a policy course for dealing with sprawl is suggested.

WHAT IS URBAN SPRAWL?

In its broadest sense, urban sprawl is just another word for “excessive” metropolitan decentralization or suburbanization. Suburbanization occurs over time when a larger percentage of a metropolitan area’s residential and/or business activity takes place outside of its central locations. Determining when urban decentralization has become excessive is not an easy task.

As discussed by two prominent urban economists, Ed Mills (1999) and Jan Bruekner (2000), the process of suburbanization has occurred in the United States for well over 75 years. In 1950, 57 percent of the population lived in the single central cities designated for each U.S. metropolitan area. While in 1950, 70 percent of the employment in the U.S. took place in these central cities. By the

mid-1990s, these percentages had respectively declined to 35 and 45 percent. Urban economists have extensively documented, modeled, and statistically examined this occurrence. Their conclusion being that 20th Century suburbanization occurred due to population growth, rising incomes, falling commuting costs, and to some extent, changing tastes on where and how Americans wish to live, work, and shop.

As population rises in a metropolitan area, it becomes increasingly more difficult to locate the same percentage of residential and business activity in a central city whose boundaries remain fixed. Higher income residents, generally, demand larger quantities of housing and the cheap land to build it is more likely on the fringe of currently developed urban areas. The construction of federally subsidized highways, and the relatively low private cost of using an automobile to get to work, has further facilitated the 20th Century movement to the suburbs. In addition, many people and businesses just prefer a suburban setting; though there is some debate as to whether this preference is at least in part induced by the limited choices provided them (see Ewing, 1997).

An Economic Concept of Urban Sprawl

Sprawl, in its current usage is now a code word for excessive suburbanization. To identify sprawl in a metropolitan area we must be able to identify the point that further decentralization becomes excessive. According to economists, the least value-laden way to do this is when further decentralization

imposes greater total costs on everyone in the metropolitan area than if the development had remained more centralized. An economist's definition of total costs refers to both the private costs born by the individuals and businesses making the decision to locate in the more decentralized location in a metropolitan area, plus the public costs that result from the decentralized location decisions of others. Total costs are used by economists in the sense that they are net of the private and social benefits that arise from the decentralized location decisions.

This form of economic thinking can help us to better understand why a household, new to a metropolitan area, decides to live in the outer suburbs, even though the primary wage earner works in the central city. The household makes this decision by weighing the private benefits of a decentralized location (possibly better public schools, cheaper land to build a larger house on, newer infrastructure, neighbors they would rather associate with, closer to public open space, etc.) against the private costs of the decentralized location (longer commuting times, less urban amenities, etc.). In this example, the household determines that the private benefits are greater than the private costs at an outer location, and choose their residence in the urban fringe. In making this decision, they are unlikely to fully consider the social costs of their decision to the entire metropolitan area (perhaps greater air pollution from a longer commute, greater freeway congestion, increased publicly-funded infrastructure costs, the social and economic isolation of those left behind at the core of the metropolitan area, etc.)

To define when new suburbanization becomes excessive, economists look to see if the total private and social costs of decentralization, after accounting for private and social benefits, are positive. This is the economist's realm of evaluating a decision based upon the tradeoffs involved in it. In the United States, people and businesses freely chose to decentralize their location in a metropolitan area and it is reasonable to assume that they only do so if the private benefits they receive from such are greater than the private costs. As Ned Levine (1997, p.280) points out: "What to one person is 'sprawl' to another is his/her home."

Suburbanization can be considered excessive when business and individuals ignore the social costs that their decision to decentralize imposes upon the metropolitan area, or the social benefits they would have generated if they had chosen a more centralized location. Economists refer to these privately ignored social costs and benefits as externalities.

Urban planners, environmentalists, and other social engineers have embraced the concept of excessive suburbanization, or sprawl, because it offers a theoretically based reason for government to redirect the intra-metropolitan location decisions of individuals and firms. However, the difficulty in deciding when to impose this redirection has always been in determining when the private and public costs of a form of suburbanization are greater than the private and public benefits.

To an economist, urban sprawl results from thousands of individual choices. If we agree that many U.S. households prefer low density living, spatial separation from others with lower incomes and social status, one-stop shopping, a location near open space; and that travel by private care is faster, cheaper, and safer than mass transit, it is not surprising that many households end up choosing locations on the less developed fringe of urban areas. Given that many metropolitan residents have made these choices, many metropolitan businesses also desire low-density sites spread out across a metropolitan area for ease of shipping, employee, and market access. In effect, the negative outcomes attributed to urban sprawl can be thought of as the summation of the many public costs that individuals and businesses have chosen to ignore when deciding upon a location at the urban fringe. The immortal words of a Pogo comic strip from Earth Day 1971 still ring true in regard to what causes the disease of urban sprawl: “Yep Son, we have met the enemy and he is us.”

A Practical Definition of Urban Sprawl

The previous explanation for the cause of urban sprawl is based in economics and rather abstract. It is not new, and Robert Harvey and W.A.V. Clark made a similar argument as early as 1965. As a more concrete alternative to trying to calculate the private and public benefits and costs of greater decentralization in a metropolitan area, policy analysts and social activists have chosen to conceptualize excessive suburbanization in a way that they are certain

that the total costs of a described form of suburbanization are greater than the total benefits. For instance, in a widely cited 1998 study, the Sierra Club defines sprawl as “low-density development beyond the edge of service and employment, which separates where people live from where they work – thus requiring cars to move between zones.” Continuing this theme, the *Planning Commissioners Journal* (2000) describes urban sprawl as “dispersed development outside of compact urban and village centers along highways and in rural countryside.” Anthony Downs (1998), at the Brookings Institution, defines urban sprawl by observable traits such as unlimited outward extension of new development, low density developments in new-growth areas, leapfrog development, and strip commercial development.

Reid Ewing (1994 and 1997), an urban planner, takes a very deliberate approach to conceptualizing what urban sprawl is. He surveyed 15 academic articles on the subject, written between 1957 and 1992, and found that the terms low-density, strip or ribbon, scattered, or leapfrog development are most often used to characterize urban sprawl. Ewing lumps these characteristics under the term “non-compact development,” but he is not satisfied with such a simple archetype. In his mind, urban sprawl is always a matter of degree and the difficulty in crafting a rule to recognize it occurs in distinguishing the scale of non-compactness that typify the forms of polycentric development that exists in most U.S. metropolitan areas. In the end, Ewing equates the degree of urban

sprawl in a region to the extent of residential inaccessibility to jobs and shopping, and lack of functional open space in the region. Ewing's definition of functional, applied to open space, is vacant land that performs some "useful" public purpose.

Quantifying Urban Sprawl

The economist's method of recognizing urban sprawl is theoretically sound, but extremely demanding to implement. Thus, it is no surprise that policy activists instead prefer depictions of types of suburban development where they believe the total costs likely are likely greater than total benefits.

The problems that arise when declaring that a type suburbanization is urban sprawl is not unlike the problem a court encounters when declaring something pornographic. We all know there are certain forms of metropolitan decentralization in which the private and social costs of it occurring are greater than the private and social benefits it generates. The difficulty, as with pornography, is in the creation of a specific canon that identifies a type of suburbanization that fails such a benefit/cost test. Though, as described above, planners and other urban activists have stepped into this void and offered characteristics of metropolitan suburbanization in which they believe the total costs to all in the metropolitan area are greater than the total benefits. If we accept these characteristics, and Ewing's insight that defining sprawl is always a matter of degree, a declaration of the degree of sprawl in an urban area may be possible, though still not simple.

Much of how planners define sprawl consists of descriptions of specific types of development. Using existing data sources, there are no easy ways to directly measure the occurrences of many of these types of development in a metropolitan area. Nonetheless, there are measurable characteristics that appear in these descriptions. These include low density, scattered, and/or dispersed development; the separation of where people live from where they work; and a lack of functional open space. These characteristics, along with the concept of excessive decentralization that occurs over time and measured in a relative sense, are what are relied on in this paper to begin to define ways of determining the degree of sprawl in urban areas in the western United States.

The Census defines U.S. metropolitan areas by a central city and the surrounding county or counties that are economically integrated – in regards to commuting and shopping patterns – with the central city. This is one of the definitions used here to define an area to examine for its degree of sprawl. The second definition is what the Census calls an “urbanized area.” An urbanized area consists of the densely settled “central places” in the metropolitan area, plus the less densely settled territory (urban fringe) that surrounds these places. An urbanized area must have a minimum population of 50,000 and the area’s fringe must consist of contiguous territory that has a density of least 1,000 persons per square mile. The urban fringe can also consist of outlying territory of such density if a road no longer than 1.5 miles in distance connects it to the central

place(s), or a road 5 miles long if water or other undeveloped territory separates it from the central place(s). The Census considers central places to be the dominant employment and residential centers in each urbanized area.

An empirical comparison of the degree of urban sprawl in different metropolitan areas across the West must begin with a unit of analysis. For this study, it is the 61 metropolitan areas in what the Census defines in 1990 as the continental western United States, less the seven metropolitan areas in Idaho, Montana, and Wyoming. Metropolitan areas in the western United States grew up in an era of rising populations, rising real incomes, and declining transportation costs. Unlike metropolitan areas in other parts of the United States, this resulted in lower densities at the urban core. It is therefore reasonable to compare only western metropolitan areas, and to exclude other U.S. areas whose metropolitan structures at a point in time are products of their quite different historical development. In addition, metropolitan areas in Idaho, Montana, and Wyoming are excluded because these three states are best considered outliers in terms of the majority of metropolitan development patterns in the West.¹

Table 1 contains a description of all the included metropolitan areas in the western United States. The first column of this table provides the metropolitan area's name and whether the U.S. Census Bureau considers it a Metropolitan

¹ The largest central cities in each of these excluded states only had 1992 populations of 136,000, 84,000, and 52,000 respectively.

Statistical Area (MSA) or a Primary Metropolitan Statistical Area (PMSA).² Column 2 in Table 1 lists the square miles of each metropolitan area, while column 3 contains the names of the 1990 component counties for each MSA or PMSA. Column 4 in Table 1 offers the names of the 1990 Census defined urbanized areas that are included in each metropolitan area, and column 5 provides the 1990 Census defined central places that are in each of the urbanized areas. For this study, the Census defined central places in 1990 are considered the central places for that urbanized area for all years under consideration. There are two urbanized areas (Logan, UT; and Longview, WA) that are not part of any Census defined metropolitan area.

insert Table 1 approximately here

Since excessive suburbanization is a relative term, a metropolitan area's level of decentralization at one point in time needs to be compared with both its level at earlier points in time and the degree of decentralization in similar metropolitan areas at the same time. In the next section, this is done for metropolitan areas in western states.

² A PMSA consists of integrated counties that are divisible into smaller, integrated units that consist of one or more counties. A MSA consists of counties that are not divisible into smaller, integrated units.

URBAN DECENTRALIZATION IN THE WEST

Based upon the previous discussion, Tables 2 through 5 offers various ways of measuring the amount of decentralization and open space loss that has occurred in the last three decades in the western United States. All of these tables are organized with the average for all metropolitan areas in a state listed in the top rows. Tables 2 and 3 are based upon information drawn from a state's urbanized areas. The downside of using this unit of observation is it being only available for decennial census years and the data for 2000 has not been released yet. Tables 4 and 5 rely on the metropolitan area (or counties) as the unit of observation and subsequently report information drawn from as late as 1998.

Comparing Urbanized Areas

Central places are the dominant employment and residential centers in an urbanized area. Measures of the percentage of an urbanized area's population and land area that are contained in its central places offer a comparable indication of how centralized an urban area is. Measured in this manner, less centralized urban areas are also more likely to fit many of the characteristics of sprawl previously discussed: dispersed development outside of compact urban villages, low density development in new growth areas, residential inaccessibility to shopping and employment, and greater strip commercial development. In one of the only statistically based examination of causes of urban sprawl, Jan Brueckner and David Fansler (1983) have also used values drawn from Census designated urban

areas. Wassmer (2001) has also used the 1990 Census definition of central places in urbanized areas to look at factors important to the generation of retail urban sprawl in the American West.

An examination of the percentage of an urbanized area's population and land area contained in its central places at one point in time, and how they have changed over time, offer information on the degree that an urban area is and has sprawled. For instance, the first data row of Table 2 indicates that 54 percent of the U.S. population living in urbanized areas chose to live in their central places in 1970. By 1990, this percentage had fallen to 50 percent. Similarly, in 1970, 41 percent of the land in U.S. urban areas was located in its central places; by 1990, this percentage had fallen slightly to 39 percent. Only the metropolitan averages calculated for California and Oregon bucked this U.S. trend. On average, metropolitan areas in these two states had a greater percentage of urbanized population living in central places, and land area in central places, in 1990 than in 1970.

insert Table 2 approximately here

Table 2 also shows that state averages mask metropolitan-area specific changes within a state. For instance, 13 of California's 37 urbanized areas (Antioch, Los Angeles, Oxnard, Palm Springs, Riverside, Sacramento, Salinas, San Diego, Santa Barbara, Santa Cruz, Santa Rosa, Seaside, and Simi Valley) actually experienced a decline in both the percentages of population and land area

in central places, or greater sprawl. While as noted before, California's metropolitan areas on average experienced an increase. The obvious lesson for policymakers in a large and diverse state like California is that blanket statements on the degree of sprawl in the state's metropolitan areas are not valid. Sprawl is a metropolitan phenomenon and needs to be quantified in only that fashion.

Table 3 offers the percentage change in urban population, and the percentage change in urban fringe land, that occurred in urbanized areas in the western United States between 1980 and 1990. As John Landis (2000) and other planners have used, an index of the degree of sprawl is calculated by dividing the percentage change in urban fringe (or non-central place) land by the percentage change in urban population. A value greater than one indicates that between 1980 and 1990 the fringe area of an urbanized area grew at a faster rate than the population in the entire urbanized area. If this has occurred, more and more people are living at lower density levels outside of the urbanized area's central places. This index offers another way of quantifying the relative degree of sprawl across different areas.

insert Table 3 approximately here

The top of Table 3 indicates that the 1980 to 1990 sprawl index for all of the United States was less than one. Population in all U.S. urbanized areas grew at a slower rate than land outside of central places in urbanized areas. On the contrary, four of the eight states in this western sample exhibited a 1980 to 1990

sprawl index greater than one. In California, average metropolitan growth in urban fringe land between 1980 and 1990 was twice as great as growth in urbanized population. Though again, this statewide metropolitan average masks significant variation among California's metropolitan areas. At one extreme is a ratio of fringe land growth to population growth of 21.4 and 14.7 respectively for Simi Valley and Salinas – representing a large increase in sprawl. At the other extreme, the -0.7 and -0.5 respective sprawl indexes for Riverside and San Bernardino – representing a decrease in sprawl. This is again further evidence that the degree of sprawl occurring across California's metropolitan areas differs greatly. Similar situations exist in other western states.

A Comparison Among Metropolitan Areas

Data from the Census designated urbanized area, and the central places they contain, represents the best widely collected information for assessing the degree of decentralization or sprawl that has occurred in an area. Unfortunately, the most recent data from U.S. urbanized areas comes from only 1990. Since many claim that sprawl has escalated in the last decade, it is important to look at some measures drawn from the 1990s. For these we turn in Tables 4 and 5 to the county-based definition of a metropolitan area that the Census uses. In other studies, David Rusk (1995), Peter Gordon and Harry Richardson (1996), John Brennan and Edward Hill (1999), and Bruce Katz (2000) have also suggested that metropolitan areas are an appropriate designation to study the occurrence of

decentralization in U.S. urban areas. To calculate the information contained in Tables 4 and 5, the 1990 central place definitions given in Table 1 are still used.

Since many lament the loss of open space in metropolitan areas as a clear symptom of urban sprawl, Table 4 offers a comparable measure of farmland loss in metropolitan areas in the western United States between 1987 and 1997.

Metropolitan land devoted to farming is the only widely available measure of how much open space exists in a metropolitan area. The first two data columns of Table 4 list the fraction of total metropolitan land devoted to farming in 1987 and in 1997. The third data column offers the percentage change in this fraction between 1987 and 1997. As the first rows of Table 4 show, only metropolitan areas in New Mexico and Washington State saw average increases in the percentage of metropolitan area land devoted to farming. Washington's average increase is only due to the large percentage increase observed in one metropolitan area (Bremerton). Over this 10-year period, the average percentage of a California metropolitan area's land devoted to farming in California fell about 9.4 percent. But specific metropolitan areas varied from respective 53 and 46 percent farmland losses in Los Angeles and Orange, to respective 29 and 12 percent farmland gains in Santa Cruz and Salinas.³

insert Table 4 approximately here

³ Farmland gains should not be considered an increase in a metropolitan area's open space. They likely occur as open space is converted to farm activity.

Table 4 also continues the practice from Table 2 of looking at how central place population, relative to total area population, has changed over time. Here, the difference is that all counties in the 1990 Census defined metropolitan area account for the total urban area and data is available from 1998. As shown in the top row, in both 1990 and 1998, on average nearly the same percentages of the state of California's metropolitan populations were living in central places. While, for the states of Colorado, Oregon, Utah, and Washington, the average across all of these states' metropolitan areas indicate that relatively fewer were living in central places.

However, as with earlier tables, Table 4 also shows that averages calculated from a state's metropolitan areas hide great differences in losses in central-place populations. For California, between 1990 and 1998, the Oakland metropolitan area led in central-place population loss with nearly a 10 percent decline in the percentage of metropolitan residents living in the cities of Alameda, Oakland, or Berkeley. In fact, 13 out of California's 25 metropolitan areas exhibited a decline in central population relative to total metropolitan population. At the same time, the Chico metropolitan area experienced a 10 percent increase in its metropolitan residents living in its central place of the city of Chico.

Finally, Table 5 offers a different perspective on metropolitan decentralization in the West. It looks at what percentage of a metropolitan area's retail activity (measured in real dollar value of sales) occurred in its central

places, and how that changed between 1977, 1987, and 1997. Percentage of total metropolitan retail activity in central places is used as an inverse measure of the degree of sprawl in an urban area. Retail sales activity, and the “big-box” and “strip-mall” ways in which it generally occurs in the suburbs, represents much of what planners and the public perceive as sprawl.

insert Table 5 approximately here

On average, for all of California’s metropolitan areas, retail activity in central places over the 20-year period between 1977 and 1997 declined by 4.7 percent. Average declines for this period, calculated for all metropolitan areas in a state, were also observed for Arizona, Colorado, Utah, and Washington.

Metropolitan areas in Nevada, New Mexico, and Oregon, on average saw an increase in the percentage of retail sales occurring in central places. As with the information contained in previous tables, these statewide metropolitan averages mask broadly varying changes across western metropolitan areas. Even though the metropolitan average loss in retail activity in central places in California was negative, eight of the state’s 24 metropolitan areas exhibited a positive increase in central place retail activity. The Chico metropolitan area experienced the greatest increase in the degree of retail activity occurring at its core (57 percent), while Santa Cruz experienced the greatest decrease (-31 percent).

A Sprawl Scorecard

This section draws upon the previously described economic way of thinking about urban sprawl, and the planning and other urbanist's literature on what type of urban growth patterns are best characterized as sprawl, to offer a data table that summarizes information relevant to determining the degree of urban decentralization that has occurred in western metropolitan areas. The data in Table 6 captures the degree of dispersion, low-density development, separation from where people live, shop, and work; and loss of open space across these metropolitan areas. It should be made clear that this table is by no means a perfect measure of the degree of sprawl in a specific area. As has been done, the information is best considered in the context of comparison with the same metropolitan area over time, or similar areas in the western United States.⁴

In Table 6, three different measures of increases in urban sprawl over the last decade are brought together and listed side-by-side. For all of these measures, a negative value indicates a greater likelihood of increased sprawl throughout the 1990s than a positive value. The greater the negative magnitude, the greater this increased likelihood. All negative values have been placed in

⁴ The statistical method of regression analysis can be used to determine if the degree of suburban activity in a metropolitan area is in some measure excessive. Wassmer (2001) has done this for retail activity in metropolitan areas in the Western United States and has found that, holding other relevant causal factors constant, greater statewide reliance on local sales taxes is related to greater retail activity in suburban places, i.e. more than the population, income, demographics, and land prices justify.

bold, and the number of negative values out of three possible is listed in the final column.

insert Table 6 approximately here

By this accounting, the states of Arizona and Washington have experienced the greatest increases in urban sprawl during the 1990s. Two-thirds of Arizona's metropolitan areas are three-for-three in the chosen sprawl indicators, while five-eighths of Washington metropolitan areas exhibit the same perfect score. The two metropolitan areas in Utah, Provo-Orem and Salt Lake City-Ogden, also score high on sprawl. The only positive thing that can be said about lack of sprawl there is that Provo-Orem experienced about a 10 percent increase in central place retail sales relative to metropolitan retail sales. Only about one-third of California and Colorado's metropolitan areas are three-for-three on the sprawl indicators. Finally, none of the metropolitan areas in Nevada, New Mexico, and Oregon scored a 100 percent in the degree of sprawl indicators.

A complete comparison among all these western metropolitan areas for degree of sprawl is only possible by looking at the separate magnitudes of all three measures. Only the Yuma, Los Angeles-Long Beach, Sacramento, Oakland, San Francisco, SLO-Atsaca-Paso Robles, Salt Lake City-Ogden, Bremerton, Seattle-Bellevue-Everett, and Tacoma metropolitan areas exhibit two of three sprawl measures that are both greater than about 10 percent losses. Tacoma is the

only metropolitan area were all three measures of sprawl exhibit greater than 10 percent loss during the 1990s.

CONCLUSIONS AND POLICY OPTIONS

While economists may have the theoretical high ground, they can't always follow through and operationalize their ideas.

This quote appears in an article by Paul Gottlieb (1999, p. 54) that he titled “Do Economists Have Anything to Contribute to the Debate on Urban Sprawl? (And Would Anybody Listen to Them if They Did?).” In this article, he laments the shortage of quality work by economists on urban sprawl. As he points out, this shortage is in part due to the difficulty in measuring the metropolitan area land use patterns that urban activists have labeled as urban sprawl: decentralized, low density, non-clustered housing, leapfrog, too much strip development, and separation of uses. In this paper, the measurement of at least the degree of decentralized, low-density, and possibly leapfrog development in a metropolitan area has been “operationalized.” Over time, these measures are calculated for urbanized areas and metropolitan regions in the western United States. In doing so, the goal was to reduce the shortage of work by economists on urban sprawl.

The picture that emerged concerning the degree of urban sprawl in the western United States is somewhat mixed, but definitely points to a comparably high degree of decentralization, and continuing decentralization in some urban regions. Whatever the form of data used to identify urban sprawl, analysts can

learn from the economist's method of defining excessive suburbanization. If a type of suburbanization generates more private and social costs, than it does private and social benefits, then it is excessive. This is also a reasonable way to characterize the way that the public uses the pejorative term "sprawl" when they apply it to some new suburban developments. If policymakers know that a certain form of suburbanization fails such a benefit/cost test, they should be appropriately trying to do something to reduce it. At the same time, this does not imply that all forms of suburbanization should be slowed.

Though in reality, the exact measurement of all the costs and benefits associated with a type of suburbanization is difficult, if not impossible to attain. No matter, if policymakers keep in mind the fact that all forms of suburbanization yields benefits and costs, they can eliminate from consideration many of the purely value-laden and one-sided discussions that this issue has been relegated to for so long. Economists do have something important to contribute to the escalating debate on urban land use in U.S. metropolitan areas and policymakers can benefit from listening.

Policy Options

In the next 25 years, with the exception of Colorado, population growth in all the western states examined here will exceed the nearly 23 percent growth rate projected by the U.S. Census for the entire United States. Arizona and Washington's populations are expected to both increase by about 33 percent,

while New Mexico's rate of population over the next 25 years is expected to be just over 40 percent. The Census anticipates that California's population will grow from around 32.5 million in 2000 to about 49.5 million in 2025, or by nearly 52 percent.

The millions of additional people expected to reside in the western United States in the next 25 years will no doubt offer benefits to the states and their economies. Benefits include the creation of new jobs, new incomes, new tax revenues, and higher property values. But more people also mean that existing metropolitan areas will grow more populated.

Population growth in the West appears inevitable, but in many respects, it should not be feared. What needs to be feared is population growth that is allowed to proceed in a manner that fails to maximize the benefits to be derived from it, and fails to minimize the costs that can arise from it. Call it the opposite of smart growth, such "dumb growth" is what needs to be avoided in the fast growing American West.

Policymakers can and should advocate approaches designed to steer population growth in a manner that maximizes the benefits to be derived from it, while minimizing the costs. An issues that arises is whether there is a role for state government, or collaborations of county governments, in influencing the process of where people and businesses locate. The reason for a government role in land use decisions, beyond just local government zoning and planning, are the

external effects that are largely ignored in purely private decisions on where to locate and the usual lack of an appropriate regional level of government to deal with issues that flow over the boundaries of local levels of government.

Getting people or businesses to consider the social consequences of their location choices offers a reason for government to help steer the intra-metropolitan location decisions of individuals and firms. This economic solution by no means calls for a complete ban on where people and businesses locate, only that they take into consideration the social costs imposed upon others when choosing urban fringe locations. Since the social benefits and costs of intra-metropolitan location decisions extend beyond city and county borders, a regional strategy is the ideal.

Most western metropolitan areas, like most throughout the United States, lack a binding regional governance structure. With little prospect of such being extensively established in the near future, state government or coalitions of county governments in a region are the arenas in which a discussion can appropriately be convened to consider directing reinvestment into socially smarter locations. Perhaps the optimal role for state government would be to provide incentives for the creation of metropolitan-wide collaborative bodies (where they do not already exist) that could approach this issue with appropriate solutions tailored to region-specific needs. Though, for these collaborative bodies to be effective at reducing

excessive suburbanization, they will need the legal and institutional ability to employ both “carrots and sticks” to influence local land use decisions.

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Table 1: Metropolitan and Urbanized Area Definitions for Western United States

1990 Metropolitan Area Name	1990 Metropolitan Area Square Miles	1990 Counties in Metropolitan Area	1990 Urbanized Areas in Metropolitan Area	1990 Central Places (Cities) in Metropolitan Area
Phoenix-Mesa MSA, AZ	14,574	Maricopa AZ, Pinal AZ	Phoenix AZ	Mesa AZ, Phoenix AZ, Scottsdale AZ, Tempe AZ
Tucson MSA, AZ	9187	Pima AZ	Tucson AZ	Tucson AZ
Yuma MSA, AZ	5514	Yuma AZ	Yuma AZ	Yuma AZ
Bakersfield MSA, CA	8142	Kern CA	Bakersfield CA	Bakersfield CA
Chico-Paradise MSA, CA	1640	Butte CA	Chico CA	Chico CA
Fresno MSA, CA	8102	Fresno CA, Madera CA	Fresno CA	Fresno CA
Los Angeles-Long Beach PMSA, CA	4060	Los Angeles CA	Lancaster-Palmdale CA, Los Angeles-Long-Beach CA, Oxnard-Ventura CA	Lancaster CA, Long Beach CA, Los Angeles CA, Pasadena CA
Orange PMSA, CA	790	Orange CA	Los Angeles-Long Beach CA	Anaheim CA, Irvine CA, Santa Ana CA
Riverside-San Bernardino PMSA, CA	27,270	Riverside CA, San Bernardino CA	Henet-San Jacinto CA, Hesperito-Apple Valley-Victorville CA, Indio-Coachella CA, Los Angeles-Long Beach CA, Palm Springs CA, Riverside-San Bernardino CA	Hemet CA, Palm Dessert CA, Palm Springs CA, Riverside CA, San Bernardino CA, Temecula CA
Ventura PMSA, CA	1846	Ventura CA	Los Angeles-Long Beach CA, Oxnard-Ventura CA, Simi Valley CA	San Buenaventura (Ventura) CA
Merced MSA, CA	1929	Merced CA	Merced CA	Merced CA
Modesta MSA, CA	1495	Stanislaus CA	Modesto CA	Modesto CA, Turlock CA
Redding MSA, CA	3786	Shasta CA	Redding CA	Redding CA
Sacramento PMSA, CA	5094	El Dorado CA, Placer CA, Sacramento CA	Sacramento CA	Sacramento CA

1990 Metropolitan Area Name	1990 Metropolitan Area Square Miles	1990 Counties in Metropolitan Area	1990 Urbanized Areas in Metropolitan Area	1990 Central Places (Cities) in Metropolitan Area
Yolo PMSA, CA	1012	Yolo CA	Davis CA, Sacramento CA	Davis CA, Woodland CA
Salinas MSA, CA	3322	Monterey CA	Salinas CA, Seaside-Monterey CA, Watsonville CA	Monterey CA, Salinas CA
San Diego MSA, CA	4205	San Diego CA	San Diego CA	Coronado CA, Escondido CA, San Diego CA
Oakland PMSA, CA	1458	Alameda CA, Contra Costa CA	Antioch-Pittsburgh CA, San Francisco-Oakland CA	Alameda CA, Berkeley CA, Oakland CA
San Francisco PMSA, CA	1016	Marin CA, San Francisco CA, San Mateo CA	San Francisco-Oakland CA	San Francisco CA
San Jose PMSA, CA	1291	Santa Clara CA	San Jose CA	Gilroy CA, Palo Alto CA, San Jose CA, Santa Clara CA, Sunnyvale CA
Santa Cruz-Watsonville PMSA, CA	446	Santa Cruz CA	Santa Cruz CA	Santa Cruz CA, Watsonville CA
Santa Rosa PMSA, CA	1576	Sonoma CA	Santa Rosa CA	Petaluma CA, Santa Rosa CA
Vallejo-Fairfield-Napa PMSA, CA	1582	Napa CA, Solano CA	Fairfield CA, Napa, Vacaville CA	Fairfield CA, Napa CA, Vacaville CA, Vallejo CA
Visalia-Tulare-Porterville MSA, CA	4824	Tulare CA	Visalia CA	Porterville CA, Tulare CA
San Luis Obispo-Atascadero-Paso Robles MSA, CA	3305	San Luis Obispo CA	San Luis Obispo CA	Atascadero CA, Paso Robles CA, San Luis Obispo CA
Santa Barbara-Santa Maria-Lompoc MSA, CA	2739	Santa Barbara CA	Lompoc CA, Santa Barbara CA, Santa Maria CA	Lompoc CA, Santa Barbara CA, Santa Maria CA
Stockton-Lodi MSA, CA	1399	San Joaquin CA	Lodi CA, Stockton CA	Lodi CA, Stockton CA
Yuba City MSA, CA	1233	Sutter CA, Yuba CA	Yuba CA	Yuba CA
Boulder-Longmount PMSA, CO	743	Boulder CO	Boulder CO, Longmount CO	Boulder CO, Longmount CO
Colorado Springs MSA, CO	2127	El Paso CO	Colorado Springs, CO	Colorado Springs, CO
Denver PMSA, CO	3761	Adams CO, Arapahoe CO, Denver CO, Douglas CO, Jefferson CO	Denver CO	Denver CO

1990 Metropolitan Area Name	1990 Metropolitan Area Square Miles	1990 Counties in Metropolitan Area	1990 Urbanized Areas in Metropolitan Area	1990 Central Places (Cities) in Metropolitan Area
Fort-Collins-Loveland MSA, CO	2601	Larimer CO	Fort Collins CO	Fort Collins CO
Grand Junction MSA, CO	3328	Mesa CO	Grand Junction CO	Grand Junction CO
Greeley MSA, CO	3993	Weld CO	Greeley CO	Greeley CO
Pueblo MSA, CO	2389	Pueblo CO	Pueblo CO	Pueblo CO
Las Vegas MSA, NV & AZ	39,370	Clark NV, Mohave AZ, Nye NV	Las Vegas NV	Las Vegas NV
Reno MSA, NV	6343	Washoe NV	Reno NV	Reno NV
Albuquerque MSA, NM	5944	Bernalillo NM, Sandoval NM, Valencia NM	Albuquerque NM	Albuquerque NM
Las Cruces MSA, NM	3807	Dona Ana NM	Las Cruces NM	Las Cruces NM
Santa Fe MSA, NM	2019	Los Alamos NM, Santa Fe NM	Santa Fe NM	Santa Fe NM
Eugene-Springfield MSA, OR	4554	Lane OR	Eugene-Springfield OR	Eugene OR, Springfield OR
Medford-Ashland MSA, OR	2785	Jackson OR	Medford OR	Medford OR
Portland-Vancouver PMSA, OR	5028	Clackamas OR, Columbia OR, Multnomah OR, Washington OR, Yamhill OR, Clark WA	Portland-Vancouver OR-WA	Portland OR, Vancouver WA
Salem PMSA, OR	1926	Marion OR, Polk OR	Salem OR	Salem OR
Provo-Orem MSA, UT	1998	Utah UT	Provo-Orem UT	Provo UT, Orem UT
Salt Lake City-Ogden MSA, UT	1618	Davis UT, Salt Lake UT, Weber UT	Salt Lake City UT, Ogden UT	Salt Lake City UT, Ogden UT
Bellingham MSA, WA	2120	Whatcom WA	Bellingham WA	Bellingham WA
Bremerton PMSA, WA	396	Kitsap WA	Bremerton WA	Bremerton WA

1990 Metropolitan Area Name	1990 Metropolitan Area Square Miles	1990 Counties in Metropolitan Area	1990 Urbanized Areas in Metropolitan Area	1990 Central Places (Cities) in Metropolitan Area
Olympia PMSA, WA	727	Thurston WA	Olympia WA	Olympia WA
Richland-Kennewick-Pasco MSA, WA	2945	Benton WA, Franklin WA	Richland-Kennewick-Pasco WA	Kennewick WA, Pasco WA, Richland WA
Seattle-Bellevue-Everett PMSA, WA	4925	Island WA, King WA, Snohomish WA	Seattle WA	Auburn WA, Everett WA, Seattle WA
Spokane MSA, WA	1764	Spokane WA	Spokane WA	Spokane WA
Tacoma PMSA, WA	1678	Pierce WA	Tacoma WA	Tacoma WA
Yakima MSA, WA	4296	Yakima WA	Yakima WA	Yakima WA

Table 2: Population and Land Information for Central Places and Urbanized Areas in Western United States

1990 Urbanized Area Name	1970 Central Place Population / Urban Population	1980 Central Place Population / Urban Population	1990 Central Place Population / Urban Population	1970 Central Place Land / Urban Land	1980 Central Place Land / Urban Land	1990 Central Place Land / Urban Land
United States average for urbanized areas	0.54	0.48	0.50	0.41	0.36	0.39
Arizona average for urbanized areas	0.78	0.69	0.62	0.70	0.62	0.66
California average for urbanized areas	0.59	0.61	0.67	0.53	0.55	0.59
Colorado average for urbanized areas	0.77	0.74	0.74	0.66	0.60	0.65
Nevada average for urbanized areas	0.63	0.50	0.50	0.62	0.36	0.44
New Mexico average for urbanized areas	0.82	0.85	0.81	0.72	0.73	0.71
Oregon average for urbanized areas	0.58	0.59	0.77	0.49	0.56	0.62
Utah average for urbanized areas	0.53	0.43	0.45	0.41	0.32	0.31
Washington average for urbanized areas	0.59	0.56	0.54	0.48	0.46	0.37
Phoenix-Mesa, AZ	0.67	0.56	0.77	0.64	0.51	0.64
Tucson, AZ	0.88	0.73	0.32	0.76	0.57	0.50
Yuma, AZ	na	0.78	0.77	na	0.78	0.83
Antioch-Pittsburg, CA	0.82	0.88	0.71	0.71	0.81	0.50
Bakersfield, CA	0.39	0.47	0.58	0.45	0.47	0.63
Chico, CA	na	0.51	0.56	na	0.56	0.69
Davis, CA	na	na	0.88	na	na	0.80
Fairfield, CA	na	0.84	0.77	na	0.84	0.88
Fresno, CA	0.63	0.66	0.78	0.53	0.65	0.75
Hemet-San Jacinto, CA	na	0.41	0.58	na	0.39	0.65
Hesperito-Apple Valley-Victorville, CA	na	na	0.89	na	na	0.89
Indio-Coachella, CA	na	na	0.95	na	na	0.99
Lancaster-Palmdale, CA	na	0.85	0.88	na	0.82	0.91
Lodi, CA	na	na	0.93	na	na	0.69
Lompoc, CA	na	na	0.67	na	na	0.27
Los Angeles-Long Beach, CA	0.43	0.35	0.42	0.38	0.28	0.33
Merced, CA	na	na	0.87	na	na	0.81
Modesto, CA	0.58	0.67	0.71	0.28	0.54	0.58
Napa, CA	na	0.86	0.91	na	0.84	0.83
Oxnard-Ventura, CA	0.67	0.69	0.49	0.63	0.63	0.29
Palm Springs, CA	na	0.49	0.31	na	0.41	0.29
Redding, CA	na	0.79	0.85	na	0.64	0.83
Riverside-San Bernardino, CA	0.42	0.41	0.33	0.37	0.35	0.29
Sacramento, CA	0.40	0.35	0.38	0.37	0.35	0.38
Salinas, CA	0.94	0.97	0.89	0.89	0.88	0.54
San Diego, CA	0.58	0.50	0.52	0.56	0.44	0.46
San Francisco-Oakland, CA	0.38	0.32	0.38	0.17	0.13	0.19
San Jose, CA	0.43	0.51	0.58	0.42	0.48	0.54
San Luis Obispo, CA	na	na	0.83	na	na	0.81
Santa Barbara, CA	0.54	0.50	0.47	0.57	0.42	0.39
Santa Cruz, CA	0.43	0.34	0.32	0.35	0.16	0.13
Santa Maria, CA	na	0.69	0.69	na	0.74	0.68
Santa Rosa, CA	0.67	0.61	0.58	0.52	0.52	0.50
Seaside-Monterey, CA	0.67	0.56	0.53	0.70	0.46	0.36
Simi Valley, CA	0.99	0.97	0.78	0.93	0.96	0.70
Stockton, CA	0.67	0.76	0.80	0.64	0.67	0.71
Vacaville, CA	na	na	1.00	na	na	0.99
Visalia, AC	na	0.84	0.90	na	0.84	0.85
Watsonville, CA	na	na	0.61	na	na	0.29
Yuba City, CA	na	0.31	0.36	na	0.19	0.25
Boulder, CO	0.97	0.94	0.84	0.92	0.83	0.70
Colorado Springs, CO	0.66	0.78	0.80	0.68	0.73	0.72
Denver, CO	0.49	0.36	0.31	0.33	0.25	0.24
Fort Collins, CO	na	0.83	0.83	na	0.63	0.76
Grand Junction, CO	na	0.50	0.40	na	0.31	0.27
Greeley, CO	na	0.85	0.84	na	0.70	0.75
Longmount, CO	na	na	0.98	na	na	0.95
Pueblo, CO	0.94	0.93	0.93	0.71	0.75	0.78
Las Vegas, NV & AZ	0.53	0.38	0.37	0.43	0.30	0.27
Reno, NV	0.73	0.62	0.63	0.81	0.43	0.62
Albuquerque, NM	0.82	0.79	0.77	0.72	0.56	0.59
Las Cruces, NM	na	0.82	0.76	na	0.71	0.66
Santa Fe, NM	na	0.94	0.89	na	0.91	0.90
Eugene-Springfield, OR	0.55	0.58	0.83	0.47	0.53	0.79
Medford, OR	na	0.75	0.70	na	0.71	0.62
Portland-Vancouver, OR & WA	0.46	0.36	0.86	0.33	0.30	0.36
Salem, OR	0.73	0.66	0.69	0.67	0.71	0.73
Logan, UT	na	na	0.65	na	na	0.46
Ogden, UT	0.46	0.31	0.25	0.34	0.20	0.17
Provo-Orem, UT	0.76	0.74	0.70	0.56	0.50	0.44
Salt Lake City, UT	0.37	0.24	0.20	0.32	0.25	0.15
Bellingham, WA	na	0.90	0.88	na	0.88	0.73
Bremerton, WA	na	0.56	0.34	na	0.54	0.15
Longview, WA & OR	na	0.56	0.55	na	0.36	0.34
Olympia, WA	na	0.40	0.35	na	0.40	0.29
Richland-Kennewick-Pasco, WA	0.58	0.61	0.81	0.57	0.51	0.53
Seattle, WA	0.47	0.39	0.36	0.27	0.35	0.23
Spokane, WA	0.74	0.64	0.64	0.65	0.49	0.49
Tacoma, WA	0.46	0.39	0.36	0.37	0.26	0.21
Yakima, WA	0.70	0.61	0.62	0.51	0.36	0.40

Table 3: 1980 to 1990 Change in Urbanized Area Population, Urban Fringe Land Area, and a Sprawl Index for Western United States

1990	1980 to 1990	1980 to 1990	1980 to 1990
Urbanized Area	% Change in	% Change in	Measure of
Name	Urban Population	Urban Fringe Land	Sprawl Index
United States average for urbanized areas	13.7	12.5	0.91
Arizona average for urbanized areas	33.63	13.25	0.52
California average for urbanized areas	47.04	103.44	2.01
Colorado average for urbanized areas	19.30	36.88	2.17
Nevada average for urbanized areas	46.40	8.58	0.04
New Mexico average for urbanized areas	29.30	59.57	1.84
Oregon average for urbanized areas	15.31	3.14	-2.91
Utah average for urbanized areas	24.34	19.87	0.65
Washington average for urbanized areas	22.21	61.40	3.59
Phoenix-Mesa, AZ	42.4	-15.1	-0.36
Tucson, AZ	28.7	66.9	2.33
Yuma, AZ	29.8	-12.0	-0.40
Antioch-Pittsburg, CA	77.9	520.0	6.68
Bakersfield, CA	36.2	0.8	0.02
Chico, CA	38.4	-8.2	-0.21
Davis, CA	na	na	na
Fairfield, CA	44.3	-4.0	-0.09
Fresno, CA	36.7	-6.7	-0.18
Hemet-San Jacinto, Ca	64.2	-9.4	-0.15
Hesperito-Apple Valley-Victorville, CA	na	na	na
Indio-Coachella, CA	na	na	na
Lancaster-Palmdale, CA	232.3	-10.0	-0.04
Lodi, CA	na	na	na
Lompoc, CA	na	na	na
Los Angeles-Long Beach, CA	20.3	-0.1	0.00
Merced, CA	na	na	na
Modesto, CA	44.5	4.3	0.10
Napa, CA	14.8	20.0	1.35
Oxnard-Ventura, CA	27.2	120.0	4.41
Palm Springs, CA	94.2	73.0	0.77
Redding, CA	48.2	-35.6	-0.74
Riverside-San Bernardino, CA	65.9	39.9	0.60
Sacramento, CA	37.8	14.1	0.37
Salinas, CA	48.0	705.0	14.70
San Diego, CA	37.8	8.5	0.23
San Francisco-Oakland, CA	13.8	2.2	0.16
San Jose, CA	15.4	-8.2	-0.53
San Luis Obispo, CA	na	na	na
Santa Barbara, CA	21.3	15.0	0.70
Santa Cruz, CA	23.6	37.7	1.60
Santa Maria, CA	55.5	35.0	0.63
Santa Rosa, CA	42.0	34.0	0.81
Seaside-Monterey, CA	15.4	51.5	3.34
Simi Valley, CA	60.2	1290.0	21.42
Stockton, CA	33.0	6.0	0.18
Vacaville, CA	na	na	na
Visalia, CA	41.8	2.5	0.06
Watsonville, CA	na	na	na
Yuba City, CA	26.3	-1.0	-0.04
Boulder, CO	21.8	140.0	6.44
Colorado Springs, CO	27.5	24.9	0.90
Denver, CO	12.3	6.0	0.49
Fort Collins, CO	35.2	0.8	0.02
Grand Junction, CO	26.5	83.2	3.14
Greeley, CO	14.9	13.3	0.89
Longmont, CO	na	na	na
Pueblo, CO	-3.0	-10.0	3.33
Las Vegas, NV & AZ	61.1	30.1	0.49
Reno, NV	31.7	-12.9	-0.41
Albuquerque, NM	18.9	23.2	1.23
Las Cruces, NM	47.9	115.6	2.41
Santa Fe, NM	21.1	40.0	1.90
Eugene-Springfield, OR	3.7	-51.7	-14.09
Medford, OR	27.6	60.0	2.17
Portland-Vancouver, OR & WA	14.2	1.6	0.11
Salem, OR	15.7	2.7	0.17
Logan, UT	na	na	na
Ogden, UT	26.0	21.9	0.84
Provo-Orem, UT	30.0	43.3	1.45
Salt Lake City, UT	17.1	-5.7	-0.33
Bellingham, WA	16.3	166.7	10.26
Bremerton, WA	75.1	194.4	2.59
Longview, WA & OR	3.7	12.4	3.33
Olympia, WA	39.1	57.2	1.46
Richland-Kennewick-Pasco, WA	3.5	34.1	9.70
Seattle, WA	25.3	43.3	1.71
Spokane, WA	4.6	4.9	1.06
Tacoma, WA	23.7	32.9	1.39
Yakima, WA	8.6	6.7	0.78

Table 4: Farm Activity and Distribution of Population Changes for Metropolitan Areas in Western United States

1990 Metropolitan Area Name	1987 Farm Land / Metropolitan Land	1997 Farm Land / Metropolitan Land	1987 to 1997 % Change in Farm Land / Metropolitan Land	1990 Central Place Population / Metropolitan Pop	1998 Central Place Population / Metropolitan Pop	1990 to 1998 % Change in Central Place Pop / Metro Pop
Arizona average for MSAs	0.327	0.260	-20.49	0.604	0.615	1.64
California average for (P)MSAs	0.470	0.443	-9.41	0.402	0.402	0.21
Colorado average for (P)MSAs	0.417	0.389	-4.97	0.520	0.515	-0.47
Nevada average for MSAs	0.155	0.118	-31.58	0.414	0.413	0.04
New Mexico average for MSAs	0.343	0.390	12.13	0.531	0.516	-2.55
Oregon average for (P)MSAs	0.218	0.203	-10.52	0.396	0.400	0.96
Utah average for MSAs	0.395	0.274	-30.57	0.407	0.387	-5.85
Washington average for (P)MSAs	0.273	0.265	4.46	0.358	0.340	-6.12
Phoenix-Mesa MSA, AZ	0.359	0.216	-39.94	0.689	0.655	-4.94
Tucson MSA, AZ	0.543	0.496	-8.80	0.608	0.717	18.00
Yuma MSA, AZ	0.077	0.067	-12.72	0.514	0.472	-8.13
Bakersfield MSA, CA	0.583	0.547	-6.11	0.322	0.333	3.53
Chico-Paradise MSA, CA	0.471	0.385	-18.27	0.220	0.241	9.55
Fresno MSA, CA	0.527	0.487	-7.67	0.469	0.457	-2.43
LA-Long Beach PMSA, CA	0.108	0.050	-53.30	0.468	0.465	-0.60
Orange PMSA, CA	0.215	0.115	-46.63	0.278	0.271	-2.57
Riverside-San Bernardino PMSA, CA	0.125	0.082	-34.07	0.200	0.199	-0.53
Ventura PMSA, CA	0.278	0.293	5.26	0.138	0.134	-2.88
Merced MSA, CA	0.850	0.714	-15.97	0.315	0.300	-4.70
Modesta MSA, CA	0.753	0.766	1.79	0.558	0.543	-2.86
Redding MSA, CA	0.156	0.131	-16.06	0.452	0.474	4.92
Sacramento PMSA, CA	0.217	0.169	-22.33	0.276	0.264	-4.29
Yolo PMSA, CA	0.780	0.828	6.13	0.610	0.637	4.50
Salinas MSA, CA	0.651	0.726	11.51	0.396	0.417	5.50
San Diego MSA, CA	0.197	0.176	-10.39	0.499	0.492	-1.40
Oakland PMSA, CA	0.473	0.435	-8.06	0.265	0.238	-9.96
San Francisco PMSA, CA	0.356	0.299	-15.94	0.451	0.443	-1.86
San Jose PMSA, CA	0.421	0.386	-8.30	0.721	0.723	0.15
Santa Cruz-Watsonville PMSA, CA	0.194	0.249	28.82	0.349	0.355	1.70
Santa Rosa PMSA, CA	0.545	0.566	3.87	0.403	0.410	1.79
Vallejo-Fairfield-Napa PMSA, CA	0.572	0.567	-0.86	0.550	0.539	-1.96
Visalia-Tulare-Porterville MSA, CA	0.457	0.424	-7.14	0.444	0.467	5.18
SLO-Atasc-Paso Robles MSA, CA	0.683	0.616	-9.87	0.385	0.376	-2.31
San Barb-Santa Maria-Lom MSA, CA	0.496	0.466	-6.08	0.499	0.503	0.77
Stockton-Lodi MSA, CA	0.920	0.903	-1.81	0.547	0.538	-1.55
Yuba City MSA, CA	0.733	0.705	-3.79	0.224	0.241	7.62
Boulder-Longmount PMSA, CO	0.327	0.270	-17.58	0.599	0.571	-4.59
Colorado Springs MSA, CO	0.674	0.637	-5.54	0.708	0.704	-0.65
Denver PMSA, CO	0.545	0.544	-0.21	0.288	0.257	-10.65
Fort Collins-Loveland MSA, CO	0.345	0.326	-5.66	0.471	0.471	-0.10
Grand Junction MSA, CO	0.205	0.196	-4.63	0.312	0.366	17.27
Greeley MSA, CO	0.824	0.749	-9.10	0.459	0.442	-3.80
Pueblo MSA, CO	0.000	0.000	7.97	0.802	0.796	-0.75
Las Vegas NV & AZ, MSA	0.093	0.046	-50.81	0.303	0.306	1.00
Reno NV, MSA	0.217	0.190	-12.34	0.526	0.521	-0.92
Albuquerque MSA, NM	0.400	0.428	6.96	0.658	0.618	-6.12
Las Cruces MSA, NM	0.235	0.239	1.52	0.458	0.450	-1.87
Santa Fe MSA, NM	0.395	0.505	27.91	0.477	0.479	0.35
Eugene-Springfield MSA, OR	0.095	0.077	-19.11	0.556	0.570	2.43
Medford-Ashland MSA, OR	0.167	0.138	-17.55	0.321	0.330	2.94
Portland-Vancouver PMSA, OR	0.217	0.208	-4.30	0.319	0.317	-0.54
Salem PMSA, OR	0.392	0.387	-1.12	0.388	0.384	-1.00
Provo-Orem MSA, UT	0.386	0.293	-24.09	0.586	0.564	-3.68
Salt Lake City-Ogden MSA, UT	0.404	0.254	-37.06	0.229	0.210	-8.03
Bellingham MSA, WA	0.092	0.076	-16.90	0.408	0.395	-3.35
Bremerton PMSA, WA	0.038	0.075	99.76	0.201	0.170	-15.45
Olympia PMSA, WA	0.122	0.121	-0.88	0.210	0.194	-7.68
Richland-Kennewick-Pasco MSA, WA	0.692	0.624	-9.89	0.632	0.629	-0.42
Seattle-Bellevue-Everett PMSA, WA	0.055	0.042	-23.60	0.331	0.315	-4.71
Spokane MSA, WA	0.543	0.523	-3.79	0.490	0.450	-8.15
Tacoma PMSA, WA	0.055	0.047	-13.42	0.301	0.266	-11.80
Yakima MSA, WA	0.586	0.612	4.38	0.290	0.298	2.61

Table 5: Distribution of Retail Sales Changes for Metropolitan Areas in Western United States

1990	1977 Central	1987 Central	1997 Central	1977 to 1987 %	1987 to 1997 %	1977 to 1997 %
Metropolitan Area	Place / Metro	Place / Metro	Place / Metro	Change in Central	Change in Central	Change in Central
Name	Retail Sales	Retail Sales	Retail Sales	Place / Metro Sales	Place / Metro Sales	Place / Metro Sales
Arizona average for MSAs	0.810	0.820	0.740	1.364	-9.754	-8.671
California average for (P)MSAs	0.539	0.539	0.523	-0.580	-3.515	-4.733
Colorado average for (P)MSAs	0.743	0.742	0.718	-1.303	-4.127	-5.380
Nevada average for MSAs	0.577	0.561	0.594	-2.844	7.178	4.136
New Mexico average for MSAs	0.860	0.877	0.883	1.947	0.772	2.687
Oregon average for (P)MSAs	0.588	0.578	0.603	-2.813	6.572	2.182
Utah average for MSAs	0.597	0.530	0.508	-11.063	-8.668	-18.927
Washington average for (P)MSAs	0.594	0.580	0.537	-3.209	-9.573	-10.989
Phoenix-Mesa MSA, AZ	0.798	0.810	0.762	1.48	-5.94	-4.55
Tucson MSA, AZ	0.840	0.823	0.784	-1.97	-4.81	-6.69
Yuma MSA, AZ	0.791	0.827	0.674	4.59	-18.51	-14.77
Bakersfield MSA, CA	0.555	0.569	0.564	2.44	-0.83	1.59
Chico-Paradise MSA, CA	0.419	0.445	0.657	6.17	47.87	56.99
Fresno MSA, CA	0.583	0.636	0.588	9.11	-7.57	0.86
LA-Long Beach PMSA, CA	0.476	0.443	0.390	-7.06	-11.81	-18.03
Orange PMSA, CA	0.243	0.227	0.246	-6.73	8.66	1.34
Riverside-San Bernardino PMSA, CA	0.402	0.309	0.298	-23.16	-3.56	-25.90
Ventura PMSA, CA	0.240	0.239	0.193	-0.45	-19.19	-19.56
Merced MSA, CA	0.590	0.617	0.612	4.68	-0.85	3.80
Modesta MSA, CA	0.750	0.750	0.645	0.04	-13.93	-13.89
Redding MSA, CA	0.728	0.773	0.833	6.18	7.75	14.41
Sacramento PMSA, CA	0.306	0.278	0.232	-9.18	-16.61	-24.26
Yolo PMSA, CA	0.720	0.752	0.712	4.40	-5.32	-1.15
Salinas MSA, CA	0.606	0.605	0.564	-0.17	-6.65	-6.81
San Diego MSA, CA	0.550	0.523	0.533	-4.92	1.99	-3.03
Oakland PMSA, CA	0.280	0.252	0.192	-10.01	-23.92	-31.53
San Francisco PMSA, CA	0.468	0.445	0.402	-4.78	-9.71	-14.03
San Jose PMSA, CA	0.674	0.701	0.739	3.99	5.39	9.60
Santa Cruz-Watsonville PMSA, CA	0.645	0.548	0.447	-15.04	-18.40	-30.67
Santa Rosa PMSA, CA	0.554	0.688	0.660	24.16	-4.07	19.11
Vallejo-Fairfield-Napa PMSA, CA	0.867	0.807	0.824	-6.88	2.06	-4.96
Visalia-Tulare-Porterville MSA, CA	0.309	0.311	0.307	0.60	-1.29	-0.70
SLO-Atasc-Paso Robles MSA, CA	0.564	0.647	0.467	14.72	-27.77	-17.14
San Barb-Santa Maria-Lom MSA, CA	0.737	0.677	0.715	-8.13	5.64	-2.95
Stockton-Lodi MSA, CA	0.670	0.711	0.625	6.07	-12.03	-6.69
Yuba City MSA, CA	na	0.534	0.621	na	16.26	na
Boulder-Longmount PMSA, CO	0.775	0.789	0.796	1.77	0.97	2.76
Colorado Springs MSA, CO	0.903	0.920	0.931	1.84	1.23	3.09
Denver PMSA, CO	0.368	0.289	0.265	-21.32	-8.48	-27.99
Fort Collins-Loveland MSA, CO	0.599	0.639	0.589	6.80	-7.90	-1.63
Grand Junction MSA, CO	0.895	0.844	0.838	-5.75	-0.71	-6.42
Greeley MSA, CO	0.729	0.778	0.662	6.79	-14.93	-9.15
Pueblo MSA, CO	0.931	0.937	0.946	0.75	0.93	1.69
Las Vegas MSA, NV & AZ	0.393	0.383	0.424	-2.65	10.90	7.96
Reno MSA, NV	0.762	0.739	0.764	-3.04	3.45	0.31
Albuquerque MSA, NM	0.846	0.883	0.832	4.38	-5.79	-1.67
Las Cruces MSA, NM	0.902	0.896	0.902	-0.74	0.73	-0.02
Santa Fe MSA, NM	0.833	0.851	0.914	2.20	7.38	9.75
Eugene-Springfield MSA, OR	0.638	0.788	0.765	23.52	-2.92	19.91
Medford-Ashland MSA, OR	0.692	0.562	0.630	-18.84	12.13	-8.99
Portland-Vancouver PMSA, OR	0.407	0.330	0.388	-18.89	17.58	-4.63
Salem PMSA, OR	0.614	0.632	0.629	2.95	-0.50	2.43
Provo-Orem MSA, UT	0.751	0.662	0.727	-11.90	9.87	-3.20
Salt Lake City-Ogden MSA, UT	0.443	0.397	0.289	-10.23	-27.21	-34.65
Bellingham MSA, WA	0.691	0.675	0.673	-2.37	-0.16	-2.53
Bremerton PMSA, WA	0.600	0.403	0.269	-32.80	-33.18	-55.09
Olympia PMSA, WA	0.550	0.593	0.528	7.95	-11.06	-3.99
Richland-Kennewick-Pasco MSA, WA	0.656	0.861	0.903	31.14	4.94	37.62
Seattle-Beelevue-Everett PMSA, WA	0.459	0.374	0.337	-18.51	-9.95	-26.62
Spokane MSA, WA	0.661	0.674	0.580	1.90	-13.99	-12.35
Tacoma PMSA, WA	0.510	0.465	0.399	-8.89	-14.18	-21.81
Yakima MSA, WA	0.625	0.599	0.605	-4.09	0.99	-3.15

Table 6: Sprawl Scorecard for Western Metropolitan Areas in the 1990s

1990	1987 to 1997 %	1990 to 1998 %	1987 to 1997 %	Degree of
Metropolitan Area	Change in Farm Land	Change in Central	Change in Central	Sprawl
Name	/Metropolitan Land	Place Pop / Metro Pop	Place / Metro Sales	Indicators
Phoenix-Mesa MSA, AZ	-39.94	-4.94	-5.94	3/3
Tucson MSA, AZ	-8.80	18.00	-4.81	2/3
Yuma MSA, AZ	-12.72	-8.13	-18.51	3/3
Bakersfield MSA, CA	-6.11	3.53	-0.83	2/3
Chico-Paradise MSA, CA	-18.27	9.55	47.87	1/3
Fresno MSA, CA	-7.67	-2.43	-7.57	3/3
LA-Long Beach PMSA, CA	-53.30	-0.60	-11.81	3/3
Orange PMSA, CA	-46.63	-2.57	8.66	2/3
Riverside-San Bernardino PMSA, CA	-34.07	-0.53	-3.56	3/3
Ventura PMSA, CA	5.26	-2.88	-19.19	2/3
Merced MSA, CA	-15.97	-4.70	-0.85	3/3
Modesta MSA, CA	1.79	-2.86	-13.93	2/3
Redding MSA, CA	-16.06	4.92	7.75	1/3
Sacramento PMSA, CA	-22.33	-4.29	-16.61	3/3
Yolo PMSA, CA	6.13	4.50	-5.32	1/3
Salinas MSA, CA	11.51	5.50	-6.65	1/3
San Diego MSA, CA	-10.39	-1.40	1.99	2/3
Oakland PMSA, CA	-8.06	-9.96	-23.92	3/3
San Francisco PMSA, CA	-15.94	-1.86	-9.71	3/3
San Jose PMSA, CA	-8.30	0.15	5.39	1/3
Santa Cruz-Watsonville PMSA, CA	28.82	1.70	-18.40	1/3
Santa Rosa PMSA, CA	3.87	1.79	-4.07	1/3
Vallejo-Fairfield-Napa PMSA, CA	-0.86	-1.96	2.06	2/3
Visalia-Tulare-Porterville MSA, CA	-7.14	5.18	-1.29	2/3
SLD-Atasc-Paso Robles MSA, CA	-9.87	-2.31	-27.77	3/3
San Barb-Santa Maria-Lom MSA, CA	-6.08	0.77	5.64	1/3
Stockton-Lodi MSA, CA	-1.81	-1.55	-12.03	3/3
Yuba City MSA, CA	-3.79	7.62	16.26	1/3
Boulder-Longmount PMSA, CO	-17.58	-4.59	0.97	2/3
Colorado Springs MSA, CO	-5.54	-0.65	1.23	2/3
Denver PMSA, CO	-0.21	-10.65	-8.48	3/3
Fort Collins-Loveland MSA, CO	-5.66	-0.10	-7.90	3/3
Grand Junction MSA, CO	-4.63	17.27	-0.71	2/3
Greeley MSA, CO	-9.10	-3.80	-14.93	3/3
Pueblo MSA, CO	7.97	-0.75	0.93	1/3
Las Vegas MSA, NV & AZ	-50.81	1.00	10.90	1/3
Reno MSA, NV	-12.34	-0.92	3.45	2/3
Albuquerque MSA, NM	6.96	-6.12	-5.79	2/3
Las Cruces MSA, NM	1.52	-1.87	0.73	1/3
Santa Fe MSA, NM	27.91	0.35	7.38	0/3
Eugene-Springfield MSA, OR	-19.11	2.43	-2.92	2/3
Medford-Ashland MSA, OR	-17.55	2.94	12.13	1/3
Portland-Vancouver PMSA, OR	-4.30	-0.54	17.58	2/3
Salem PMSA, OR	-1.12	-1.00	-0.50	1/3
Provo-Orem MSA, UT	-24.09	-3.68	9.87	2/3
Salt Lake City-Ogden MSA, UT	-37.06	-8.03	-27.21	3/3
Bellingham MSA, WA	-16.90	-3.35	-0.16	3/3
Bremerton PMSA, WA	99.76	-15.45	-33.18	2/3
Olympia PMSA, WA	-0.88	-7.68	-11.06	3/3
Richland-Kennewick-Pasco MSA, WA	-9.89	-0.42	4.94	2/3
Seattle-Beelevue-Everett PMSA, WA	-23.60	-4.71	-9.95	3/3
Spokane MSA, WA	-3.79	-8.15	-13.99	3/3
Tacoma PMSA, WA	-13.42	-11.80	-14.18	3/3
Yakima MSA, WA	4.38	2.61	0.99	0/3